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The evolving design of online health websites: an interpretive study of different users' activities

Sumayya Banna
University of Wollongong
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THE EVOLVING DESIGN OF ONLINE HEALTH WEBSITES:
AN INTERPRETIVE STUDY OF DIFFERENT USERS’
ACTIVITIES

A thesis submitted in fulfilment of the requirements for the award of the Degree

DOCTOR OF PHILOSOPHY

From

UNIVERSITY OF WOLLONGONG

By

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INFORMATION SYSTEM
FACULTY OF COMMERCE

2011
CERTIFICATION

I, Sumayya Banna, declare that this thesis submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in Information Systems, School of Economics, Faculty of Commerce, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Sumayya Banna
2nd August, 2011
This thesis reports the findings of a study concerning the complex dynamic phenomenon of online health. Online health has the potential to greatly improve health outcomes, because the Internet develops an increasing capability to support richer interactions between health professionals and the public. However, this potential has yet to be fully realised. Therefore, the aim of this study is to provide a greater understanding of this phenomenon.

The research adopts an interpretivist perspective, which brings together a suitable mix of methodologies and theoretical concepts. This study applies an innovative, mixed methods approach, namely usability testing, Q Methodology, content analysis, and, Activity Theory. The main focus of this study is on the perceptions of diverse users of online health websites, as well as the interactive features of the medium that could meet the needs of these diverse users. As a result, the research has significant contributions to theory and also lessons for practice.

The research was conducted in four phases of data collections, as follows: Phase 1 consisted of usability testing of a respected palliative care website to assess the needs of various users and to suggest areas for improvement; Phase 2 was the first stage of a Q study with thirty seven (37) participants which revealed public users’ varying attitudes toward online palliative care in the context of the Australian healthcare environment; Phase 3 was a content analysis of health and palliative care websites to explore their interactive features and various designs of online health systems worldwide, with a particular focus on online palliative care websites; Phase 4 the second stage of the Q study with seventy (70) participants which revealed a greater diversity of users’ perceptions toward online health websites, including palliative care clinicians.

The results of the research are significant for both academics and practitioners. From a scholarly perspective, this study is important theoretically and methodologically. It demonstrates how the application of dimensions of the interactivity concept can
underpin the content and design aspects of online health. Activity theory was found to be useful as a powerful, descriptive tool that provides a holistic explanation of people’s views and motives when engaged in different activities in relation to accessing online health websites. By applying a mixed methods approach of data analysis involving usability testing, content analysis and the techniques of Q Methodology, this research covered both objective and subjective aspects of the online health context. Although Q Methodology is a relatively new method applied in the online health literature, Q Methodology was found to be a valuable method for categorizing people’s differing perceptions of online health websites. The combination of Activity Theory and Q Methodology provided appropriate techniques for conducting the research and then interpreting its results in an integrated holistic manner. The research findings contribution to an overall understanding of users’ perceived needs from online health websites, the importance of designing websites to meet varying needs and the need to anticipate how these needs may change in the future as technologies evolve.
PUBLICATIONS FROM THE RESEARCH

The following papers and publications have been produced from the research reported in this thesis:

1. Banna S., Hasan H., and Dawson P. “Understanding the diversity of user requirements for interactive online health service”, submitted to Int. J. Human-Computer Studies.


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I would also like to express my special thanks to Dr Joseph Meloche for his continued support, guidance and kind assistance in general. His profound knowledge and experience of the research methodology and insights enabled me to make significant progress.

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A very special thank you goes to my loved and highly respected husband Mr. Mohammad Al Mutairi for his support throughout my study and taking care of our one and half year old gorgeous lovely daughter Jana. Finally, I would like to dedicate this dissertation to my beloved and unforgettable dearest deceased parents, Mr. Abdul Rahman and Mrs. Fawzieh Essa who had also inspired me to further education to the highest level and constantly challenge myself. My dedication also goes to my beloved brother (deceased) Noor-Eddin, and my beloved Uncle (deceased) Mohammad Essa for their incessant love and support. Thank you all!
# TABLE OF CONTENTS

Certification ................................................................................................................. ii  
ABSTRACT ................................................................................................................ iii  
Publications from the research ..................................................................................... v  
LIST OF FIGURES .................................................................................................. xiv  
LIST OF TABLES ................................................................................................... xvii  
LIST OF Abbreviations ............................................................................................ xix  

Chapter 1 ...................................................................................................................... 1  
1.1 Introduction .................................................................................................. 1  
1.2 Background to the Research ........................................................................ 2  
1.3 Explanation and Justification of the Research Approach ............................ 3  
1.4 Significance of the Research ........................................................................ 6  
1.5 Objectives of the Research ........................................................................... 8  
1.6 Research Questions ...................................................................................... 9  
1.7 Structure of the Thesis ............................................................................... 10  
1.8 Chapter Summary ...................................................................................... 12  

Chapter 2 .................................................................................................................... 13  
2.1 Introduction ................................................................................................ 13  
2.2 An Overview of Contemporary Health Systems ....................................... 14  
2.3 An Overview of Online health ................................................................... 16  
2.4 The Needs of Health Consumers ............................................................... 21  
2.4.1 The Primary Source of Information ........................................................... 25  
2.4.2 Perceptions towards Physician-Patient Communication ......................... 26  
2.5 Perceptions towards Online Health Information Technology ..................... 28  
2.6 Assessments of Healthcare Websites ............................................................. 30  
2.7 Interaction Design ...................................................................................... 35  
2.8 Human-Computer Interaction (HCI) ............................................................. 39  
2.9 The Concept of Usability ........................................................................... 42  
2.9.1 Website, Website Usability, Website Design ............................................ 44  
2.10 The Concept of Interactivity ..................................................................... 46  
2.10.1 Defining the Interactivity Concept as a Continuum ......................... 52
2.10.2 Interactive Features ................................................................................ 56
2.11 Chapter Summary ....................................................................................... 56

chapter 3 ..................................................................................................................... 58

RESEARCH DESIGN, METHODOLOGY & THEORETICAL BASIS .............. 58
3.1 Introduction ................................................................................................ 58
3.2 Research Approach ..................................................................................... 59
3.2.1 Qualitative versus Quantitative Research Approach ......................... 59
3.2.2 The Selection Qualitative Research Approach for This Study ....... 60
3.2.3 Inductive versus Deductive Research Approach ............................... 61
3.3 Theoretical Paradigm Approach .................................................................. 62
3.3.1 Epistemology .......................................................................................... 63
3.3.1.1 Constructionism ............................................................................... 65
3.3.2 Theoretical Perspective ........................................................................ 66
3.3.2.1 Interpretivism .................................................................................. 66
3.3.3 Methodology ........................................................................................... 67
3.3.3.1 Case Study ..................................................................................... 68
3.3.4 Methods ................................................................................................... 68
3.3.4.1 Qualitative Data Analysis Methods .............................................. 69
3.4 Research Design for This Study ................................................................. 70
3.5 Activity Theory: Background, Development, and Principles ............... 73
3.5.1 Activity Theory: The Historical Perspective ....................................... 73
3.5.2 The Evolution of Activity Theory .......................................................... 73
3.5.2.1 The First Generation Activity Theory .......................................... 74
3.5.2.2 The Second Generation Activity Theory ...................................... 75
3.5.2.3 The Third Generation Activity Theory ........................................ 78
3.5.3 The Lessons from the Use of Activity Theory in previous Research ...... 81
3.5.4 Principles of Activity Theory ................................................................. 83
3.5.4.1 Principle 1: Activity as the basic Unit of Analysis ......................... 83
3.5.4.2 Principle 2: Object-Orientation ....................................................... 84
3.5.4.3 Principle 3: Tool Mediation ............................................................ 85
3.5.4.4 Principle 4: History and Development ........................................ 86
3.5.4.5 Principle 5: Internalization/Externalization ................................. 87
3.5.4.6 Principle 6: Zone of Proximal Development ................................ 90
5.4.1 Content Availability and Choice .............................................................. 170
5.4.2 Effort of Users .......................................................................................... 172
5.4.3 Responsiveness ........................................................................................ 174
5.4.4 Monitoring Information/System Use: Customization and Management of Information ........................................................................................................... 176
5.4.5 Ease of Adding Information ..................................................................... 178
5.4.6 Facilitation of Interpersonal Communication .......................................... 178
5.4.7 Other/Unexpected Interactive Options ..................................................... 180
5.4.8 Interactivity Continuum Spectrum ........................................................... 182
5.5 Phase 4: The Final Stage of Q Study Results ........................................... 187
5.5.1 The Factor Correlation ............................................................................. 188
5.5.2 The 3 Factor Solution Data ...................................................................... 189
5.5.3 Normalized Factor Scores ........................................................................ 191
5.5.4 Factor 1: Service-Oriented Users ............................................................. 191
5.5.5 Factor 2: Interactive Users ....................................................................... 195
5.5.6 Factor 3: Health Information Seekers ...................................................... 198
5.6 Chapter Summary .................................................................................... 201
Chapter 6 .................................................................................................................. 203
Interpretation of the Results ..................................................................................... 203
6.1 Introduction .............................................................................................. 203
6.2 Interpretation of Phase 1 Results ............................................................. 204
6.3 Interpretation of Phase 2 Results ............................................................. 204
6.4 Interpretation of Phase 3 Results ............................................................. 209
6.5 The Link between Phase 2 and Phase 3 .................................................... 211
6.6 Interpretation of Phase 4 Results ............................................................. 216
6.7 The Link between Phase 3 and Phase 4 .................................................... 226
6.8 Chapter Summary .................................................................................... 231
Chapter 7 .................................................................................................................. 232
Theoretical Interpretation of this Research .............................................................. 232
7.1 Introduction .............................................................................................. 232
7.2 Activity Theory: Application ..................................................................... 232
7.2.1 Systems with Activity as the Unit of Analysis ....................................... 232
7.2.2 Developing the Research Activity for my study .................................. 234
LIST OF FIGURES

CHAPTER 1
Figure 1.1: Organisation of this Thesis ........................................................................... 10

CHAPTER 2
Figure 2.1: Health Consumers in the Healthcare Environment (Hesse and Shneiderman 2007) ........................................................................................................... 22
Figure 2.2: Thesis’ Epistemology, Theoretical Perspective, Methodology and Methods (Crotty 1998) .......................................................................................... 63

CHAPTER 3
Figure 3.1: Thesis’ Epistemology, Theoretical Perspective, Methodology and Methods (Crotty 1998) ........................................................................................................... 63
Figure 3.2: The Model of the Qualitative Research Process Used in My Research, adopted from Miles & Huberman (1994) ....................................................................... 70
Figure 3.3: The Vygotskian Triad of Mediated Action ....................................................... 75
Figure 3.4: Leontiev’s Three-Level Model of Activity ...................................................... 76
Figure 3.5: The Structure of Engeström’s Collective Human Activity System (Engeström 1999) .................................................................................................................. 77
Figure 3.6: Central Activity and Interconnected Activities, Engestrom (1999) ...... 79
Figure 3.7: Two Interacting Activity Systems as an Alternative Model for the Third Generation of Activity Theory. One Example of this is the Interaction between the Activities of Design and use of Information Systems ...................................... 80
Figure 3.8: The Computer Tools as an Extension of the Internal Plane of Action (IPA) (Kaptelinin 1996, p. 52) ...................................................................................... 89
Figure 3.9: The Expansive Learning Cycle (Engeström 1999b) ...................................... 92

CHAPTER 4
Figure 4.1: Usability Evaluation Methods (Hartson, Andre & Williges 2001) ...... 100
Figure 4.2: User Action Framework (Andre et al. 2001) .............................................. 101
Figure 4.3: ATUL Layout (Vrazalic & Hasan 2001) ..................................................... 102
Figure 4.4: Number of detected Usability Problems by Number of Tested Subjects ................................................................................................................................. 104
Figure 4.5: An Example of the Zing Technology ........................................................... 115
Figure 4.6: Q Sort Grid for Ranking of the Statements .................................................. 116
Figure 4. 7: Interactive Model by Miles and Huberman (1994) ......................... 120
Figure 4. 8: an Example of a Completed Online Q Sort using Q Flash ............. 121
Figure 4. 9: The International Directory of Hospice and Palliative Care Websites. 132
Figure 4. 10: The International Directory of the Top 20 Most Popular Websites ... 133

CHAPTER 5

Figure 5. 1: Content Availability and Choice of Worldwide Online Palliative Care
Websites ................................................................................................................... 171
Figure 5. 2: Content Availability and Choice of Worldwide Health Websites ...... 172
Figure 5. 3: Effort Users must exert on Links of Palliative Care websites .......... 173
Figure 5. 4: Effort Users must exert on Links of Online Health websites .......... 174
Figure 5. 5: Responsiveness of Palliative Care Websites .................................... 175
Figure 5. 6: Responsiveness of Health Websites ............................................... 176
Figure 5. 7: Management of Information for worldwide Palliative Care websites . 177
Figure 5. 8: Management of Information for worldwide Health websites .......... 178
Figure 5. 9: Communication Tools for Worldwide Health Websites ................. 179

CHAPTER 7

Figure 7. 1: The Vygotskian Triad of Mediated Action ....................................... 75
Figure 7. 2: Leontiev’s Three-Level Model of Activity ....................................... 76
Figure 7. 3: The Structure of Engeström’s Collective Human Activity System
(Engeström 1999) ................................................................................................. 77
Figure 7. 4: Central Activity and Interconnected Activities, Engestrom (1999) ... 79
Figure 7. 5: Two Interacting Activity Systems as an Alternative Model for the Third
Generation of Activity Theory. One Example of this is the Interaction between
the Activities of Design and use of Information Systems ................................. 80
Figure 7. 6: The Computer Tools as an Extension of the Internal Plane of Action
(IPA) (Kaptelinin 1996, p. 52) ............................................................................ 89
Figure 7. 7: The Expansive Learning Cycle (Engeström 1999b) ......................... 92
Figure 7. 8: The Common Activity of obtaining Online Health Information (in the
initial Phase of the Research it was assumed that there is a common Activity of
use) ......................................................................................................................... 233
Figure 7. 9: The Data Collection and Analysis Activity Covering the 4 ............. 235
Figure 7. 10: The Interpretation Activity of the Researcher using Activity Theory to
obtain a deeper understanding of the Results of the Data Analysis Activity ... 237
LIST OF TABLES

Table 2.1: Total Government Expenditure on Health as a Percentage of GDP of the Developed Countries.................................................................................................................. 15
Table 2.2: Brief Definitions of some Key Terms in the Online Health Environment 18
Table 2.3: Interactivity Framework as Applied in various Studies............................... 54
Table 3.1: Research Plan from Year 2008-2010.......................................................... 71
Table 3.2: The Main Elements of Activity Theory (Mwanza and Engestrom 2003) 77
Table 5.1: Research Phases from 2008-2010............................................................. 144
Table 5.2: Demographic Details of the six Subjects used for the Usability Tests of Caresearch website.......................................................................................................................... 146
Table 5.3:: A Comparison between 3 to 7 Factor Solutions ........................................... 150
Table 5.4 : Consensus Statement on the 4-Factor (Varimax)........................................ 150
Table 5.5: 5 Items that distinguish Factor 4 from all other Factors.......................... 151
Table 5.6: 4 Items that distinguish Factor 3 from all other Factors.......................... 151
Table 5.7: 6 Items distinguish Factor 2 from all other Factors.................................. 151
Table 5.8: 4 Items that distinguish Factor 1 from all other Factors.......................... 151
Table 5.9: Correlation between Factors 1 to Factor 3............................................... 152
Table 5.10: Factor A: Array of Z-Scores (±1), Statements and Categories............... 155
Table 5.11: Factor B: Array of Z-Scores (±1), Statements and Categories............... 157
Table 5.12: Factor C: Array of Z-Scores (±1), Statements and Categories............. 160
Table 5.13: Factor C: Descending Array of Z-Scores (±1), Statements and Categories .......................................................................................................................... 162
Table 5.14: The Producers of Information for Online Palliative Care Websites: Government, Non-Profit and Commercial Organisations ...................................................... 164
Table 5.15: the Producers of Information for Online Health Websites: Government, Non-Profit and Commercial Organisations................................................................. 164
Table 5.16: Worldwide Palliative/Hospice Care Sites’ Overall Interactivity ............. 165
Table 5.17: Worldwide Health Websites’ Overall Interactivity .................................... 167
Table 5.18: Other unexpected Features in the Health Website Sample.................... 182
Table 5.19: Online Palliative Care Websites Interactivity: Individual Criteria Ranked from least Interactive to Most Interactive............................................................. 184
Table 5.20: Online Health Websites Interactivity: Individual Criteria Ranked from Least Interactive to Most Interactive..........................................................185
Table 5.21: A Comparison between 3 to 7 Factor Solutions.................................188
Table 5.22: Correlations between Factors 1 to Factor 3........................................188
Table 5.23: Consensus Statements in 3 Factors (Varimax)....................................189
Table 5.24: 7 Items distinguish Factor 1 from all other Factors .........................189
Table 5.25: 10 Items that distinguish Factor 2 from all other Factors ..................190
Table 5.26: 8 Items that distinguish Factor 3 from all other Factors ....................190
Table 5.27: The Demographic Information for Factor 1.....................................191
Table 5.28: Factor 1: Array of Z-Scores (±1), Statements and Categories.............193
Table 5.29: The Demographic Information for Factor 2.....................................195
Table 5.30: Factor 2: Array of Z-Scores (±1), Statements and Categories.............197
Table 5.31: The Demographic Information for Factor 3.....................................199
Table 5.32: Factor 3: Array of Z-Scores (±1), Statements and Categories.............200
Table 6.1: Interpretation of Q Methodology for the Four Factors Results............207
Table 6.2: Interpretation of Phase 2 and Phase 3 of the Results..........................213
Table 6.3: Interpretation of Q Methodology for the Three Factors Results...........224
Table 6.4: Interpretation of Phase 3 and Phase 4 Results...................................228
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-health</td>
<td>Electronic Health</td>
</tr>
<tr>
<td>HCI</td>
<td>Human-Computer Interaction</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>HON</td>
<td>Health On the Net</td>
</tr>
<tr>
<td>CMC</td>
<td>Computer-Mediated Communication</td>
</tr>
<tr>
<td>WBIS</td>
<td>Web-Based Information System</td>
</tr>
<tr>
<td>ZPD</td>
<td>The Zone of Proximal Development</td>
</tr>
<tr>
<td>IPA</td>
<td>Internal Plan of Action</td>
</tr>
<tr>
<td>WWW</td>
<td>World Wide Web</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>E-Commerce</td>
<td>Electronic Commerce</td>
</tr>
<tr>
<td>EMR</td>
<td>Electronic Medical Record</td>
</tr>
<tr>
<td>ATUL</td>
<td>Activities Tools Usability Learning or Activity Theory Usability Laboratory</td>
</tr>
<tr>
<td>FRAQ</td>
<td>Frequently and Recently Asked Questions</td>
</tr>
<tr>
<td>IS</td>
<td>Information System</td>
</tr>
<tr>
<td>AMA</td>
<td>Australian Medical Association</td>
</tr>
<tr>
<td>FAQ</td>
<td>Frequently Asked Questions</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
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CHAPTER 1

INTRODUCTION

1.1 Introduction
This thesis explores and examines the perceptions of diverse users towards contemporary social phenomena in the online health context. These phenomena are becoming increasingly more complex with the rapid and continual growth of the technological capabilities of the Internet and the increasing demand for new interactive functionality by users.

In the 1950s, computer technologies were first used as a means to collect, manage, and disseminate data. Since the 1970s, there has been an exponential increase in speed and memory enhancement of computers, coupled with explosion of electronic network infrastructures to transmit large amounts of data. The subsequent emergence of the Internet and the global reach of the World Wide Web have changed every facet of life. One of the technological changes has been the creation of ever expanding opportunities to assess and deliver health information to the public. The Internet has become increasingly popular as a means to transform personal and public health, where it is an ideal medium to disseminate information and provide education (Escoffery et al. 2005). This phenomenon is part of the emerging area known variously as electronic health, e-health or online health. Throughout this thesis, I will use the term ‘online health’ to refer to this phenomenon.

There are many advantages of the Internet over other information broadcast media, including the ability to provide access to a wealth of information by the population without cost, at anytime and anywhere, while also maintaining privacy and anonymity (Shephard 2002). In addition, the Internet offers many sources of information on a huge variety of topics and delivers information quickly and flexibly. Governments, non-profit organizations private and commercial actors around the world have taken the advantage of the Internet’s ability to communicate with large numbers of people, and, have established a variety of health-related websites. More recently, the Internet also supports the capability for advance effective
communication leading to greater interaction between health professionals and the public. The social phenomenon of online health has the potential to greatly improve health outcomes, which is yet to be fully realised, and, so is the subject of this thesis.

This chapter sets to provide an overview of online health and, discusses the research scope and its significance in understanding and improving online health websites as sources of health-related information and facilitators of interaction between health professionals and the public.

1.2 Background to the Research

Expectations and promises are reformed and renewed more often than they are fulfilled in the online health environment. For instance, whilst electronic patient record systems have existed since 1966; they are still not a reality even after 40 years (Taylor 2006). Advances in information and communication technologies and the growth of the Internet have had a profound effect on most industry sectors, as it is applied ubiquitously everywhere today. However, electronic patient record systems are still far from effectively used in the healthcare sector.

The healthcare sector is considered to be the biggest service sector, receiving enormous investments and growing at a rapid pace (Hernandez 2009). It is widely believed that healthcare is an industry sector that currently experiences many challenges. These include the limited capacity of the existing healthcare systems to support the increasing demands of an ageing population, the continuous rise of healthcare expenditure, increased exposure of medical errors, and, more informed consumers. As a result, governments are faced with an urgent need to find ways to limit the rise of healthcare costs without compromising quality, equity, and access. One emerging approach is to make greater use of information and communication technologies (ICT) in the delivery of health services, where appropriate. ICT is viewed as potentially having a significant role to play in raising productivity, controlling costs, and improving care in this complex and information-intensive environment. The gradual creation of better informed consumers/citizens can lead to more effective health outcomes as people are given more responsibility in the
management of their own health, which in turn brings about sustained behaviour change (Tsiknakis & Kouroubali 2009).

Rapid developments in ICTs are transforming the ways services are delivered to the public. The area of healthcare has always been viewed as particularly information intensive, with health authorities having to be engaged in collecting, disseminating and communicating information long before the advent of computers. ICT together with the growth of the World-Wide Web, have brought enormous changes that provide many new opportunities for processing information and supporting communication in the context of healthcare. Furthermore, the Internet heralded a major change in the dissemination of health and medical information with the promise to improve knowledge transfer from health professionals to the general publics and, help the public in maintaining and improving their health and their general well-being. New opportunities can be exploited in innovative information systems, which can improve health outcomes by supporting information exchanges between healthcare professionals and the public. When conducting research in this area it is therefore essential to take a holistic approach that integrates the latest ICT tools and processes with the needs of all stakeholder groups. Therefore, the research described in this thesis uses a combination of innovative research methods to analyse the effective use of ICT and usability in online health, as will now be explained.

1.3 Explanation and Justification of the Research Approach

This study was inspired by an evaluation of a particular Australian palliative care website, CareSearch, at the request of the owners who were redeveloping the site. The candidate was invited to participate in this evaluation so that her research would contribute to this evaluation. This real world experience led to an awareness of the issues and the development of the broader research agenda on online health and, the research approach for the study described here was designed in this real world context using a selected combination of suitable innovative research techniques in 4 phases, as presented in Chapter 3.
The first phase of this research consists of usability testing of the CareSearch website to gauge the overall impressions of users and the usefulness and easiness of use of the system. This study then uses the Q Methodology to determine subjective perceptions of various stakeholders in this CareSearch website and similar palliative care as well as health websites, and, their perceptions of a range of possible activities of use. This was conducted in two phases, Phase 2 and Phase 4. Phase 2 was conducted to find out people’s perception towards palliative care websites and, Phase 4 explores various people’s views towards health websites in general. In addition, Activity Theory was used to interpret the results of the final Q-study. Between the two Q studies a content analysis of worldwide health websites was performed.

The excitement surrounding the Internet reflects its capability to support activities that no other medium can. Internet technology now provides opportunities for making the communication of information between experts and their audience more meaningful and as well as providing global connectivity and communication between various stakeholders groups. Interactivity has been identified as one of the characteristics of the World Wide Web (WWW). The importance of interactivity is reflected by attention paid by many scholars since the latter half of the 1990s (Kenny, Gorelik & Mwangi 2000). Therefore, Phase 3 of the research uses content analysis of a broad range of online health websites.

The content analysis aims to explore the content, layout and interactivity of palliative care and other health websites in developed countries. These were chosen because of their more advanced technologies and governmental infrastructure as well as more sophisticated healthcare systems (Giovanni 2006). The concept of interactivity as proposed by Heeter (1989) and others help provide the framework for the content analysis. In this sense, it allows the research to expand on the understanding of the health websites and to try to find ways for improvements and the enhancements of the websites.

The research approach was chosen to allow for this rapid development and, change in communication technologies and the rapid change in population profiles, i.e. the
growth of elderly populations, and, the emerging impact of chronic illnesses over the same period. Twenty years ago, medical care was largely focused on treatments and cure of acute illnesses. Today, the healthcare system is challenged in new ways. Clinical approaches to acute illness are much less effective than dealing with chronic illnesses. The management of chronic illness requires more attention to physical and psychological as well as medical care. The social and economic costs of illness must also be addressed (Rothschild & Lapidos 2003). To meet these challenges, healthcare organizations need be continuously transforming their entire suit of systems, including their information systems to deliver better healthcare services. The healthcare sector, as it is the case with other economic sectors, must confront its challenges by managing innovations on a regular basis (Bosa 2008; Tsiknakis & Kouroubalı 2009). Innovations in the healthcare sector are needed to enable governments to overcome the rise of healthcare expenses without compromising quality, equity, and access. Emerging evidence supports the beneficial effects of online health, but many challenges remain for research in online health in the approaches taken, methodologies used, and the evaluation of results. When conducting research in this area it is beneficial to take a holistic approach that integrates the study of the latest ICT tools and processes with different needs of individuals.

An important area of research is the evaluation of health Web-based information systems, or health websites, because they can contribute to an important body of knowledge as it assists the value and the quality, as well as the efficiency of future health initiatives. Proper usability testing is needed to improve the efficiency and effectiveness of the websites. Usability testing increases someone’s expertise, experience and insights to enable improved service provision. With the increased use of computer based information systems, knowledge, skills and experiences of computers users has become very broad. Therefore, universal usability is indeed an issue, because it has the potential to provide a simplified and understandable design, which potentially will be used by all users.

Universal (ubiquitous) design is a young and new discipline that focuses more on users’ experiences and makes explicit the need to accommodate users with different
skills, knowledge, age, gender, and abilities. In the health context, this paves the way for future ubiquitous developments, such as personal medical devices, improved healthcare systems, and, expanded government services. It also focuses on designs that bridge the gap between what users know and what they need to know, user diversity, and, technology diversity (Lazar 2007).

Despite the importance of online health evaluation, this particular area of research is underdeveloped in theory and practice (Brender 2006; Hernandez 2009). Therefore, this study is designed to develop a holistic evaluation for online health services and tools by addressing the activities of diverse consumer-oriented online health. This research also aims to identify gaps and opportunities in tools development, policy, and research. This is an area where research is needed to better understand and improve the role of technology in dynamic online socio-technical systems that can be generalised to the wider problem of online health services and user interaction. Because it is an area of rapid change, the research methods used must be able to anticipate the impact of new innovative Web technologies that emerge in the future.

1.4 Significance of the Research
This research study is significant from theoretical and practical perspectives. From a theoretical perspective it brings together a variety of innovative research methodologies to address a phenomenon that is complex and constantly changing, namely the contribution to health outcomes from online health. From a practical perspective, there are lessons from the findings of the research for practice to guide improvements in the content and functionality of online health, website design and performance. Health websites in advanced countries were chosen for this study because they had more of the advanced features for interactivity and the findings could then provide a useful for informing other emerging and developing countries’ websites. Chapter 2 (Section 2.2) provides an overview of contemporary health systems in advanced countries.

The literature review points to the existence of a gap in the understandings of various users’ needs from the health information systems’ perspective. The research adds to
this body of knowledge, giving a voice to users, providing them with an opportunity
to contribute to the overall improvement of health website design and performance.
The research also adds to the understanding of the dynamic phenomena of health
websites by underlying the adoption of interactivity features and levels of online
health from a variety of users’ perspectives.

From a theoretical significance perspective, this study fills a gap in the understanding
of suitable research methods for research topics such as, investigates the perception
of different stakeholder groups of technologies that are rapidly changing. The
research analyzes the use of ICT in healthcare. This research is informed by Activity
Theory that considers activity, which is a broader concept than individual goal-
oriented actions, as the most appropriate unit explaining how a particular
philosophical framework and principle can be applied in the context of use and
design activities of ICT artifacts, in order to bring sense and meaning to the
complexities of changes about their use and analyzing the basic unit of analysis
(Hasan 1999; Engeström 1987). Applying the holistic and dynamic framework of
Activity Theory to analyse real world situations enriches the understandings of many
interconnected elements: the object (purpose) of an activity; the subjects (people who
carry out the activity; the tools and rules that mediate the activity; and, the social
context in which the activity occurs). Furthermore, mapping the resulting factors of
the Q study as activity is a useful descriptive mechanism to give intensive meaning
to the research findings.

However, Activity Theory does not provide an instrument for data collection and this
has no potential in itself of deducing the subjectivity of the subjects it studies. Q
Methodology is selected as a discovery mediated tool for this research to avoid this
issue, as it allows opening up and digging into the subjective views of the
participants in a rigorous manner. This research is significant as it adopts a Q
Methodological approach for capturing diverse users’ perceptions and, places the
participants at the centre of analysis to enable this research to explore ways to engage
and motivate people. The alignment and integration of Activity Theory with Q
Methodology is essential here, as it provides appropriate techniques for conducting
this research and interpreting its findings. This research demonstrates the
effectiveness of combining Q Methodology and Activity Theory for studies in an information system, which has not been previously undertaken in relation to online health. Therefore, this research study fulfils this important gap in the relevant literature by its use of complementary procedures in an innovative and effective manner.

1.5 Objectives of the Research

This research aims to explore the current phenomena of user perceptions towards online health and deepen the understandings of the nature of the content of the health websites during the study period (2008-2010) in a way that will assist how these websites may evolve in the future. To further this aim, I examine the usability and the interactivity of websites designed to provide information and support in areas of public health. To accomplish this, I compare the views and activities of different stakeholders concerning the changing user demands and interaction capabilities of such online health systems. It aims to bring these together in an understanding that allows for divergent views and needs that are relevant for current future developments of the technologies and changing user populations.

My research is informed by Activity Theory. I hold the view that activity is the most appropriate unit of analysis (Engestrom 1987) and recognize users’ perceptions as activities. The application of Activity Theory to analyse real world situations such as these enriches my understanding and simulates the social presence. The Activity Theory framework underpins this research as a holistic and dynamic framework using activity as a unit of analysis to instantiate the factors identified by the Q study.

This study aims to achieve the following objectives:

- To evaluate the usability of online health websites using a scenario-based evaluation method.
- To explore the content and the features of online health websites as well as online palliative care worldwide, especially in developed countries (e.g., Australia, UK, USA etc.)
- To identify and analyse the dimensions of interactivity that influence online health and online palliative care
• To investigate, evaluate and analyse users’ perceptions and their perceived information and interaction needs that are currently being accommodated or envisaged with public Web-based Information Systems in a dynamic environment, i.e. healthcare.

• To gauge and interpret perceptions and activities of online health using the holistic and dynamic Theory of Activity.

1.6 Research Questions
This research was first motivated by the present challenges facing the interaction design of ongoing development of Web-based Information Systems, in particular, the challenges of public health websites, including: the amount of information they contain, the specialised nature of the information, increasing the awareness and public knowledge of health, and, the increasing public demand for information and interactive services. In the dynamic public health context, the provision of effective online health information and services can have a substantial benefit in reducing the strain on public health services that are required to cope with the complex and ongoing information needs of users. Furthermore, a technological revolution is reshaping the way that healthcare is organized and delivered, and, transforming the ways public services can be delivered to citizens; this revolution affects the relationship between physicians and patients.

The broad goal of this research is to add to our understanding of user interactions with health websites in order to inform design, as technologies and user needs continually evolve. The specific research involves an in-depth study of the use and usability of an existing Web-based information system in the area of palliative care. This research employs a depth case study of a particular site under development that can be generalised to the wider problem of public health Web services and user interaction.

This study proposes the following specific research questions:
1. What are the perceived information and interaction needs that are currently being accommodated or envisaged within public Web-based information systems in a dynamic environment like healthcare?
2. What is the level of interactivity features of health websites that are utilizing the interactive capacity of the health Web-based systems?
3. How are the findings of this research being applied theoretically using the framework of Activity Theory to develop a holistic, contextual and dynamic tool and providing an understanding of the problem?

1.7 Structure of the Thesis
This thesis consists of eight chapters as shown in Figure 1.1.
Chapter 1 introduces the study and discusses the importance of the research study. The first chapter also introduces the background to the study, the research objectives, the main research questions that were addressed, and, the significance of the study.

Chapter 2 presents a comprehensive review of the relevant literature surrounding online health. The chapter accelerates the understandings and perceptions of various users’ needs of the health information system. The chapter provides further investigation on the concept of interactivity in the new media in general and, its importance in the online health environment, in particular.

Chapter 3 presents the design and the Methodology adopted to collect data and the research model in this study. This chapter describes the theoretical perspective, methods, methodology, and epistemology used as a research strategy. The chapter also discusses the relevant qualitative analysis techniques that were used for analysing data.

Chapter 4 justifies and describes in detail the method of analysis used to explore the research questions and to answer the research problem. A rationale for the choice of data collection and qualitative innovative research methods is provided in conjunction with the methodological selection of the techniques used and outlines of strategies, Q-study and phases involved. This chapter also introduces an overview of the theoretical basis behind this research study.

Chapter 5 reports the results and the findings of the research study conducted using usability testing, Q Methodology, and content analysis approaches. This chapter presents the results of Phase 1, scenario-based usability of the websites, which was conducted in the year 2008, as a preliminary study of the research. This chapter also reports the findings of Q Methodology, which is conducted in two separate distinctive phases: Phase 2 and Phase 4. While in Phase 2 data was conducted in the spring of 2008, Phase 4 was conducted in the year 2010. The chapter also reports the results of the content analysis of the websites as an exploratory study to signify Phase 3, which started in 2009.
Chapter 6 presents a detailed explanation and interpretation of the results and findings for phases 1 to 4. This chapter also discusses the link between the Q results and content analysis findings to reveal the importance of meeting the universal needs and requirements of the Q sample related to the online palliative and health websites. The discussion of the results is necessary to form the basis of the philosophical interpretations.

Chapter 7 introduces the theoretical framework that forms the basis of this research study. The chapter provides an overview of Activity Theory. This chapter describes and illustrates the application of the philosophical framework of Activity Theory to the research questions.

Chapter 8 summarizes the main key findings, its implications and future research directions, and, draws out the significance of this research study for both theory and practice in the online health phenomena. Finally, it also explains the limitations of the research and how these were addressed.

1.8 Chapter Summary
This chapter has presented a background of the online health phenomena and an overview of the research study. In particular, it has identified the main research questions based on background discussion. In addition, it has outlined the significance of this study and the main objectives that aids the exploration of the topic of online health. The final section of this chapter has also presented an overview of the rest of the chapters in this thesis.

The next chapter reviews the relevant literature on online health and the relevant issues of information and communication technologies in healthcare sector.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction
This chapter presents the results of a comprehensive review of the relevant online health literature. The purpose of this review is to identify any gaps in literature regarding the understandings and perceptions of various users’ needs for health information systems. My research will address the gaps found, aiming to give a voice to users, thus allowing them to contribute to the improvement of various types of health websites, and therefore overall healthcare delivery.

This chapter starts with an overview of contemporary health systems followed by a section on online health concepts. It then presents a review of the literature concerned with the needs of health consumers, and, the relationships between healthcare providers and their clients (patients, family, friends and relatives). The literature on research concerning the interactions of users with health related ICT is presented in the third section. The review of literature on health websites assessment is presented in the fourth section of the chapter. Literature reviews on interaction design, Human-Computer Interaction (HCI) and usability is presented in the fifth, sixth, and seventh sections, respectively. As a critical objective of my study is to investigate the concept of interactivity in new media, literature that focused on interactivity is covered in depth in Section 8 of this thesis. This chapter describes briefly the research methods such as usability testing, Web content analysis and a Q Methodology study, as presented in the forthcoming chapters.

My research utilises the philosophical framework of Activity Theory as an appropriate descriptive tool to further explore the expressed and evaluated views of stakeholders in online health. Elements of the Activity Theory framework include the subjects (users), the object (the purpose), the community; the social context, the tools, and most importantly, the relationships and the dialectic interactions among these elements. A review of the literature on Activity Theory will be presented in Chapter 3.
2.2 An Overview of Contemporary Health Systems

This section sheds light on complex contemporary health systems. In developed countries such as Australia, the USA, the UK, Canada and New Zealand, health systems are often characterized as a mixture of community and hospital-based services provided by professionals in public and private facilities and organizations (Whetton 2005). The health systems also often differ in their sources of funding, as a mix of private and public, and, not for profit services. However, the general aim of health systems is to meet the healthcare need of the population (ibid).

Statistics from the World Health Organization (WHO 2010), presented in Table 2.2, show that total government expenditure on health as a percentage of their Gross Domestic product (GDP) is high across developed countries. According to the World Health Organization’s report, countries with highest level of per capital health expenditure are mainly those located in North America and the European region. Furthermore, according to their report, the countries with the highest government expenditure on health are also the countries with the highest life expectancy among their populations. Table 2.1 shows that the average increase of government expenditure, as a percent of the overall economy, has been 90 percent from the year 2000 till the year 2007, in developed countries. Interestingly, among the advanced nations, the highest governmental health expenditure occurs in the USA, followed by the UK, then Canada, and New Zealand, whereas the lowest expenditure has taken place in Australia. This variance is a strong indication of the presence of cost issues in healthcare sector that need to be addressed.
Table 2.1: Total Government Expenditure on Health as a Percentage of GDP of the Developed Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>2000</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>9.9</td>
<td>10.1</td>
</tr>
<tr>
<td>Canada</td>
<td>8.8</td>
<td>10.1</td>
</tr>
<tr>
<td>UK</td>
<td>7</td>
<td>8.4</td>
</tr>
<tr>
<td>France</td>
<td>10.1</td>
<td>11</td>
</tr>
<tr>
<td>Germany</td>
<td>10.3</td>
<td>10.4</td>
</tr>
<tr>
<td>Italy</td>
<td>8.1</td>
<td>8.7</td>
</tr>
<tr>
<td>Japan</td>
<td>7.7</td>
<td>8</td>
</tr>
<tr>
<td>New Zealand</td>
<td>7.7</td>
<td>9</td>
</tr>
<tr>
<td>Netherlands</td>
<td>8</td>
<td>8.9</td>
</tr>
<tr>
<td>Switzerland</td>
<td>10.2</td>
<td>10.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>8.2</td>
<td>9.1</td>
</tr>
<tr>
<td>USA</td>
<td>13.4</td>
<td>15.7</td>
</tr>
</tbody>
</table>

Source: World Health Statistics 2010, WHO

There is a common objective amongst developed countries to reinvent their old health system to a new one that offers 24 hour/day 7 day/week 365 days/year assistance, meeting existing needs, anytime and anywhere. One way that this can be achieved is by increasing the use of information and communication technologies in the health system. The focus of contemporary health systems in developed countries has shifted from costly hospital-based services to community-based care with an emphasis on health promotion and interventions (Duffett-Leger 1996). “The first development is that patients have access to the same information, knowledge, and guidelines as clinicians…sometimes people will manage their own problems” (Smith 2004a, p.328). To achieve this movement there must be a transfer of knowledge from professionals to the wider community. This can be facilitated by creating information systems to provide consumers with access to reliable sources of health information. Reinventing health systems does not mean excluding consumers from participation; this can be facilitated by promoting ‘self-management’ and ‘self-control’ and equally by viewing them as capable partners, being able to make decisions and manage their own health (Whetton 2005). In Australia, for instance, there is an increased recognition of a holistic strategy towards healthcare so as to reduce the burden of illness through treatment and management (ibid).
Although contemporary health systems in these countries are geared towards offering high quality services and improved healthcare outcomes, challenges put demand on resources. These challenges include the changing pattern of diseases in western populations, aging populations with multiple health issues and needs, globalization issues, and, the management of information resources such as health knowledge-bases (Whetton 2005).

One practical way to access information about health is via the Internet in both developed countries and developing countries. The Internet is a relatively new medium and has become a rapidly evolving source of global health-related information. Over one hundred million people use the Internet over other media for healthcare information worldwide (Kommalage 2009). Health information is one of the most commonly searched topics on the Internet (Nicholas et al. 2003; Sillence et al. 2007; Ahmad et al. 2006). There are over 70,000 health websites (Pagliari & Gregor 2004), while about 4.5 percent of all Internet users worldwide searching for health-related information (Mohrahan-Martin 2004).

2.3 An Overview of Online health

Online health is a relatively recent phenomenon in the history of healthcare, starting in the late 1990s and being undertaken by the health industry as a component of e-commerce. At first, the concept was commonly used among industry leaders and marketers rather than academics as one of the ‘e-words’ such as e-commerce, e-business, e-mails and so on. The term is viewed as a new opportunity for the Internet, to be applied in the area of the healthcare industry, which has already proven to be successful in e-commerce for conducting business transactions (Eysenbach 2001; Oh, Rizo, Enkin and Jadad 2005).

The term ‘online health’ is used interchangeably with ‘healthcare informatics’, or as a subset of health informatics. Table 2.2 presents some definitions for the commonly used terms in healthcare. Amongst the terms used in healthcare, ‘telemedicine’ appears to be the oldest term that has been practised for almost one hundred years, via the use of telecommunications and information technologies, while other terms
are new and have only been recently developed. However, the newest term is online health, which came into use in 2000 (Pagliari et al. 2005).

The history of involvement of ICT in healthcare started with telemedicine, followed by telehealth, health informatics or medical informatics, and then finally, online health. It is interesting to note that telehealth emerged from telemedicine, which is now used as a broader concept than telemedicine, not only for administrative and educational functions that originally related to telemedicine, but also for technology solutions, including emails to facilities, and, for electronic communication between patient and physician (Wikipedia 2010).

Health or medical informatics, on the other hand, is an integrative discipline arising from the synergistic application of computational, information processing, cognitive and communication tasks of medical practices, education and research; in order to improve the management of patient data, clinical knowledge, population data and other information relevant to the patient care and healthcare community with its primary focus on the acquisition, storage and use of information (Whetton 2005). Health informatics has expanded rapidly over the past years. It is a young science, which emerged in the 1940s after the invention, innovation and advancement of digital computing and, after decades of development of information systems designed primarily for physicians and other healthcare managers and professionals.
In this sense, online health is the newest term and is a broader concept than telemedicine and the others, because it encompasses telemedicine, telehealth, telecare and health informatics by the use of telecommunication and information technologies to transmit digital data for clinical, educational, administrative and social applications, both locally and globally.

Although the terms ‘e-health’, ‘online health’, or ‘electronic health’ are widely used by many people and organizations around the globe, there is no consensus and precise definition for these concepts (Oh et al. 2005).
There are two comprehensive reviews of the literature on these definitions. Oh et al. (2005) scanned all published work using various electronic databases from year 1966 to 2004, and, reported 51 unique definitions. However, the study identified 2 universal themes: the use of health and technology, and, 6 less general themes such as commerce, stakeholders, outcomes, places and perspective.

Pagliari et al. (2005) conducted a review of the literature on the term ‘online health’ using multiple databases from 1997 to 2003 and reported 36 definitions for online health. Their results showed three distinctive themes, which relate to the use of specific technologies (Internet, information technology, combined information and communication technologies, digital technologies and so on); applications (telemedicine, delivery of health-related services, wide range of health informatics, health-related activities and so on); and stakeholders (consumers, patients, physicians, organizations, etc.). However, the majority of the definitions centre on the communicative aspect of online health by emphasizing the use of network technologies to target all stakeholders or types of consumers rather than targeting only patients and health professionals.

Both narrow and broad definitions of online health can be found in the literature. For example, the narrowest definition of online health in the literature is centred on the combined use of electronic information and communication technology in the healthcare sector and is a sub-discipline of health informatics (WHO as cited in Oh et al. 2005).

In contrast, Eysenbach (2001, p. 2.) defined online health in broad terms and not referring only to technological development or ‘Internet and medicine’, but rather as,

“An emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global
thinking, to improve healthcare locally, regionally, and worldwide by using information and communication technology”

Interestingly, Eysenbach (2001) further clarified the concept in relation not to ‘electronic health’, but rather as the ‘10 Es’, which include efficiency, enhanced quality, evidence-based empowerment, encouragement, education, enabling, extending, ethics and equity.

1. Efficiency – the aim of e-health is to reduce the cost of healthcare delivery by avoiding unnecessary treatments and interventions and enhancing the patients-physician relationship
2. Enhancing quality – e-health should aim to promote quality assurance in the care delivered to patients by directing the patient to the best quality providers.
3. Evidence-based- e-health should be evidence-based through scientific evaluation.
4. Empowerment – e-health should empower its consumers and stakeholders by not only acting as a knowledge-base, but also promoting accessibility to its users to make health choice.
5. Encouragement – e-health should involve new ways of sharing and partnership when looking at the patient-physician relationship
6. Education – e-health should be viewed as a knowledge-base portal for different types of consumers.
7. Enabling – e-health should enable its consumers to share and exchange information and communication.
8. Extending – e-health should be extended in a scope and scale to allow the health service to overcome any geographical boundaries and include a wide range of products and services.
9. Ethics – e-health should overcome ethical issues such as privacy and equity.
10. Equity – e-health should be an opportunity to include various people with different ages, gender, ability, education, social, and economical status.
Eysenbach (2001) also added to the concept of e-health the dimensions of easiness of use, entertainment and excitement.

Eysenbach (2001) also added to the concept of e-health the dimensions of easiness of use, entertainment and excitement.

Among healthcare concepts, palliative care is not new term and is generally defined as ‘an approach that improves the quality of life of patients and their families facing the problems associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual’ (WHO 2011). This term is often confused with hospice care. Palliative care is a multidisciplinary approach involving healthcare teams (nurses, chaplains, physicians, psychologist and others) to address a patient’s physical, emotional, spiritual and social concerns. While palliative care is appropriate for patients in all stages of life-threatening diseases, hospice care generally provides for patients with a prognosis of 6 months or less to live (Hill 2007). Palliative care aims to prevent and relieve the suffering of terminally ill patients by means of early identification and quality treatment of pain as well as the many other problems that they face. These problems can be physical, psychosocial and spiritual. Stakeholders in palliative care include the patients, their carers, friends and family as well as the clinicians. Since the overall life expectancy is increasing, there is an increasing demand for effective delivery of palliative care with more options to enable people to take more control of their health.

2.4 The Needs of Health Consumers
Who are health consumers? What needs do health consumers/customers have? Figure 2.1 reveals the important components of any healthcare system in any environment. The centre of this Figure shows the close association between physician and patient. Surrounding this relationship or link is circles of expanding groups that make up the whole healthcare system. The practitioner or physician’s
side is surrounded by coordinating care teams, such as office staff, long-term care, and larger enabled organization such as hospitals and other healthcare organizations and healthcare providers. On the patient or public side, the patient is surrounded by family, friends, relatives and neighbours. This public side can have greater public interactions with churches, community, business and other social services. Both sides of the relationship are highly affected by the larger context of policies and regulations (Hesse & Shneiderman 2007).

From the public side, the experiences of health problems create unique needs for patients and their families. It is well documented in the literature that emotional distress is a common feature, especially in a long-term illness journey, from diagnosis through to the terminal phases of an illness (Vachon 1998). A review of literature shows that any health incident includes two inter-related domains of family needs in relation to patient care; this includes physical needs such as pain management, and, psychosocial needs, such as, a need to feel that the health professional cares about the patient (Steele & Fitch 1996; Osse, Vernooij-Dassen & DeVree 2000; Mor & Masterson-Allen 1988; Ramirez, Addington & Richards 1998). The family and personal needs domain encompasses physical concerns, such as, someone being concerned with a family member’s health, psycho-social needs,
including a need to feel there is hope, and; practical needs for care assistance, such as, a need to have information about what to do for patient at home. The two domains have been identified through qualitative methods and further validated in subsequent instrument development and testing studies (Kristjanson, Atwood & Degner 1995; Kristjanson 1986; Kristjanson 1989).

In one study, Monterosso, Kristjanson and Dadd (2006) measured the needs of parents of children with cancer in Australia. The provision of information seems to be the key intervention to help parents cope. Resources include information, social support, employment and finances which are important in relation to patient well-being.

Some studies have elucidated the increased needs for information amongst patients with terminal disease and their families. For example, McIlmurray et al. (2001) and Mystakidou et al. (2002) identified conflict regarding the disclosure of information, stress on family, fear of loss of control and fear of loss of loved ones news, as key issues in palliative care. Observations in the healthcare context revealed some differences in requirements of patients and families for information about illness or prognosis (Code & Paul 2007). According to Rose (1999), the requirements for information change over the course of an illness. Wong et al. (2002) conducted a survey of patients with advanced cancer and their carers and identified pain management, fatigue and homecare resources as the areas in where information was most needed.

Recent literature has focused on very specific needs. Moadel, Morgan and Dutcher (2006) assessed the psycho-social needs among ethnically diverse cancer patients in the USA. Their findings reveal that patients’ primary needs concentrate most on the need for information followed by the need for emotional support. Practical needs are ranked only at moderate levels and spiritual needs are the least endorsed, as shown in other studies of needs assessments (Bonevski et al. 2000; Wingate and Lackey 1989). McIlfatrick (2006) indicated that social and psychological support, financial concerns and the needs to make decisions and choices as well as the need for information as the most important types of needs. The study also found professional
providers have trouble in communication and information exchanges, fragmented co-
modation, and communication and continuity of care between services. Similarly, 
Kirk, Kirk and Kristjanson (2004) elicited views of patients regarding their 
experiences of disclosure and information sharing during the course of the illness to 
identify common concerns that might be used by health carers to shape and develop plans with respect to communication with patients from various ethnic backgrounds in Australia and Canada. The authors concluded that information perceived as important for patient-family communication tend to change and diverge as an illness progressed, and, communication between them became verbally explicit. Therefore, information delivery for patients’ needs has to be individualised with particular attention to each stage of the illness.

From the physician’s perspective, Nordqvist et al. (2009) explored the attitudes of 20 clinicians and health professional towards the use of Web 2.0. The results reported positive and satisfied attitudes among clinicians towards online patient information and email communication, while some practitioners emphasized the importance of ‘face-to-face’ communication.

From both the patient and physician’s side, Andershed (2006) conducted the most comprehensive systematic review of literature, from January 1999 to February 2004, to focus on the overall experiences of the needs of chronically ill patients’ close relatives. This review analysed 94 research studies; 59 studies were qualitative and 35 quantitative. The authors identified the necessity for information and communication as the primary theme; the consensus across these investigations was that optimal communication and sufficient information made it possible for caregivers to function at their best. In addition, relief of the chronic patients’ pain and discomfort was consistently associated with positive assessments of the care giving role. Other reviews of the literature, although not as exhaustive as the Andershed (2006)’s review, include Hudson, Aranda and Kristjanson (2004); Kristjanson and Aoun (2004). These studies repeated the same themes: information, communication, service provision, and, that support from health and community services are essential needs of caregivers.
2.4.1 The Primary Source of Information

One of the important issues in healthcare is the lack of resources available to patients to fulfil their unmet information needs (Fitzsimons et al. 2007). Pereira, Bruera and Kavanagh (2000) insisted on the urgent needs for secondary sources of information. The authors found that there is an increased desire to seek a second opinion to verify information patients already obtained from (other) healthcare professionals about their illnesses and available treatments and their participations in decision-making regarding their treatments.

Many studies recognize the importance of access to different sources of information. For example, Andreassen et al. (2005) concluded that the primary source of information was the physician in relation to their patients living with oesophageal cancer, and, the improvement of quality of care is unlikely to occur without addressing and understanding the needs of the family members. Newnham et al. (2006) also questioned the needs of chronically ill patients in Australia for more accurate and reliable information about their illness to be informed when making decisions. The authors concluded that the majority of oncology patients did not believe that obtaining additional information could adversely affect the doctor-patient relationship. The authors called for health professionals to provide patients with guidance in finding information sources and with assistance in interpreting the information obtained. Rozmovits and Ziebland (2004) explored cancer patients’ reflections on their met and unmet information needs and their experiences with information provision. They found that, overall, information needs evolved over the course of the illness, and, not all information providers were equipped to provide relevant information at all times. Therefore, useful information provision strategies need to adapt to patients’ levels of knowledge, interest, capacity and state of health, rather than the patient adapting to the information provider. Useful information was supportive, empowering and personalized. Gray et al. (1998) conducted several focus groups with cancer survivors who were concerned primarily with inadequate information and services beyond the initial diagnosis and treatment, minimization of the non-medical impact of illness over time, fractured communication channels, a sense of abandonment by providers, researchers and the healthcare system, and, mistrust of administrative decision-making. Useful information would allow patients
to better respond to the realities of post-disease survivorship, and, could potentially assist them in countering the negative perceptions of healthcare providers, administrators and the healthcare system that were an unnecessarily inevitable part of long-term survival.

2.4.2 Perceptions towards Physician-Patient Communication

In Figure 2.1, which reveals the elements of the healthcare system, the centre of the figure showed the direct relationship between the healthcare professional and the patient.

The literature just presented acknowledges the indispensable role of patient-practitioner communication in improving the quality and delivery of healthcare services (Hill & Powell 2009; Hernandez 2009). The Web has become a vehicle with the promise to improve knowledge transfer from health professionals to the general public. It has the potential to provide services to help patients improve their health and their general well-being, and thus, to reduce the gap between health professionals and the public, and, complement the primary role of the doctor-patient relationship (Kivitis 2006). The evolving, more balanced doctor-patient relationship has stimulated patients to play a more active role in managing their healthcare, making quality of online medical information an important issue (Salo et al. 2004).

A number of researchers also acknowledge the importance of improving physician-patient communication, which can result in improved quality of care, because physicians are not (always) born with excellent communication skills, but rather can learn them as they practice. For this reason, this particular type of communication in healthcare is the primary way to gather and disseminate appropriate health information to enhance the delivery of healthcare (MacKinnon 1984).

Various studies have identified ineffective communication as the major barrier to achieving quality healthcare (Bhasale, Miller & Reid 1998; Wilson et al. 1995).
A positive communication interaction in a physician-patient relationship was an important aspect in assisting patients to cope with their health problems. Communication was one of the most frequently identified areas of need and, interaction with physicians was found to be an integral part of end-of-life care (Rose 1999; Hudson, Aranda & Kristjanson 2004; Kristjanson & Aoun 2004; Andershed 2006).

Steinhauser et al. (2000) determined the factors considered important at the end-of-life by patients, their families, physicians and other care providers and ranked communication with physicians as one of the highest attributes of quality of palliative care.

Many studies found that some caregivers are not satisfied with their communication with their physicians. Therefore, study sample participants recommended improved communication with physicians as a way to improve the quality of palliative care (Hanson, Danis & Garrett 1997). Wilkes, White & O'Riordan (2000) concluded that information was the one of the principal needs for patients in their cancer journey and most family obtained the needed information from their general practitioners (GPs), and, expected all doctors, from specialists to GPs, to provide them with the information concerning the disease, treatment, and the community services available at any time. When the information was not given to the families as expected, families were often disappointed, helpless and frustrated. Often the families do not know what kind of information is needed until has crisis occurred. Lack of information regarding services was problematic. Therefore, healthcare providers have responsibilities in determining whether families are aware of what information is available; to identify the suitable medium of information for families. Furthermore, information must be given to families at the pace and the time appropriate to their needs.

In a comprehensive literature review, Rees and Bath (2000) concluded that women with breast cancer and their families have substantial needs for information and they were often dissatisfied with the information they received from their healthcare professionals. Breaking bad news is a complex communication task, affecting
patients’ satisfaction with care and their level of hopefulness (Baile et al. 2000). A patients’ dissatisfaction with information is often related to doctor-patient interaction (McPherson, Higginson & Hearn 2001). Communication difficulties include lack of patient involvement in discussions, inadequate provision of information to the patients and families, and, the physician’s discomfort in information sharing, particularly about prognosis (Stewart 1995 & Christakis & Lamont 1999).

Furthermore, nurses play a central role in communicating and in providing information and teaching the needed skills, and were often cited as a sources of emotional support (Andershed 2006).

Steinhauser (2005) ranked having a nurse with terminally-ill patients as the third highest attributes of quality of care among bereaved caregivers, because patients felt more comfortable. Marco, Bruderer and Thum (2005) found that patients were more satisfied with communication from nurses than from doctors and indicated higher overall satisfaction with nursing care than with physician care.

2.5 Perceptions towards Online Health Information Technology

Many studies have explored the patients’ perceptions towards interactive computer technologies. For instance, Pyper et al. (2004b) concluded that an electronic medical record can give patients a sense of control over their illness by providing access channels and content tailored to the way patients live their lives and comprehend information. ICT systems provide opportunities to communicate and overcome patients’ fears and make them better informed. Patients entrust their healthcare professionals and organizations with the security, confidentiality, appropriate management and ethical use of their information. ICT systems provide opportunities to communicate and make patients’ fears and needs better known to clinicians.

Fisher and Britten (1993) found that patients tend to view technology as a substitute channel for face to face communication, as it is created on their behalf to enable access to desired services and physicians, and therefore, to improve the physician-patient relationship.
Patients perceived utility of information seeking on the Internet was explored in a study of blind or visually impaired individuals in Australia. Williamson, Albrecht, Schauder and Bow (2001) found that useful information promotes a greater sense of control over both the disability and the environment, while the usable Internet adapts to the numerous, frequently evolving challenges associated with being visually impaired. Therefore, overall information seeking utility is concurrently dependent on both perceived information usefulness and perceived technological usability (Williamson et al. 2001).

The Internet is a convenient source of information (Pereira, Bruera & Kavangh 2000). The reason for patients to go online is so that they can engage in a frank online discussion about their health status. While they can retain anonymity, they can also find online social support such as online discussion group, and easily access to information and resources needed within a few clicks. However, Pereira, Bruera, & Kavangh (2000) highlighted the negative effects of online activity on patient care and well-being, which can occur in a variety of ways, such as, misperceptions, unrealistic expectations, loss of confidence in attending physicians and in conventional medicine, and, financial hardships. The authors concluded with some suggestions to overcome some of these unfavourable consequences: healthcare professionals need to identify their patients’ and families’ needs and motivations for seeking information, encourage patients and families to discuss the information they find online and judge the validity and importance of new information, including that collected by patients.

Many researchers have investigated the need for Web-based health systems. Willis, Demiris and Oliver (2007) found that patients and health professionals benefit from interaction on the Internet to find answers to healthcare questions, communicate and deliver healthcare interventions. Their study suggests that it might be useful for patients and caregivers to view technology as a potential means to open up social networks, create more peer-to-peer communities, allow access to information, and address isolation, rather than as a substitute for personal patient care.
McGrath et al. (2007) found that electronic medical record (EMR) systems help to improve the quality of healthcare as well as physician-patient relationship when it is used extensively by physicians.

Another study (Clark 2002) explored the perceptions of elderly people toward computers using on-line questionnaires and participation in on-line chat-room interviews. The result show that interaction with computers results in a supportive, nurturing relationship, giving seniors opportunities to challenge themselves and test their abilities. In doing so, individuals feel connected, supported and valued. For these subjects, the computer is a tool to help them gain or regain control over their social relationships and the world around them, and, one that can become a trusted partner providing timely positive and negative feedback as well as personalized support and encouragement to actively participate in society.

2.6 Assessments of Healthcare Websites

The Internet has heralded a major change in the dissemination of health and medical information with the promise to improve knowledge transfer from health professionals to the general public, to help patients maintain and improve their health and their general well-being, and to reduce the gap between health professionals and the population in terms of power and communication (Benigeri & Pluye 2003).

According to Grandinetti (2000), in the year 2000 there were more than 70,000 health-related websites. Patients with greater access to appropriate health and medical information expect to have better health outcomes, to have better use of health systems, and to build stronger relationships between patients and doctors. Millions of Internet users around the world today are using email. Many doctors also use emails to communicate with their patients. The use of emails by patients has the potential to expand significantly in the medical world, complementing visits to the doctors, and, improving compliance and access to care.

The Internet is able to facilitate discussions and informal consultations and can reduce barriers to communication. Online discussion forums may enable health
professionals to exchange information and to have increased access to medical findings. Likewise, Web-based forums may enable high quality professional discussions, as most of the sites require registration. In addition, chat rooms facilitate real time conversations, such as Yahoo Messenger and all other instant messaging software. Even though the users’ identities cannot be verified, chat rooms provide moderators or attendants who lead the discussion and remove inappropriate users. One of the four pillars of quality control of health information on the Internet is evaluating information by third parties (Eysenbach et al. 2000).

With the continuous evolution of medical websites, health information is becoming more available on the Internet. For this reason, government initiatives worldwide, especially in developed countries have established several health database websites on the World Wide Web that are accessible without cost to anyone looking for medical information on the Internet and thus take the advantage of this extraordinary medium of communication (the Internet) (Nsuangani & Perez 2006) to reach large numbers of consumers anywhere at any time.

This method of communication has clear risks. Internet communications in an established patient-physician relationship are encompassed by existing mechanisms and standards for accountability: state licensing standards and oversight, and liability laws. All of these are missing in new patient-physician relationships. One important point is the absence of the personal communication and connection that occurs in a face-to-face meeting (Miller & Derse 2002).

However, the shortfall of this rapid development of medical and health information on the Internet raises the issue of the quality of medical and health information (Impicciatore et al. 1997). Judging the quality of health information is not always straightforward. This poses the risk that inaccurate, outdated, or low quality health information can be disseminated. Due to the existence of such a problem, organizations have developed and considered some criteria, for website content, form, accessibility and credibility, which should be considered when evaluating health information (Eysenbach et al. 2000). Until now, the impact of these criteria on the design, form, usefulness, and the use of health information has been relatively
weak as users are unaware of them (Benigeri & Pluye 2003). This implies that although healthcare professionals are recognized as the most reliable source of health information, health consumers have a responsibility to critically question the information source posted on the health website when using the Internet as a secondary source of health issue information (Nsuangani & Perez 2006).

It is essential that the issue of quality and value are perceived by savvy health consumers because it could be potentially damaging to their health to act on incorrect health-related information (Williams, Huntington & Nicholas 2003). An epistemic or perceived value is important because it is may have an effect on a consumer’s level of satisfaction of online health service by enabling consumers to make more informed health decisions, taking an increasingly active role in healthcare and improving coping skills through social support with other online consumers (Goetzinger et al. 2007). The cited literature confirms a positive relationship between perceived value and level of satisfaction (Cronin, Brady & Hult 2000).

Many studies assess the quality of Web-based health information (Wilson 2002; Webster & Williams 2005; Jadad & Gagliardi 2002; Kamel Boulos et al. 2001; Gilliam et al. 2003; Kim et al. 1999; Eysenbach & Kohler 2002). It is interesting to note that Eysenbach & Kohler (2002) examined and reviewed 79 empirical studies, in which authors evaluate a total of 594 websites and 1329 Web pages and, report 408 evaluation results for 86 distinct quality criteria that assessed the quality of health information for consumers on the WWW. Of the 86 identified quality criteria, the most frequently used were accuracy, completeness, readability, design, disclosures and references. Fifty-five studies (or 70%) concluded that quality is a problem on the Web, 17 studies (or 22%) remained neutral, and only seven studies (9%) came to a positive conclusion about the quality of the sites reviewed. The authors concluded that there is a large variation of quality between websites and the quality of medical information on the Web. They argue that differences in study methodological rigor, quality criteria, study population and topic chosen lead to large variations in outcomes, and, that operational definition of criteria are needed.
Sillence et al. (2007) also questioned how patients evaluate and make use of online information based on the design and content factors contributing to either selecting or rejecting the website. Their study provides general support for well-designed websites that should include design factors such as good navigation aids, interactive features and clear layout. High quality of content factors are informative content, relevant information, wide variety of topics, unbiased information, clear, simple language used, discussion groups, and, frequently asked questions sections. For the purpose of my study, it will be essential to look at and closely examine these traits of websites.

Lewiecki et al. (2006) developed measurement tools to determine the quality of osteoporosis websites for use by patients and healthcare providers. Quality indicators are categorised as content, credibility, navigability, currency and readability. Their study concludes that higher quality scores were associated with a higher level of search engine functionality. The authors observed significant variability of website quality. Since this study employs both patients’ evaluations as well as healthcare providers, similar statements from their study about whether the websites offer basic information that is helpful, scientifically correct, easy to find, up-to-date, and easy to understand will be used in my study.

Howitt et al. (2002) also developed a rating instrument for assessing UK general practice websites, and then, evaluated and judged critically the content and quality websites using the website assessment tool. These authors conclude that general practice websites offer a wide range of information, technically satisfactory, but apart from e-mail, these websites do not exploit fully the potential for electronic doctor-patient communication. Their statements about the functionality and currency of the websites will be modified and used to match the purpose of my study.

Several organizations have developed guidelines for assessment of the credibility of health-related websites. For instance, the Health on the Net (HON) organization for medical and health websites developed 8 principles; these are: (1) authority; (2) complementary; (3) privacy; (4) attribution; (5) justifiability; (6) transparency; (7) financial disclosure; and, (8) advertising policy. It should be note that the HON codes
are not specifically a rating system, but are aimed at increasing the quality, soundness and the reliability of health information on the Web by targeting both developers and readers. HON is a self-regulatory, non-profit, non-governmental organization and has a voluntary certification system.

Bomba (2005) reported on validation methods for rating an instrument’s reliability to help designers, evaluators and patients to evaluate the quality of health websites and health information on the Web. The authors questioned whether there should be standard criteria to judge the quality of health information websites. For my purpose, I concluded that quality assessments will be a subjective process and that people, even experts, will assess quality differently. This indicates that consumers’ views about the quality of health information on the website may differ from the views of experts. Therefore, items or elements need to be included or excluded, as with the evaluation criteria will always be debated. Therefore, the next section will describes the concept of interaction design.

Adams (2010) explored renewed concerns about the reliability of online health information in the light of the increasing popularity of ‘Web 2.0’ using 63 various sources including the literature and web reviews. She found that the collaborative aspects of web applications offer new opportunity for patients and healthcare consumers through the creation, sharing and retrieval of information. However, specific issues related to new Web applications now used for health purposes must be addressed. These include disclosure of authorship and information quality, autonomy and privacy, and the ability to apply information to personal situations. Elliot and Shneker (2009) also pointed to low health literacy among Internet users as a major barrier to optimal health communication. Elliot, Charyton and Long (2007) conducted a health literacy assessment of healthcare website. Their findings revealed a gap between health literacy levels among patients and their families and the amount of significant information content of healthcare websites. Furthermore, Hester (2009) also investigated the relationship between health literacy and social communication skills, such as facial expressions, initiating discourse and voice tones, in older adults. The authors found that understanding nonverbal cues related to comprehension of written healthcare information is essential.
Kim and Chang (2007) emphasized the importance to user satisfaction of key functional characteristics in designing and operating health information websites including usage, support and customization.

Many studies, Alalwany and Alshawi (2009), Goetzinger, Park, Lee and Widdows (2007), Hesse and Shneiderman (2007), explored the significance of a user’s perception in evaluating e-health information and services and found a set of criteria that influence users’ utilization and satisfaction of e-health service.

2.7 Interaction Design

Interaction design is defined as “designing interactive products to support people in their everyday and working lives” (Preece, Rogers & Sharp 2002; 2007, p. 6). In this sense, interaction design is about user experiences that improve the way people work, communicate and interact. Thus, the user experience concept becomes central to interaction design. Garrett (2003, as cited in Preece, Rogers & Sharp 2007, p.10) referred to this concept as, “every product that is used by someone has a user experience: newspapers, ketchup bottles, reclining armchair, cardigan sweater”.

According to Preece, Rogers & Sharp (2002, 2007), and the four basic activities for the process of interaction design involve:

1. Identifying needs and establishing requirements to have a better understanding of different users experience for the interactive products.
2. Developing alternative designs to meet the users’ needs and requirements.
3. Building interactive versions of designs to makes it communicable and assessable.
4. Evaluating the constructed versions of the designs throughout the process to ensure the product is usable and the user experiences what it has to offer.

Design evaluation is the heart of interaction design, which is a non-linear and repeated process. Preece, Rogers & Sharp (2002, p. 317) also defined evaluation as ”the process of systematically collecting data that informs us about what it is like for
a particular user or group of users to use a product for a particular task in a certain type of environment”. In other words, its focus is to ensure that the product is usable and acceptable; design evaluation is addressed through a user-centred approach to design, which seeks to involve users throughout the process to obtain feedback and suggestions for improvements. To achieve a clear understanding of the health information system design, a maximum level of users’ satisfaction and better performance should be recognized (Preece, Rogers & Sharp 2002).

Dix et al. (2004) defined interaction design as “achieving goals within constraints” (p. 193). Goals focus more on understanding the purpose of the design and is concerned with what it intends to produce and the users of the design, whereas constraints focus on identifying the resources, materials, standards and requirements (time, cost and health safety) to develop the product. Furthermore, there always will be a trade-off between the choice of goals and constraints, meaning that some goals or constraints can be relaxed to meet others. Human computer interaction requires understanding the capacities, limitations, tools, and platforms of the computer and human behaviour (psychological, social aspects and human error) to produce the system design. It is expectable for humans to make errors or mistakes because it is part of human nature. This emphasizes the need for system designed to reduce the occurrence of such mistakes. For instance, it is important to understand the material, its failures and strengths, and, to build in safety features in physical design.

According to Dix et al. (2004), the process of design begins with identifying the product requirements with the use of a number of techniques such as interviewing people, videotaping them, studying and inspecting the documents and materials used and observing people directly. The findings are then analysed to bring out the key issues and communication that will be useful in later stages of the design. Then, the evaluation of design for its usability, which involves using some form of prototyping to see how well the system is working and where there can be improvements.

Interaction design is a challenging and a serious problem for growing multiple users with variable capabilities who are faced with a constantly evolving range of sophisticated technologies and services. They also have to take account of the many
factors that affect quality for end-users (Pirhonen et al. 2005). However, identification of specific users’ needs will enhance the usability of the system. On the other hand, it is often possible for designers to assume that all end-users understand what is obvious for designers. However, users’ needs and desires are usually different from those experienced by designers; designers actually design the product, whereas users do not use the product until it is finished. Users may not agree with the designer’s sense of design. Communication with the system’s users is an essential aspect as it provides a deep understanding of the organizational functions and activities; also, a close observation provides an understanding of the whole process of design. In fact, there may and likely will be different “sets” of users, each with distinct needs. To bridge this disconnection between users and designers, Web developmental teams should adhere to four goals to achieve a good design (Cooper & Reimann 2003, cited in Butow 2007):

1) Ethical: the design should help improve the users’ lives by excluding unnecessary information that distracts the users and makes them less efficient in completing tasks.
2) Purposeful: the design should have a purpose to not only help users achieve their goals, but also understand their limitation.
3) Pragmatic: the design should meet the requirements of all stakeholders-users-engineers, marketers, managers, and others – and overcome the gap between users and designers.
4) Elegant: the design should be as efficient as possible to gain users’ ongoing interests; all parts of the design must feel like they work together as a whole.

Typically, systems are designed without knowing and ignoring the needs of the users and human factors; the systems are designed only to perform set functions and to perform the task from an engineering or technical perspective. For this reason, the system designs are often not interactive and do not perform the tasks needed by real people. Emphasis should be placed on increasing the need to incorporate usability and the purpose of the systems for the users in designing an interactive information system. The key elements to consider in the interactive systems include ease of use, effectiveness and enjoyableness from the users’ perspective. Preece, Rogers & Sharp
(2002) identified that the purpose of the interactive design is to: enhance the effectiveness, efficiency and safety of the use, good utility (usefulness) for users in order to perform the needed tasks; be easy to learn and user friendly, so the users can remember how to use the product, and, it can be enjoyable, helpful, motivating and pleasurable from the user’s perspective.

Therefore, when considering the usability of the design it is important to consider the following: firstly, when, where and who is going to use the system, and secondly, it is important to understand the activities people do when interacting with the product. This helps determine the type of activities the system needs to support and optimize the users’ interactions with the system (Preece, Rogers & Sharp 2002). Hence, to design the system, it is important to develop a conceptual model that envisions the proposed products based on the users’ needs and requirements identified by a clear understanding of the problem, i.e. what the systems are intended to do. The conceptualization process involves designers in contemplating how the design will assist the users to perform their activities using their assumptions.

Te’eni, Carey & Zhang (2007) indicated that the process of interaction is one where users care about what to enter as input into the system and what they get out as the output from the system; thus, how the experience of the entire interaction of the interface feels. Given the system has the functionality to make it useful and helpful to the user; it is expected to be usable too. The main purpose of this interactive design of the product is to ensure its usability, i.e., how easily the product is to be understandable to its users, its effectiveness and its enjoyment of use. To design an interactive product/service requires an understanding of the situation and ways to improve it. It also requires effective ways to identify the strengths and weakness when designing a system; for instance, to compare existing systems with ‘good’ and 'bad' designs, which will better assist in creating an understanding of the designing process and identify options for improvement. To make the systems enjoyable to use, a ‘good’ or user-friendly design is constructed through involving users and getting to know what is in their minds regarding a ‘good’ design.

The growth of well-designed interactive systems is credited to an interdisciplinary
approach that has led to a better understanding of the dynamics of human needs. According to Preece, Rogers & Sharp (2002), good interaction design acknowledges the importance of understanding how users act and react to events and how they communicate and interact together, what makes people from a variety of disciplines and fields become involved and cause the design to succeed. The need for other disciplines in interacting in relation to product design became apparent with increased awareness and the extended use of systems by the larger community (Preece, Rogers & Sharp 2002). Furthermore, Preece, Rogers & Sharp (2002) indicated that the major challenges of the interactive designs are the design work and the communication of the design work. A written report is essential in communicating with the clients, which creates common terminology. Using common terminologies can establish the medium to communicate the systems design between the designers and clients. In addition, users’ training can further improve their attitudes, behaviours and performance using the design process to incorporate improvements to the design.

2.8 Human-Computer Interaction (HCI)

The main difference between interaction design and Human-Computer Interaction (HCI) is their scope (Preece, Rogers & Sharp 2007). Interaction design has a wider focus, centres on the theory, research and practice of designing user experiences for all types of technologies, systems and products, whereas HCI traditionally has had a narrower focus as being “concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them” (ACM SIGCHI 1992, p.6; Hewet et al. 1996).

Te’eni, Carey & Zhang (2007, p. 2) defined human computer interactions (HCI) in the context of organizational work that attempts to understand, establish and “shape how people interact with computers, the process they engage in, and the resources they use, and the impact they accomplish”. The quality of HCI relies on a well-defined interaction design that mimics the human-computer engagement or interaction processes. Therefore, the aims of HCI is to increase user effectiveness.
and improve user computer experiences with organizational systems and to understand how the interface or the human system can achieve high quality design through performance and usability, but incorporates human emotions such as physical and social experiences of the interaction.

According to Te’eni, Carey & Zhang (2007), users are now expecting a standard of usability because poor usability will result or lead to a poor design, thus, high loss of the organizational revenues because the customers abandon the system and are dissatisfied with it. The US Military produced human engineering design criteria, such as, achieving the required performance, minimizing skills and personnel requirement and training time, achieving reliability of personal human-computer combinations, and, fostering design standardisation within and among systems. Nielsen (1993) (cited by Te’eni, Carey & Zhang 2007) identified the following usability themes:

- Time to learn how to use and operate the system
- Speed of performance
- Rate of error made by users
- User’s retention time of information
- User’s satisfaction with the system

HCI draws on many disciplines and involves the design, implementation and evaluation of interactive systems in the context of users’ task and work; HCI is an essential part of the design process. One of the key elements in HCI design is to recognize and understand all the users. For instance, the call centre in an organization records all incoming callers’ requests and queries, which are then sent to respective sections for appropriate action. The collected data from the call centre used to identify customer satisfaction and recognize the numbers of customers’ complaints will improve the product or services in an organization. Users of the system were divided up into two categories: direct users of the system who receive the call and record the information and, indirect users who use the information from the system to further enhance organizational improvement. For an organization, it is easier to determine the system’s direct users than to identify indirect users; however, the best
way to identify the indirect users would be to ask the people who works in the organization (Dix et al. 2004).

Preece, Rogers & Sharp (2002; 2007) explained the importance of involving users in the development phase so as to ensure that users’ activities are taken into account. Developers can gain a better understanding of users’ needs and requirements, which leads to a more usable product; to create a sense of ‘ownership’ among users so they feel they have contributed to the product’s development, and, managers ensuring that real users’ views are incorporated into the design of the new product. To better manage expectations and to create a feeling of ownership, different degrees of user involvement may be implemented. Preece, Rogers & Sharp (2002) further emphasized the importance of high degrees of user involvement by explaining advantages and disadvantages in each situation. If users are full-time, then they become more familiar with the system and its rationale, but if the project continues over years, the user may lose touch with the users groups and their contribution may become less valuable. On the other hand, a part-time user can be more effective in long-term phases in providing important development information. However, the degree of involvement may vary in different situations and circumstances as appropriate. The major reason for not involving users is that it is time consuming and probably very costly to manage the input, organize and control such involvement.

Preece, Rogers & Sharp (2002; 2007) also emphasized the need for a user-centred approach in developments where real users and their goals are the driving force in the development of the product. As a result, a well-designed system should utilise human skill and judgement, relevant to the work at hand, and, support the users. In addition, the authors discuss three key principles of interactive design as revealed by Gould and Lewis (1985). Firstly, the early focus on users and tasks through understanding users’ behaviour, characteristics and so on. Secondly, empirical measurement by recording and measuring intended user’s reactions from early development stages, and, lastly, iterative design that involves user testing to fix the problem and to perform more testing in order to further improve the system. Iterative designing has become widely accepted.
2.9 The Concept of Usability

As discussed in Chapter 4 (Section 4.2), the early definition of usability by ISO9241-11 International Standard Organization (1998) focused on effectiveness, efficiency and satisfaction dimensions. Similarly, Te’eni, Carey & Zhang (2007, p. 3) also defined usability as, “the extent to which a system with a given functionality can be used efficiently, effectively, and satisfactorily by specific users to achieve specified goals in a specific context of use”. This definition binds the entire systems design and development process together.

There are some main limitations or weaknesses that exist behind the previous definitions of usability. When usability is defined external elements to the system that includes users, tasks, goals, and context are must also be taken into account. For instance, Shackel (1986 as cited in Te’eni, Carey & Zhang 2007) proposed four, high-level operational criteria or goals to numerically measure and specify usability:

a) Effectiveness: a required level of performance by a percentage of specific users within a range of usage environments;
b) Learnability: a pre-defined time period from the start of user training and based on a specified amount of training;
c) Flexibility: the levels of adaptation and variability in possible tasks; and,
d) Attitude: user satisfaction levels after continued use.

Nielsen (1993) revealed that usability is a narrow concern when compared to the issue of system acceptability and models usability, as an attribute of system acceptability. However, Similar to Shackel (1986), Nielsen argues that usability itself can be further broken down into five defining attributes or goals (cited in Te’eni, Carey & Zhang 2007)

1) Learnability: the system should be easy to learn;
2) Efficiency: the system should be efficient so that high levels of productivity are possible;
3) Memorability: the system should be easy to remember and not require re-learning;
4) Errors: the system should have low error rate and enable quick recovery after errors; and,

5) Satisfaction: the system should be pleasant to use.

Preece, Rogers & Sharp (2002) adds safety to their list of defining criteria and/or goals, describing usability as the protection for users from dangerous and undesirable situations. Preece, Rogers & Sharp (2007, p. 22) also added utility to the list that refers to “the extent to which the product provides the right kind of functionality so that users can do what they need or want to do”.

In a more comprehensive review, Hornbaek (2006) reviewed current practice in measuring usability by categorising and discussing how usability is measured based on the ISO definition and, analysed problems with the measures employed from 180 studies published in HCI journals. The author reported some problems on how usability measures are employed such as, 1) the quality of interaction measure 2) almost one quarter of the studies do not assess the outcome of the user’s interaction; 3) measures of learning and retention, e.g., of how to use an interface, are rare; 4) some studies are unclear or weak on how users interact with an interface in the terms of quality in-use; and, 5) some studies ignore users’ satisfaction viewpoint.

According to Stone et al. (2005), the selection of the most appropriate usability metrics should depend on the type of the system application being tested. For instance, with information retrieval applications, the key design criteria are search time, whereas with a word processing application, the efficiency and effectiveness of producing a document would be the important design criteria.

With the more widespread use of computers, the knowledge, skills and experiences of computers users have become very broad. Therefore, universal usability is essential because it is simply good design for systems that potentially will be used by anyone. Universal design is a young and new discipline that focuses more on users’ experiences and makes explicit needs to accommodate users with different skills, knowledge, age, gender, (dis) abilities and so on. In the health context, this paves the way for future developments such as personal medical devices, improved healthcare
systems, and, expanded government services. It also focuses on designs that bridge the gap between what users know and what they need to know, user diversity, and, technology diversity (Lazar 2007). For example, Cohene et al. (2007) (as cited in Lazar 2007) indicate that user-centred design for Alzheimer’s disease holds many challenges:

1) The ability to communicate and interact with the user group.
2) Accessibility for participants has a greater impact on the entire design.
3) The challenge to meet the needs of a broad range of stakeholders includes relatives, friends and healthcare providers.

2.9.1 Website, Website Usability, Website Design
A website is an information resource set up as one complete system (Lin, Zhang, Koubek and Mourant 2006) on the World Wide Web. It is considered to be a group of functional attributes that are connected to each other to satisfy the needs of the users (ibid). Websites can be classified into four distinct categories based on the purpose of their use: information source, entertainment, communication and commerce (Lindgaard and Dudek 2003). A successful website has ‘user friendly’, usable and functional aspects (Lee and Koubek 2010).

Earlier, Chapter 4 (Section 4.2) and Section 2.9 of this chapter presented various definitions of usability. In general, usability can also be defined as a “the measure of the quality of a user’s experience when interacting with a product or system- whether a website, a software application, mobile technology, or any user-operated device” (U.S. Department of Health and Human Service 2011). The usability of a website has traditionally been defined in terms of perceived ease in which users can access desired information (Nielsen 2000b). Therefore, the term Web usability is focused on HCI and user-centred design (Jaspers 2009). When applying usability to Web applications, the main tasks of the Web include: locating desired information and services by direct search or discovering new information by browsing, comprehending the presented information and other required tasks, Web usability
can be therefore used to support web applications and online tasks with effectiveness, efficiency and satisfactions (Nielsen 2000b). Lazar (2006), Brinck, Gergle and Wood (2002) and Pearson and Pearson (2008) defined Web usability as making the design simple enough for the users who are goal-driven to accomplish the required tasks with minimal efforts.

Shneiderman (2005) states that interface design can be a balanced act between adequate functionality that will deliver the application as useful while simplicity that makes an interface easy to use. He also stresses the importance of having designers go beyond ‘user friendly’ design and understand the genuine needs of the users. Web usability can benefit business organization because a usable website reduces the costs related to development and maintenance and increases the return on investment (Pearson and Pearson 2008).

Many studies have found website usability as an important determinant of user satisfaction (Pearson, Pearson and Green 2007; Adbinnour-Helm, Chaparro and Farmer 2005; Sindhuja and Dastidar 2009; Pearson and Pearson 2008; Falvian, Guinaliu and Gurrea 2006; Tan and Wei 2006). This implies that the web designers should focus on consistency and accuracy of the information along with content, learnability, navigability and other factors while designing a website to a predefined the level of users’ satisfaction. Designing a website through applying principles of best usability practice can be an effective way to deliver real value to its users (Van Duyne, Landay and Hong 2007).

Web design is a relatively new term. It was initially considered as being solely a technical activity performed by skilled technician to ensure the functionality and usability of the website (Alby and Zucchermaglio 2008). Recently, the importance of social collaboration among designers including technicians is highly recommended to ensure the effectiveness of websites (Aakhus and Jackson 2005; Alby and Zucchermaglio 2008). Van Duyne, Landay and Hong (2007) suggested that it is necessary to examine the principles that define a website’ objectives, tracking visitor activity and maximizing its visibility for a successful Web design to deliver real value to its users.

Vila and Kuster (2011) analysed the effect of a well-designed website on consumers’ attitudes and behaviours. Their study found that a well-designed website with security indicators and plenty of informative content satisfies the users. However, it is not possible for a well-designed website to bring about all desired effects because consumers’ preferences vary widely and there is a divergence of consumer values.

2.10 The Concept of Interactivity

Interactivity is highly linked to computer-mediated communication because it is seen as a critical advantage of the medium where communicators are offered ‘two-ways communication’ opportunity (McMillan 2009; Fortin & Dholakia 2000; Rafaeli & Sudweeks 1997; Williams, Rice & Rogers 1988). Because of the nature of interactivity and the function of the Web, in which Web users are able to transmit and receive messages, new communication designs are needed. While the traditional static media models offer the opportunity of one-to-many communication, the Web is about the “many-to-many” channel of communication (Hoffman & Novak 1996; Rust & Oliver 1994).

Much of the literature created manifold definitions for the concept of interactivity, which makes it difficult to practically apply the concept (Gustavsen & Tilley 2003; McMillan 2002; Jensen 1998). Before the advent of the Web, interactivity was assumed to be an attribute of interpersonal communication (Morris & Ogan 1996). With the rapid rise of the Web, interactivity appeared as a unique attribute that distinguished the Web from traditional media. Although the concept of ‘interactivity’ has not only been used widely in many different disciplines, it also has insightful
appeal, the concept is still under-defined and remains a buzzword, in which many people apply it and few scholars have defined it (Wu 1999; Rafaeli 1988; Jensen 1998; Kenny, Gorelik & Mwangi 2000).

The concept of interactivity has been defined and used in many disciplines. For example, in the field of Human-Computer Interaction (HCI), interactivity is conceptualised and focused on improving the interface of computer hardware and software because HCI is ‘situated, particular, detailed, gritty, error-prone, and largely non-determined reality’ (Thomas 1995, p. 2). Jensen (1998) suggested that researchers in the field of HCI have identified the determinants of the interactivity concept in terms of the control that exists between the human or users and the computer as the key determinant of interactivity. From a sociological perspective, Jensen (1998, p. 188) defined interactivity as ‘the relationship between two or more people who, in given situation, mutually adapt their behaviour and actions to each other’.

However, much of popular and scholarly literature on computer-mediated communication conceptualized interactivity based on three primary perspectives: structure (features), process (or users), and perception (McMillan 2009).

From the structure perspective, interactivity is conceptualised around the features of the new media in a way that makes it different from traditional media where content analysis method are often used (Deighton 1996; Hoffman & Novak 1996; Rafaeli & Sudweeks 1997; Rice & Williams 1984)

Some researchers conceptualise interactivity as a uni-dimensional construct while others propose a multidimensional construct of interactivity (Ghose & Dou 1998; Ha & James 1998; Stout, Villegas & Kim 2001; Macias 2003; Sundar, Kalyanaraman & Brown 2003). For example, Ha and James (1998) analysed the content of business websites by examining certain dimensions. Their primary interest was to examine the concept of interactivity as a characteristic of two-way communication and to determine elements of website effectiveness. Ha and James (1998) conceptualised interactivity from a uni-dimensional perspective where interactivity is “seen as
consisting of the availability of the choices available, and of unrestrained navigation in cyberspace” (p. 457). From this perspective, the prevalence and the frequency of interactivity were identified by particular features in the World Wide Web.

Ha and James (1998, p. 457) also proposed a multi-dimensional approach to interactivity where interactivity is defined around five dimensions, where each dimension was tied to corresponding characteristics including playfulness, choice, connectedness, information collection and reciprocal communication. Ha and James concluded that the business websites use fewer dimensions of interactivity. Their contribution to website content analysis lies in recapitulating existing theoretical approaches to the interactivity from the communication perspective, and, identifying dimensions of interactivity.

Ghose and Dou (1998) analysed 101 websites and examined the use of functions related to the “Lycos Top 5 percent” websites list, which is one important measure of effective websites, and related these interactivity dimensions to the quality of the selected websites. They found that the interactive functions were an improved indicator of commercial website quality (Ghose & Dou 1998; Novak & Hoffman 2001; Parasuraman, Valarie & Leonard 1988).

Sundar, Kalyanaraman and Brown (2003) conceptualized interactivity as a user-to-system perspective, in which a utilization of content delivery, in a political candidate's website, in terms of users occurred in a contingent way. Their findings reveal that any increase of interactive tools on a political candidate's website results in a more positive impression of the political candidate (Sundar, Kalyanaraman & Brown 2003).

From the users’ perspective, the most interactive media is the one that comes closest to face-to-face communication. Conversational media such as video conferencing is considered more interactive than consultative media such as computer-based online services (Jensen 1998). Thus, the concept of interactivity refers to media patterns of both consultative and conversational type.
It was in this sense that Miller in Jensen (1998, p. 191) defined interactivity as “a reciprocal dialogue between the user and the system. From this perspective, interactivity is understood to be user’s active participation in directing the flow of information of the computer as a system, which allows information exchange with the user and the input from the user to be processed in order to create the proper response within the context of the program (Jensen 1998, p. 191). According to Miller in Jensen (1998), interactive media involves “the viewer as a source of input to determine the content and duration of a message which permits individualised program material.

Several studies centre on interactivity as enabling the role of users’ feedback. For example, Steuer (1992, p. 84) defined interactivity as ‘the extent to which user can participate in modifying the form and content of a mediated environment in real time’. Steuer also proposed three major factors that affect interactivity. First, the speed of interaction that deals with response time (the more immediate users perceive their actions the higher they perceptive interactivity); second, the range in terms of how many options a user has in making changes in a mediated environment; and finally, mapping which deals with, ‘the way in which human actions are connected to actions within mediated environment’ (Steuer 1992, p. 86). The speed of interactions and range of the Web seem to indicate how responsive users perceive the Web whereas mapping seems to indicate how users perceive themselves as controllers of their actions in a computer mediated environment.

Meanwhile, Rafaeli (1988) defined interactivity as a variable quality of communication settings that referred to how reciprocal a particular exchange was. Rafaeli (1988, p. 111) defined interactivity as ‘an expression of the extent that, in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchange referred to even earlier transmissions’. Rafaeli and Sudweeks (1997, p. 121) later revised this definition as, ‘the extent to which messages in sequences relate to each other, and especially the extent to which later messages recount the relatedness of earlier messages’. His conceptualization of interactivity was the first to be applied to Internet research. Similarly, an experiment was constructed and conducted by Macias (2003, p. 4),
where she defined interactivity as, ‘the state or process of communicating, exchanging, obtaining and/or modifying content and/or its form with or through a medium’. Macias (2003) examined the relationship between interactivity on a company’s website, with comprehension and persuasion regarding company products.

Rogers (1986; 1995) suggested that in a fully interactive media, senders and receivers roles are interchangeable. Furthermore, Rogers (1995) identified that user control over mutual discourse is one of the keys elements of interactivity. Bretz (1983) described three criteria that must be met in order for a system to be interactive: transmission of message, response from one side of the participants, and, reaction from the other participants. Rafaeli and Sudweeks (1997) defined interactivity as, ‘the extent to which messages in a sequence relate to each other, and especially the extent to which later messages recount the relatedness of earlier messages’. In this sense, interactivity is viewed as not a characteristic of the medium used, but process-related.


From the perception perspective, Newhagen, Corders & Levy (1995, p. 166) were the first to conceptualize interactivity as a ‘two-dimensional construct: internally based self-efficacy and externally based system efficacy’. Internally-based efficacy means that users exercise control over their actions in computer-mediated environments, while externally-based efficacy indicates how responsive the Web media is as a system to their actions.

Based on users’ perception perspective, the review of existing literature proposes multiple definitions of interactivity. For example, Wu (2000) viewed interactivity as the subjective experience of an individual user, and, defined it as, ‘the extent to which a person perceives he or she has control over the interaction process, his or her communicative counterpart (a person, a mass-mediated environment, or a computer
mediated environment) personalizes and responds to his or her communicative behaviour’ (Wu 2000, p. 41). This approach identifies certain personal characteristics of users by categorizing the way they perceive the same medium and message differently.

Similarly, Downes & McMillan (2000) interviewed individuals who hold the responsibilities of teaching, researching and creating content in the evolving environment of computer-mediated communication (CMC) to explore their individual’s perception toward an interactive media. Based on those interviews, they identified primary dimensions of interactivity. The main dimensions that emerge from their study are direction of communication and control of the communication experience.

Bucy (2004, p. 377) argued that identifying interactivity as a perceptual variable "routinizes the concept and makes it a part of everyday media experience," and further, encourages "the concept's theoretical development by enabling empirical measurement through attitudinal and emotional scales".

Many scholars have focused on conceptualizing the term interactivity by combining all three approaches: features of the medium, process and the perception of users. One of the pioneering studies and the most worthy of consideration when studying interactivity via websites using content analysis is Heeter (1989). This study has adapted Heeter’s (1989) six dimensions of interactivity, namely (1989, pp. 221-225):

- The complexity and availability of choice: users are provided with a range of choices (selectivity).
- The effort users must exert: the amount of effort users must take to access information.
- The responsiveness to the user: the degree to which the medium can react to users.
- Monitoring of information use: potential tools to monitor system use.
- Ease of adding information: the degree to which users can add information to the system.
- Facilitation of interpersonal communication: the degree to which the media system facilitates interpersonal communication.

There are reasons for adopting her six dimensions of interactivity in this research. Firstly, Heeter (1989, p. 17) conceptualised interactivity in a broader perspective where she defined interactivity as, 'actions the participant is capable of observing through one or more senses over whatever channels exist to connect the participant to the experience'. Under a participant-centred conceptualization, user’s experience with a particular technology was the main focused (Heeter 2000). Therefore, interactivity is not only the medium itself, but more of what occurs through the medium. Secondly, interactivity of health websites could be the main contributor to overall economy improvement because the enormous growth of the new sites available on the Web brings challenges to the online healthcare industry, in reaching the vast majority of people and having them exhibit ‘stickiness’ to the website, with the aim of being able to reduce the cost of healthcare and increase the quality of care (Meyer 1996; McNeil 1996; Hernandez 2009).

Chapter 4 (Section 4.8.3) further discussed Heeter’s (1989) dimensions in greater detail. Heeter interactivity dimensions were applied in various disciplines, including marketing, CMC, Journalism, HCI and information systems. Table 2.3 demonstrates and summarizes the diversification of Heeter’s dimensions as applied to various disciplines.

2.10.1 Defining the Interactivity Concept as a Continuum

Apart from multiple dimensions of interactivity, some studies clearly focused on conceptualising interactivity as a continuum (Fortin 1997). When defining interactivity as a continuum, interactivity is seen as a quality of communication setting that can be presented in varying degrees within the same medium (Rafaeli 1990). Therefore, it is not just a matter of ‘either you have it or you don’t’ (Heeter 1989; Vorderer 2000). Instead, ‘there is a continuum that acknowledges different degrees of interactivity: continuous interaction with the media being at one extreme and having the potential only to start or stop a reception at the other extreme’
(Vorderer 2000, p. 25). Heeter’s definition of interactivity would fit in what Jensen called the continuum approach.

Steuer (1992, p. 80) conceptualised interactivity as, ‘the degree to which users of a medium can influence the form or content of the mediated environment’; these are two intertwined concepts. This bi-dimensional approach of interactivity would also fit into the continuum approach.

Meanwhile, Rogers (in Jensen 1998) defined interactivity as a continuum:

‘the capability of new communication systems (usually containing a computer as one component) to ‘talk back’ to the user, almost like an individual participating in a face-to face or relatively similar type of conversation. Interactivity is a variable; some communication technologies are relatively low in their degree of interactivity (for example, network television), while others (such as computer bulletin boards) are more highly interactive’ (p. 192).

From this perspective, interactivity is related to a context of interpersonal communication. Such a definition allows various communication technologies to be placed on a continuum from ‘low’ to ‘high’ depending on their degree of interactivity. For example, a website could simply have a page of the text without any links, search engine, emails, or feedback options and may rank very low on the interactivity continuum, even though it is a part of a potentially highly interactive medium compared to television or other traditional media. On the other hand, some television broadcasts such as shopping channels that allow for immediate response through the use of toll-free numbers would rank much higher on the interactivity continuum spectrum.
Table 2.3: Interactivity Framework as Applied in various Studies

<table>
<thead>
<tr>
<th>Researchers</th>
<th>Discipline</th>
<th>Interactivity Framework Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ha and James (1998)</td>
<td>Marketing</td>
<td>Playfulness, Choice, Connectedness, Information Collection, Reciprocal Communication</td>
</tr>
<tr>
<td>Jensen (1998)</td>
<td>CMC</td>
<td>Transmissional, Consultational, Conversational, Registrational Interactivity</td>
</tr>
<tr>
<td>Dholakia et al. (2000)</td>
<td>Communication</td>
<td>User Control, Responsiveness, Real Time Interactions, Connectedness, Personalization/Customization, Playfulness</td>
</tr>
<tr>
<td>Downes &amp; McMillan (2000)</td>
<td>CMC</td>
<td>Direction Of Communication, Time Flexibility, Sense of Place, Level of Control, Responsiveness, Perceived Purpose of Communication</td>
</tr>
<tr>
<td>Leung, Chan &amp; Wu (2002)</td>
<td>Education</td>
<td>Control and Message</td>
</tr>
<tr>
<td>Kiousis (2002)</td>
<td>CMC</td>
<td>Technological Structure of The Media Used, Characteristics of Communication Settings, Individuals’ Perceptions</td>
</tr>
<tr>
<td>Researcher</td>
<td>Domain</td>
<td>Elements</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Gustavsen &amp; Tilley (2003)</td>
<td>Public Relations</td>
<td>User Control, Personalisation, Responsiveness, Connectedness, Real Time Interactions, Playfulness</td>
</tr>
<tr>
<td>Paulussen (2004)</td>
<td>Journalism</td>
<td>Choice Complexity (Responsiveness, Facilitation of Interpersonal communication, Ease of Adding Information, Immediacy), Hypertextuality, Multimodality</td>
</tr>
<tr>
<td>Yadav &amp; Varadarajan (2005)</td>
<td>CMC</td>
<td>Bidirectional, Timely, Mutually Controllable, Responsive</td>
</tr>
</tbody>
</table>

*Note: CMC means ‘Computer-Mediated Communication’
2.10.2 Interactive Features

In this study interactivity is defined as a multi-dimensional construct that forms on a continuum. The categories of interactivity are manifested through various forms of interactive features that fall on that continuum, as explained on previous section (Section 2.10.1). Interactive features that characterize new media include online chatting, sending emails, bulletin boards, multi-media downloads, and polls…etc. Interactive features that utilize characteristics of media and allow partial human-human communication are considered middle-ground interactive features. For instance, customization options that provides a means for users to modify information and express their views but do not generally support exchanging of ideas resides between the two extremes of medium interactivity and human interactivity (Chung 2008; Stromer-Galley 2000). Features that promote interpersonal communication are considered as higher levels of interactivity. These features include e-mail links, chat features and bulletin boards. From this perspective, interpersonal communication or user-to-user mutual communication is considered to contribute to a key distinction between traditional forms of healthcare delivery and online health in that the people can participate as active agents through interpersonal communication.

2.11 Chapter Summary

This chapter forms the basis of the upcoming work that will be presented in the following chapters. In this chapter, an in-depth review of the relevant previous literature of online health consumers, their ultimate and increased needs, and, their perceptions towards ICT was presented because it is important to consider the nature of these needs in the context of how the future health information system can best be provided. It is anticipated that such systems will be highly interactive, but there is little research in this area. Therefore, this research sets to fill this gap in the literature.

This research proposes that usability, and particularly, the concept of interactivity within the new media will be significant to the future of online health in improving health outcomes at a lower cost to health systems. The subjective nature of the concept of interactivity is central to the research objectives. The methodology
leading to the use of methods (including Web content analysis and Q Methodology) will be presented in Chapter 4. This is necessary because it should be understood within the broad topic of my research, which addresses the content, layout and functionality of health websites in general, in order to learn how health information systems can improve healthcare outcomes. The focus of my study will be on online health and palliative care where a particular website is in the process of being redesigned during the course of the study.
CHAPTER 3

RESEARCH DESIGN, METHODOLOGY & THEORETICAL BASIS

3.1 Introduction
The selection of any research design involves three related steps (Crotty 1998; Sarantakos 1998). The starting step in developing a research design is locating the research study within an appropriate paradigm of research inquiry. The choice of research paradigm governs the selection of an appropriate research methodology, which is the second step. The chosen research methodology indicates what methods to use in the data collection and analysis of data, the third and the final step.

In addition to the methods used, my research study applies the philosophical framework of Activity Theory to interpret the findings within the paradigm. This research design and its choice of paradigm is suitable to address the gap in the literature, as there is lack of studies into online health involving interactivity and, leading to better healthcare outcomes, as identified in Chapter 2.

The choice of the methodologies and methods are often referred to as the processes that researchers use to fulfil the aims of my study and help answer the research questions. This chapter provides the justification for the choice of the methodologies and methods, which are related to the underlying assumptions about the social reality and the understanding of human knowledge. Therefore, theoretical perspective, methods, methodology and epistemology will underpin and construct the design for the current research.

With respect to the purpose of my study and the research questions as stated in Chapter 1, my study is comfortably placed within an epistemology (often referred to as a paradigm) of constructionism, which is also often used interchangeably with constructivism (Crotty 1998) and the theoretical perspective of interpretivism. The aim of my study is to explore the understandings and meanings of human beings (individuals) and their social and cultural world. The corner stone of constructionism
is the social construction of meaning, and therefore, my study is aligned with a
constructionism epistemology. It was considered appropriate to use an interpretive
approach and multiple (mixed) research methods to gather data in order to respond to
the aims and objectives of my study and provide information relevant to answering
the questions proposed. This approach would provide the researcher with a wide
range of data gathered from a number of participants and settings through a variety
of methods.

Thus, this chapter begins with an overview of the research paradigm adopted in the
thesis. The major part of this chapter then follows and includes a presentation of the
research approach, which is qualitative in nature rather than data-oriented. The
research design identifies the thesis’s epistemology and theoretical perspective and
further discusses the research methodology and the practical approach adopted to
achieve the objectives of my thesis. This study used a research strategy chosen due to
its ability to investigate the phenomenon of a health, Web-based information system.
Data was collected using three methods: Q Methodology, usability testing and
content analysis. The chapter also looks at the qualitative analysis techniques that
were used for analysing data. The chapter also provide an overview about Activity
Theory including its background, development and principles. This chapter ends with
an ethical clearance considerations.

3.2 Research Approach

3.2.1 Qualitative versus Quantitative Research Approach

Qualitative and quantitative methods are two broad approaches to research and are
often used in social studies, including information systems. The distinction between
qualitative and quantitative research is a methodological issue that have been
explained by a number of different studies (Thomas 2003; Corbetta 2003; Mack et al.
2005). The basic difference between the two methods are reflected in some major
areas, including: their analytical objectives, types of research questions created, types
of data produced, and the degree of flexibility in the design of the research (Mack et
al. 2005). Qualitative research places its emphasis on the interactive process of
discovering how the social meaning is constructed, and, it is not rigorously measured
in terms of quantity, intensity, or frequency, and stresses the relationship between the researcher and the topic being investigated. Conversely, quantitative research is based on the hard, objective and standardised types of data, measurement and the analysis of casual relationships between variables, not processes. While qualitative research involves soft, deep, rich and non-numerical interpretation of social phenomena for discovering the underlying meaning of relationships, quantitative research on the other hand involves numerical representation and manipulation of observations for the purpose of explaining the phenomena (Denzin & Lincoln 1994; Zikmund 2000; Creswell 2003). Variables and relationships are the central idea in quantitative research (Neuman 2006).

In quantitative research, it is necessary to have a detailed planning process prior to data collection, as a tool for measuring concepts, planning design stages, and, dealing with sampling issues. Because of the fundamental differences between the two approaches, the quantitative approach prefers to employ a deductive model where theory precedes observation in testing the relationship between the variables to provide evidence for testing the existing hypothesis. On the other hand, qualitative research prefers to use an inductive model, which is open and interactive and where observation often precedes theory. That is, data collection discovers information from the perspective of participants about the social phenomena, such as behaviour, attitudes and perceptions that are not directly observable (Neuman 2006; Corbetta 2003). The findings in qualitative research are not used to test a theory and make generalisations about a population, but rather to build or modify a theory (Aaker, Kumar and Day 2001; Bryman 2008).

3.2.2 The Selection Qualitative Research Approach for This Study
The qualitative approach has been deemed to be appropriate for my study for two main reasons: first, by its nature, the qualitative approach or interpretive research approach is capable of yielding significant levels of rich data and thus allows my research to develop an understanding of the meaning or nature of other’s experiences, attitudes and perceptions. When the information about the social phenomena is limited and not well understood discovery is an important aim of the
research and can be prematurely used, quantitative research methods can lead to inclusive findings (Denzin & Lincoln 1994). The outcomes of data can be beneficial in identifying patterns, themes and processes that may be valuable for the limited-known area of research. In other words, the characteristics of a qualitative approach are consistent with the objectives of my study to gain an in-depth, holistic view and clearer and fuller picture of the online health context (Sarantakos 1998; Creswell 2003; Miles & Huberman 1994). A qualitative approach was required to explore and uncover this complex topic in depth. A qualitative approach was required because it allowed flexibility in gathering information and exploration of issues. This information will be used to assist in the building of a theory. To obtain the depth and detail of qualitative data required understanding the complex phenomena, the researcher needs to get close to the phenomena under study. The psychologically closer the researcher gets to the phenomena, the clearer it gets (Deshpande 1983). Consequently, this assists the researcher in maintaining the original themes, concepts and forms of data collected, and, these can be reviewed with participants (Miles & Huberman 1994).

The **second reason** for using a qualitative approach for the current study is that it assumes that realities can be perceived differently by individuals involved in it and, these realities benefit from their interpretations, rather than being measurable by a researcher. In other words, qualitative methods provide an opportunity for participants to express their views, perceptions and feelings to facilitate the construction of social meaning and sense making of reality.

### 3.2.3 Inductive versus Deductive Research Approach

It is important to distinguish the research approach in terms of whether it is inductive or deductive. An inductive approach is known as building or developing theory, which is usually associated with qualitative research in which research starts with data collection in an attempt to develop a theory. Once the researcher has collected data, the researcher can conceptually determine if further data collection is necessary to generate further theory. The deductive approach is known as theory testing and is associated with a quantitative approach, in that the researcher starts with a theory or
hypothesis and design research strategy to test the relationships between variables (hypothesis) and to provide evidence for or against a pre-specific hypothesis (Saunders, Lewis, & Thornhill 2007; Neuman 2006; Bryman 2008).

This research utilises an inductive approach associated with qualitative methods where the researcher start with data collection and systematically analyses participants’ subjective views and opinions. Then the study conceptualises the findings using Activity Theory to further interpret the results of this study.

3.3 Theoretical Paradigm Approach

Apart from quantitative and qualitative approaches, my study further attempts to distinguish an approach for this research based on Crotty’s (1998) model of selecting the theoretical paradigm approach. The question that first comes to mind first is, what is a paradigm? A paradigm is a set of beliefs and values that the researcher needs to get ideas about the nature of the reality for conducting particular research (Guba & Lincoln 1994). For social research, five types of paradigms have been identified: positivism, realism, post-positivism, critical theory and constructivism (Guba & Lincoln 1994; Sarantakos 1998).

In this study, Crotty’s (1998) model is used as a guide to form the basis of this thesis’ theoretical approach, because his classification of research paradigm approaches are clearer and more helpful in justifying any researcher’s decisions than others, such as Saunders, Lewis, & Thornhill (2007). Saunders, Lewis, & Thornhill (2007) divided up their research model into six stages to include philosophies, approaches, strategies, choices, time horizons, techniques and procedures.

It is notable that Crotty’s model of selecting a research design places its emphasis on epistemology, which is ‘what it means to know’ (Crotty 1998, p. 10), and, the omission of reference to the issue of ontology, which is refers to as ‘what is’ (Crotty 1998, p. 10). The reason for his omission of ontology is that it is not possible to conceptualise ontology separately from epistemology because these two issues are related and tend to emerge together. From his perspective, it is quite possible to
follow his model to formulate any research design without expressly introducing ‘ontology’ into the schema.

In this thesis, the views, beliefs and perceptions of the users of health Web-based information systems were reached by following a research string of subjectivism-interpretivism/phenomenology (see Figure 3.1). The choice and the justifications behind selecting this approach will be discussed in detail in the following sections.

Figure 3.1: Thesis’ Epistemology, Theoretical Perspective, Methodology and Methods (Crotty 1998)

### 3.3.1 Epistemology

Epistemology is a theory of knowing or ways of knowing and justified beliefs, or, how we obtain knowledge of external reality and how we know the world. Crotty (1998, p. 8) asserted that epistemology is a way of explaining “how we know what we know”. Epistemology is “a way of looking at the world and making sense of it” (Crotty 1998, p. 8). It is concerned with the origin, nature, limits of human
knowledge, and, how things can be communicated to the researcher (Dawson 2002). Crotty’s conceptual framework outlined three epistemological constructs including objectivism, subjectivism and constructionism.

Crotty (1998, p. 8) explained that the objectivist “holds that meaning and therefore meaningful reality exists apart from the operation of any consciousness. Objectivists view the real world as objects, assume meaning is already inherited within the object being examined and, the attributes of an object can be measured and quantified (Crotty 1998). In this regards, objectivism has formed the basis of epistemological stance for social sciences in the Western World and is closely aligned with the positivism theoretical perspective. From this perspective, the social world can be examined by “value-free” methods (Mertens 1998). However, the absolute position of objectivists and their claims of reality have been challenged and tempered by the tentativeness of their present limited knowledge. Therefore, one can grasp reality in imperfect ways because we as researchers are constrained by human limitations, including underlying knowledge and understandings of reality (Crotty 1998; Mertens 1998). Because of the downside of concepts of objectivism, it is still difficult to control variables in the social and natural environment.

The epistemology of subjectivism suggests that meaning has emerged out of nothing because meaning “does not come out of interplay between subjects and object, but is imposed on the object by the subject. Here the object as such makes no contribution to the generation of meaning” (Crotty 1998, p. 9). When applying subjectivism to the social world, a human being will face difficulties in making meaning out of something, and, may also import meaning from other sources quite imperceptive from the object at hand, or even from a fantasy world or the world of make believe. Subjectivists also tend to emphasise the subjective meaning of social objects, which in turn neglects the external factors that influence the relationships between the perceptions of the subjects (individuals), interpretations and actions, which in turn can expose interpretations of reality to be heavily influenced by various social groups or the perceptions of reality by significant figures.
This research adopts ‘constructionism’ as its epistemological perspective, which is found to be consistent with the nature and objectives of my research, because it did not just describe what is found by objectivism, as would be seen in the positivist stance (Crotty 1998).

### 3.3.1.1 Constructionism

In contrast to objectivism and subjectivism, constructionism, often referred to as constructivism, can be applied comfortably to the social world because meanings are continually constructed by social actors, not discovered, and interconnectedness exists between the subjects and the objects (Bryman 2008; Crotty 1998). In other words, the cornerstone of reality in constructionism is socially constructed meaning (Mertens 1998). Crotty (1998) asserted that we construct all of our knowledge, social and meaningful reality when human beings are engaging with the world that they live in because individuals are not passive recipients of a set of meanings, but are actively and reflectively involved in constructing the meaning of reality. It implies that learning and social phenomena are not only produced through social interaction, but that they are constantly in the state of revision. In other words, it assumes that researchers should participate with the world being investigated to explore the perceptions of participants. The role of the researcher is to understand, reconstruct and analyse the perceptions of participants in a way that leads to constructive meaningful outcomes and findings (Guba & Lincoln 1994). This implies that knowledge is intermediate, as seen in postmodernism (Bryman 2008).

In this sense, people tend to construct meaning about the social phenomena in different ways when they are looking at the same phenomena (Crotty 1998). This implies that researchers tend to reach different perspectives when exploring the same phenomena on how different stakeholders construct their beliefs in social context (Schutt 2006). In this research, the aims and the objectives of the researcher is to understand, reconstruct, critique and analyze people’s perceptions trying to reach common understandings. Therefore, as the information available increases, the constructions of knowledge are opened to new interpretations and revisions (Carr & Kemmis 1986).
As previously explained, reality is constructed and there is no meaning (or truth), from this perspective, without mind. Thus, the researcher has undertaken constructionism as an epistemological stance, which allows the researcher to understand and construct reality from the perspective of different stakeholders who experienced or lived in the phenomena being studied. To approach a problem from a constructionist epistemology, the notion of triangulation, which involved the use of mixed or multiple methods and data sources is applied to my research to support and strengthen the interpretations and conclusions (Mertens 1998). In this respect, data for my research is collected using several sources and samples from a variety of methods. This is done to achieve consistency with the data collected, which can be evaluated, and, to identify the possible difference of aspects and attributes relevant to the particular contexts in which the research takes place.

3.3.2 Theoretical Perspective
The theoretical perspective underlying the philosophical assumption is related to the researcher’s view of reality or social life within that world. Crotty (1998, p. 3) defined theoretical perspective as “the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria.” There are a number of research philosophies in which researchers can use to shape their methodology, including positivism, post-positivism and interpretivism. In this sense, it should be clear that the distinction between these types of theoretical perspectives do not mean that one philosophical position is better than the others, but rather that they all are “better” in achieving and framing different things (Saunders, Lewis, & Thornhill 2007). Coming from a constructionist epistemology, theoretical perspective, which underpin the proposed aims and questions of this research, this study aligns itself to the interpretivism research philosophy.

3.3.2.1 Interpretivism
Meaningful social action and social reality can be viewed as being constructed. It is a process that is constantly based on interpretation and reinterpretation of human behaviour. Crotty (1998, p. 67) described the term interpretivism as ‘it was
conceived in reaction to the effort to develop a natural science of the social. Its foils largely logical empiricist methodology and aims to apply that framework to human enquiry’. It constructs meaningful social action and social reality. The main goal of the interpretivist paradigm is to understand the social phenomena and construction of meaning in the social situation from the point view of those who live it (Schwandt 1998).

In this sense, it is important for interpretivists to find out the subjective meanings or realities of participants in order to understand and make sense of their actions (Saunders, Lewis, & Thornhill 2007). The researcher as interpretivist tends to understand issues in terms of different meanings and thus, there is not only one perspective reality in the social world (Rubin & Rubin 1995).

The justification for the selection of the interpretivism approach is because social reality is something subjectively constructed and interpreted by people rather than being objectively interpreted, as seen in the positivism approach (Denscombe 2002). For instance, one of the objectives of my thesis is to investigate the current key issues facing the healthcare industry. This objective reflects the need to investigate the social reality of online health and its relationship to the users of Web-based information systems. To achieve this objective, an interpretivism theoretical perspective was applied to evaluate the subjective views of various stakeholders from the healthcare website.

3.3.3 Methodology
Crotty (1998, p. 3) defined research methodology as, ‘the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes’.

The preference of choosing the research methodology is influenced by the researchers’ theoretical perspective and the way they use their data (deductive or inductive approach) (Gray 2004). The present study has undertaken a case study as a research methodology to achieve the overall aim of the research.
3.3.3.1 Case Study
A ‘case study’ approach is a strategy for designing research that aims to examine particular phenomena within its natural social setting using multi-sources of evidence (Robson 2002; Yin 2003). It provides an intensive understanding, holistic description and analysis of contemporary and complex social phenomena in the real life context (Merriam 1998; Yin 2003, Scholz et al. 2005). Case studies enable the researchers to obtain a deep understanding of the social phenomena, because it allows researchers as well as participants to check their understanding until they reach sufficient answers and understanding. In other words, the case study approach informs a qualitative research design, which enables researchers to investigate activity; process or individual (Stake 1995). For these reasons, the case study becomes a useful tool for doing the work of theory generation (Eisenhardt 1989). For the current study, the case study approach has been deemed as the most appropriate methodology for exploring the online health environment within the complex health care system.

Furthermore, case studies enable the researchers to use multiple sources of data and a variety of research methods to explore the research questions to foster the validation of the results through triangulation (Denscombe 1998). Therefore, triangulation makes the findings of the research more likely to be valid and compelling (Yin 2003). Case studies have also been widely used to gain a deep understanding of the research investigated. Nevertheless, the case study approach has been criticized as not being a reliable and legitimate research strategy due to its difficulty in generalising the findings to a larger population (Yin 1994; Thomas 2003).

3.3.4 Methods
The fourth and the final step of the Crotty model involve the selection of a set of ‘methods’ to gather and analyse the data. The methods are “the techniques or procedures used to gather and analyse data related to some research questions or hypothesis (Crotty 1998, p. 3). Research methods involve the forms of data, analysis and interpretation that researchers propose for their studies. Qualitative methods
enable researchers to study social and cultural phenomena and allow them to use a
variety of data sources (Myers 2005).

It is recommended that a variety of methods are employed in information systems
research to capture the richness of the social context and develop an understanding of
the inside perceptions of the individuals involved (Miles & Huberman 1994). To
achieve the objectives of my research, three phases were employed: phase 1:
usability testing; phase 2: content analysis; phase 3: Q Methodology, which also
included a pilot test.

In qualitative research, it is common to distinguish between primary and secondary
sources of data. While primary sources are gathered from individuals or participants
directly, secondary sources are published materials (Creswell 2003; Neuman 2006).
For data collection about ‘real life’, my research relies heavily on primary sources
with a limited number of secondary sources, i.e. the existing literature.

3.3.4.1 Qualitative Data Analysis Methods

The research design for my qualitative research approach is closely aligned with
Miles & Huberman’s (1994) Model, as depicted in Figure 3.2. The iterative model of
Miles & Huberman (1994) consists of four sequential stages: data collection, data
reduction, data display and the drawing, and verification of conclusions. According
to Miles and Huberman (1994), qualitative data analysis is a continuous, iterative
scheme. This is essential in further exploring the data and the literature in a more
revealing fashion. My study involves the use of Q Methodology, content analysis and
usability testing for data collection and reduction, the use of Activity Theory for
data display and in interpreting my model to enrich the drawing of conclusions.
In this study, data will come from usability studies of public health websites. The tests use a scenarios based approach focussing on activities of a variety of stakeholders. Data will also come from a Q Methodology study of these stakeholders, from two aspects, firstly looking at the attitude of users to existing sites and secondly, their suggestions for capability in future developments of the site. In addition, health websites in a number of countries will be identified and a content analysis done in order to find out what interactivity features are currently being used.

As the data is collected and analysed an activity systems model will be developed to visualise and explain the complex interaction of activities uncovered, together with their mediating tools.

3.4 Research Design for This Study
The research design should address the structure of the logical inquiry of the study to include a plan to determine the ‘what, why and how’ and, the need to be observed and analysed, designing strategy details of the results and the findings of the research.
This research has taken into account the nature and time for this study to determine the overall nature of the content, the layout of online health as well as the usability testing approach, and, the users’ perceptions of online health. Overall, four sets of data collection are utilised in my study:

- Phase 1: Usability testing health and palliative care websites
- Phase 2: First stage of Q study.
- Phase 3: Content analysis of health and palliative care websites
- Phase 4: Second stage of Q study.

Phase 1 includes usability testing of palliative care and health websites, which was done on autumn 2008. Phase 3 encloses content analysis of both palliative care and health websites conducted in two different time frames: palliative care in winter 2009 and spring 2009. The content analysis for health websites took place from spring 2009 and the same list was revisited in June 2010. Meanwhile, Phases 2 and 4 used the Q Methodology approach, where in the Phase 2 stage a concourse was held and Q sorts test on palliative care websites was done in autumn 2008; and, Phase 4 included both concourse and Q sorts on health websites, which were conducted in the summer of 2009 and autumn of 2010. It is worth noting that both phases involved a variety of stakeholders, including students, families of patients, general practitioners, medical staff and others. Table 3.1 below summarizes the entire research plan for my study.

Table 3.1: Research Plan from Year 2008-2010

<table>
<thead>
<tr>
<th>Phases</th>
<th>Research Plan</th>
<th>Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Usability testing health and palliative care websites</td>
<td>Autumn 2008</td>
</tr>
<tr>
<td>Phase 2</td>
<td>Q Methodology: the first stage of Q study</td>
<td>Spring 2008</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Website content analysis: palliative care and health</td>
<td>Winter 2009 and Spring 2009</td>
</tr>
<tr>
<td>Phase 4</td>
<td>Q Methodology: the second stage of Q study</td>
<td>Summer 2009 and Autumn 2010</td>
</tr>
</tbody>
</table>

In the beginning of this research, the first attempt on Phase 1 was actually an exploratory study of content and layout. In this sense, the overall impressions on health websites are necessary to explore. The rationale of having Phase 1 was to have
an understanding of the nature of the health websites to simulate the nature needs for palliative care in Australia as one of the most developed Western countries in the world. The Internet and information technology would be already used by the healthcare sector. This was one reason why the researcher has chosen to study palliative care websites as an example of health websites and to represent an overall population of health websites for this researcher’s study.

In Phase 2, the Q Methodology approach was used to view the subjectivity and the insights on people’s views of online health. This phase was undertaken to gather data on how health websites in general and palliative care in particular are perceived in the light of this dynamic environment of healthcare, which is characterized by instant changes. This phase involved a small sample. The researcher decided to collect information from participants in Australia from graduates students and academic staff in the university as well as some members of the general public. It was assumed that these groups were relatively representative of the Internet users worldwide, as this is a global phenomenon.

In the later stage of this research, Phase 4 was necessary to undertake in order to shed light on health websites as a whole and, perceive the overall impressions and attitudes of the users. The same repetitive Q Methodology was used in Phase 4, but set in a different period of time, and, with a more extensive and larger population sample. This large sample includes not only students and academics, but medical staff and practitioners who work in palliative care units and healthcare settings.

Phase 3 of content analysis was also undertaken to collect data on the nature of the content and the layout as well as overall impressions. In this sense, it allowed the researcher to expand on the understanding of the health websites and to try to find ways for improvements and the enhancements of the websites. The researcher also revisited the existing lists to include the most popularly used health websites to enable the researcher to further develop a better understanding of the content and layout of the websites, worldwide.
3.5 Activity Theory: Background, Development, and Principles

3.5.1 Activity Theory: The Historical Perspective
The history of Activity Theory can be traced back to the 18th century in the work of the classic German philosophy of Kant and Hegel in constituting the dialectic relationship between subject and object, which was used in the more contemporary work of Marx and Engels in their economic writings on dialectic materialism (Kuutti 1996). In the 1920s, the Russian school of thought of Vygotsky was founded to study higher mental functions and consciousness of people, which laid down the foundation of Activity Theory. To understand Vygotsky’s work, it is important to look at the political environment in Russia at that time. After the Russian revolution, the new Marxist philosophy expected individuals to sacrifice their individual achievements for the improvement of the larger society because the success of any individual was reflected in the success of the culture and the society. Therefore, the notion of collectivism and socialism was encouraged (Vasta, Haith & Miller 1995). Working within the boundaries of Marx and Engels, Vygotsky was concerned with developing a cultural-historical theory that would incorporate these elements into his model of human development within the context of the social-cultural approach, in which the individual developed as a result of his or her culture. In other words, Vygotsky aimed to study consciousness and how it is generated. In the 1930s, his colleagues, Leontiev, Luria and others began studying human consciousness from the ‘activity’ approach (Coles 1996; Rodriguez 1998). In the 1940s, the philosophical concept of activity was introduced into the discipline of psychology. All of these cultural-historical psychologists have had a profound effect on the way the theory was developed, and more importantly, it was Leontiev who developed Vygotsky’s work into a coherent, integral and conceptual framework for a complete theory of human activity (Leontiev 1981).

3.5.2 The Evolution of Activity Theory
The lineage of Activity Theory has evolved through three generations (Engeström 1987; 2001). First, Vygotsky developed the concept of mediation by tools of the core dialectic relationship between subject and object (who does what). Then, Leontiev integrated other human and social relations into the concept of activity to overcome
the limitation of the first generation and developed the hierarchical framework of activities, actions and operations. Later on, Engeström proposed a graphical model of a collective activity system. Engeström further developed an understanding of networks of activity systems. The next Sections (3.5.2.1, 3.5.2.2 and 3.5.2.3) describe the first generation, second generation, and third generation of Activity Theory, respectively.

3.5.2.1 The First Generation Activity Theory
The goal of Vygotsky was to investigate how human consciousness is created. Vygotsky (1987) proposed that consciousness is a “thought … is not born of other thoughts”. Thought has its origins in the motivating sphere of consciousness, a sphere that includes our inclinations and needs, our interests and impulse, and, our effect and emotion. The affective and volitional tendency stands behind thought. Only here we do find the answer to the final ‘why’ in the analysis of thinking (p. 282). Vygotsky (1978) believed that the higher psychological function in the human, which is consciousness, differs from the preconscious psyche of animals, and, is constructed through communication and interrelationship between subjects with the world (people). Therefore, to understand Activity Theory, one needs to consider not only consciousness, but also Vygotsky’s concept of mediation. Basically, Vygotsky proposed that consciousness is constructed, not through direct interactions with the world, but indeed the relationship between human and objects of the environment is mediated through the use of tools (artefacts). The fundamental concept of Vygotsky’s (1978) of mediation is a state of direct association between stimulus (S) and response (R), which is mediated by the tool. This idea was crystallised in Vygotsky’s (1978, p. 40) famous triangular model of ‘complex mediated act’, which commonly expressed the relationship between the subject, object and mediated artefact. Figure 3.3 represents Vygotsky’s triangle model of the simple stimulus-response process to the complex and mediated act that can be thought of as the first generation of Activity Theory, as clarified by Engeström (1999).
Figure 3.3: The Vygotskian Triad of Mediated Action

However, the limitation of Vygotskian first generation Activity Theory was that the generality of his work was and thus theoretically complex to apply in practice. There is also a lack of empirical evidence to support Vygotsky’s research. Therefore, his main contribution is measured as a set of principles of Activity Theory, which form a useful starting point for explaining human behaviour. Another limitation is that much of the psychologist’s work was directed and focused on individuals and Vygotsky’s model did not incorporate all elements of human behaviour. At the age of 38, Vygotsky died of tuberculosis before his work was completed. Vygotsky’s student Leontiev expanded on Activity Theory by making the distinction between actions and activity, which marked the second generation of Activity Theory.

3.5.2.2 The Second Generation Activity Theory

The second generation of Activity Theory mainly derived its inspiration from Leontiev’s model of the three-levels of activity and his distinction between activity and action by expanding the theoretical model of Vygotsky. His model incorporated the concept of collective activity, which involved more than one person to carry out the actions.

In his three-level model of activity, he placed ‘activity’ at the top of the hierarchy, as shown in Figure 3.4. The activity does not exist without a long-term purpose and strong motives, whereas actions are always geared and directed towards goals.
Participating in an activity involves performing sets of conscious actions and operations. Actions are a fundamental component of activities and consist of short-term operations or tasks where goals are subordinated to the purpose of the activity. While an activity is defined by long-term purpose and motive, actions are more short-term, planned with specific goals. Actions are a conscious representation of a desired outcome, which consists of an intentional characteristic (what must be done) as well as an operational characteristic (how it can be done). Operations are ways in which actions are executed and correspond with goal achievement. According to Leontiev (1978), an operation is something that is performed by routine in order to complete an action in the current situation and condition. Leontiev (1978) also accounted for the breakdown of activities into action and actions into operations, as described as the hierarchical concept of activity, which will be discussed later in the chapter.

![Figure 3.4: Leontiev’s Three-Level Model of Activity](image)

However, Leontiev never graphically expanded the Vygotskian triad into a model of a collective activity system (Engeström 1987; 1991). Engeström (1987; 1999) proposed an enhance model of a Vygotskian triangle with additional elements to the Activity Theory triangle shown in Figure 7.3, in order to enable an examination of systems of activity at the macro level of the community. This expansion of the basic Vygotskian triangle aims to represent the social or collective elements in an activity system, those being Community, Rules and Division of Labour, as depicted in Table 3.5. This depiction of an activity is used in conjunction with Table 3.2 to interpret the findings of the study in terms of activities and systems of activities.
**Figure 3.5: The Structure of Engeström’s Collective Human Activity System**
(Engeström 1999)

**Table 3.2: The Main Elements of Activity Theory (Mwanza and Engestrom 2003)**

<table>
<thead>
<tr>
<th>Activity</th>
<th>What sort of activity am I interested in?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object (ive)</td>
<td>Why is the activity taking place?</td>
</tr>
<tr>
<td>Subjects</td>
<td>Who is involved in carrying out the activity?</td>
</tr>
<tr>
<td>Tools</td>
<td>By what means are the subjects performing the activity?</td>
</tr>
<tr>
<td>Rules and Regulations*</td>
<td>Are there any cultural norms, rules or regulations governing the performance of the activity?</td>
</tr>
<tr>
<td>Division of Labour*</td>
<td>Who are responsible for what, when to carry out the activity and, how are those roles organised?</td>
</tr>
<tr>
<td>Community</td>
<td>What is the environment in which this activity is being carried out?</td>
</tr>
<tr>
<td>Outcomes</td>
<td>What is the desired outcome from carrying out this activity?</td>
</tr>
</tbody>
</table>

*Note – Rules, Regulations and Division of Labour of Activity Theory will be omitted from the discussions in this research*

Since most human activities are collective, Engestrom (1987) explained that the collective activities and collaborative work should include community, rules and division of labour. Community consists of all subjects involved in doing the same work or work collectively. Rules are regarded as those that mediate the relationship between subject and community that cover the conventions, regulations and social relations within the community, which guide the activities and the behaviours in the system. In addition, the relationship between the community and the objects is mediated by the division of labour.
Engestrom (1990) incorporates both internal and external tools in his model of activity as a system where internal tools would be the absorption of inherited culture by learning and training and using external tools, which are the new creations and inventions. An activity can have an individual as subject or can be an engagement of a collective subject composed of a group of people who would bring different skills and understandings oriented by a certain goal or common object that transforms activity into outcomes.

However, the downside of the second generation of Activity Theory is its insensitivity towards cultural diversity (Cole 1999). When the Activity Theory framework was applied internationally, the question of diversity and dialogue between different cultures and traditions became a serious challenge. Consequently, there was an essential call for the development of the third generation of Activity Theory, because it was no longer sufficient to focus on an isolated activity system.

3.5.2.3 The Third Generation Activity Theory

As a result of the existing challenges, the third generation of Activity Theory needs to develop conceptual tools for analysing and transforming networks of interacting systems and for understanding the dialogues, multi-voices, and, multiple perspectives within the system. This third generation of Activity Theory, which Engestrom (1999a & b; 2001) represented graphically, as shown in Figure 3.6, reflected the expansion of Activity Theory, so that it could interact with multiple activity systems.
In this model, Engestrom (2001, p. 136) described the object of activity as ‘a moving target, not reducible to conscious short term goals’. This implies that there is a demand for joint and collective work that should be established between different sets of stakeholders, governed by rules and divisions of labour, to determine the new object of interacting activity systems.

Another system of activities, shown in Figure 3.7, could be the relationship between the design and use of activities involving the creation of computer-based applications, as described by Bodker (1991a & b) and Bodker et al. (1987).
In this regards, Engestrom (2005a) summarized the third generation of Activity Theory using five fundamental principles:

1. The unit of analysis related to the network of other activity system is defined in terms of its collectiveness, artefact-mediation and object-orientation.
2. Activity systems are multi-voiced and have a community of multiple perspectives resulting from a division of labour amongst the participants.
3. The problems of activity systems can be understood through their development and history.
4. As tensions accumulated within and between activity systems, contradictions play a central role in change and development of the activity systems.
5. Through a zone of proximal, activity systems can transform expansively to reconceptualise the object of the activity.
3.5.3 The Lessons from the Use of Activity Theory in previous Research


As confirmed by the seminal works of Vygotsky (1978), Leontiev (1981), and, Engestrom (1987), Activity Theory is holistic, comprehensive and authoritative. It has been shown to be suitable for rigorous academic studies in many fields. IS related research has shown that it is also in essence quite practical and is particularly suitable for studies of real world practice. According to Activity Theory, ‘activities’ are the significant things people (the ‘subjects’) do and are usually long-term projects. Each activity has a purpose (the ‘object’) that may be concrete/real, e.g. to build a technical artefact, or abstract/ideal (to set up an information system). The motives of an activity are always considered to be objective, whether the activity is real or ideal (Christiansen 1996). Activities can be carried out by an individual or a group of people who may have different motives for being involved and different understandings of what is being done. Activities may equally well be carried out by different sets of ‘actions’, e.g. you may entertain guests by cooking a meal at home, while I may take them out.
Activity is the minimum meaningful context for understanding individual actions and unless the whole activity is the unit of analysis, the analysis is incomplete (Kuutti 1996; Hasan 1999). Overall, this principle highlights the importance of studying human activities in context, which is of direct relevance to fields of research dealing with socio-technical systems, such as the fields of Human-Computer Interaction (HCI) and IS. The idea of useful systems implies that systems are designed to serve a purpose or to support user activities; a theoretical framework is required and needed to form the basis by placing the user and the user’s activities in context, rather than placing the system itself at the centre of the evaluation process. Kuutti (1996) suggests that Activity Theory can provide this theoretical framework and potentially address the ubiquitous fragmentation of fields such as IS.

Research in the field of information systems takes into considerations the overtime-dynamic interplay between information and communication technologies, activity and human that emerge as the dimensions of the whole system as work activity (Hasan and Crawford 2006). Hasan and Crawford (2006) contend that the main reason for the use of Activity Theory in IS research is that it provides a well-developed framework for analysing the complex dynamics settings that typically involve ongoing interactions between human (subject) and technical elements (tools or objects). ‘Activity Theory, with its focus on accumulating factors that affect the subjective interpretations, the purpose and sense making of individual and group actions and operations, provides a useful paradigm for the ways in which human experience, needs and creativity shape the design and effectiveness of emerging technologies’ (Hasan and Crawford 2006, p. 7). Activity Theory shows the effects of tools and environment on human’s actions, reactions and behaviour in work settings and in users’ relations with technology (Kuutti 1996; Kaptelinin 1996; Nardi and O’Day 1999).

The idea of useful systems implies that systems are designed to serve a purpose or to support user activities; a theoretical framework is required and needed to form the basis by placing the user and the user’s activities in context, rather than placing the system itself at the centre of the evaluation process. Kuutti (1996) suggests that
theoretical framework of activity has the potential capability to address the ubiquitous fragmentation of the human-computer interaction field.

3.5.4 Principles of Activity Theory
Activity Theory is a complex conceptual framework that has evolved historically, and, continues to evolve as it is applied in research and in practice. Therefore, it is essential to highlight its fundamentals and principles. These basic principles of Activity Theory include the basic unit of analysis, object-oriented, the use of tool mediation, history and development, the dual concept of internalization/externalization, and, the zone of proximal development, and, contradictions and conflicts (Bannon 1997; Kuutti 1996; Engestrom 2005a). The following discussions, Sections 3.5.4.1-3.5.4.7, introduce and explain each principle of Activity Theory. The applications of these principles in my research will be explained later this Chapter.

3.5.4.1 Principle 1: Activity as the basic Unit of Analysis
In Activity Theory, the basic unit of analysis of all human endeavours is activity, which is a broader concept than individual goal-oriented actions (Hasan 1999). The word activity is a translation from the Russian word ‘deyatelnost’, which conveys a coherent system of human doing physical or external behaviour and internal mental process that, ‘are combined and directed to achieve conscious goals’ (Bednyi and Meister 1997, p. 1). The early notion of an activity is generally a physical activity. The latter notion of activity includes mental activities and incorporates Vygotsky’s idea of mental tools as mediators, rather than only material tools of work. An activity is directed towards an object and defined by it and thus, activities are distinguished according to their object. In contrast to the Subject- Reaction part, as formulated by Vygotsky (1978), where human mind and behaviour generated a reaction or totality of reactions to the external and objective world, an activity is then seen as a system, as proposed by Leontiev (1981), in which the structure of activity is not a reaction in itself but a ‘system of interrelationships’ between people that was mediated by the use of instruments and tools (Verenikina & Gould 1998, p. 6). This indicates that all human activity is purposeful, is carried out through the use of ‘tools' and is socially
mediated. What forms the central core of an activity is the dialectic relationship between the subjects (human) and objects (purpose).

The ‘active’ subject learns and grows while the object is defined and redefined by the subject in the ongoing conduct of the activity. Activity Theory provides an intermediate concept, that of an activity, to resolve the dichotomy between studying individuals and social systems (Kuutti 1991). The dichotomy either removes individuals from their natural social environment or focuses on analysing collective interactions at the expense of the individual. Activity is the minimum meaningful context for understanding individual actions and unless the whole activity is the unit of analysis, the analysis is incomplete (Kuutti 1996; Hasan 1999). Overall, this principle highlights the importance of studying human activities in context, which is of direct relevance to HCI and IS.

3.5.4.2 Principle 2: Object-Orientation

The principle of object-orientation refers to the ‘objectified motive’ of an activity (Christiansen 1996). Similarly, Hasan (1998) also indicated that the motive of an activity is always objective, whether the activity is real or an idea. Every activity is directed towards this object and defined by it and thus, activities are distinguished according to their object. That activity is always purposeful even if the subject is not fully aware of that purpose. For example, a manager’s motivations for using an Executive Information Systems may include the desire to be better informed and to make better decisions, but may also include the desire to increase status, to impress one’s competitors, along with other variety of motives (Hasan 1998). Whether the object is material (physical) or ideal (mental) has a value in itself, because it fulfils some human need (Kaptelinin 1992). Manipulating and transforming a shared object into an outcome over a period is what motivates the very existence of a purposeful activity (Kuutti 1996). The object only reveals itself in the process of doing, and hence, the object is continuously under development and revealed in different forms for different participants of an activity (Engestrom 1990).

It is interesting to note that the object of an activity does not equate directly to the motive (Kaptelinin 2002). While different individuals performing or doing an
activity may have different motives for doing so, and, the motives for carrying out an activity may change over time, this does not affect the actual object of the activity. For example, if the object of a system development project is to construct a system to make processing more efficient, the motives for doing so may vary from costs reduction (from the managers’ perspective) to improving customer care (from the marketers’ perspective). A single object gives the activity direction and purpose.

Bannon (1997) and Nardi (1996a & b) both pointed out that the principle of object orientation, in which humans live in a reality that is objective and in a broader sense; thus, the things that constitute this reality have not only the properties that are considered objective according to natural sciences, but also are socially and culturally defined properties as well.

3.5.4.3 Principle 3: Tool Mediation

Tool mediation is often considered the most fundamental principle of Activity Theory, in which Vygotsky based his original work on, which distinguishes human activity from the activities of animals. Leontiev (1981, p. 56) asserted that ‘tool mediates activity and thus connects humans not only with the world of objects but also with other people. Because of this humans’ activity assimilates the experience of humankind’.

An activity is mediated by both types of tools: tools used and the social context of the work activity. This two-way concept of mediation implies that the capability and availability of tools mediates what can be done and the tool, in turn, evolves to hold the historical knowledge of how a society works and is organised. Human activity is mediated by a number of tools (external and internal). Tools specify modes of operations and are historically developed in social terms. Possessing an evolutionary cultural component, an activity is defined by the tool-mediated relationship between subject and object – that is, between the doer and his/her purpose. Tools expand our potential to manipulate and transform objects, but also restrict what can be done within the limitation of the tool, which, in turn, often stimulates improvements to the
tool. The mediation is a mutual development of both the activity and the kinds of tools used.

There are three kinds of tools that mediate human activity (Hasan 1999; Bertelsen 2000; Hasan and Gould 2001):

1. Primary Tools: Artefacts, instruments, machines, computers, etc.
2. Secondary Tools: Language, signs, models, ideas, etc.
3. Tertiary Tools: Cultural systems, scientific fiction, context, virtual realities, etc.

Since primary tools are physical (material tools), they produce changes to the material object, whereas the secondary tools (psychological tools) influence the psyche and behaviour of subjects. However, regardless of the type, all tools are transmitters of cultural knowledge (Kaptelinin 1996), or a historical residue of activity development (Kuutti 1996). Tools determine the modes of operation and are historically developed, possessing cultural aspects. As such, the use of these culture-specific tools shapes the way people act (Nardi 1996a & b; Hasan 1998). In this sense, this aspect can shapes future designs of systems.

When the tools are computer-based, this notion becomes a source of power (Kaptelinen 1996), especially used in the context of analysing the dialectic interactions between people and technologies, and, how they are shaped by human activity. The Division of Labour (the balance of tasks among different people in the system) and Rules (the code and guidelines for actions and behaviour in the system) are two characteristics that can mediate the relationship between the community and the activity (Engeström 1987).

3.5.4.4 Principle 4: History and Development

Briefly, ‘Activities are not static or rigid entities; they are under continuous change and development’ (Kuutti 1996, p. 26). Historical development is not linear or structured in a predictable pattern. It is rather irregular and discontinuous (Kuutti
As each activity develops over time, parts of older activities remain embedded in the development process (Kuutti 1996). Therefore, in order to understand a current activity, it is important to analyse its historic development. Activities are dynamic and in a continuous state of evolution, with development taking place at all the different levels of an activity (Kuutti 1996). By analysing the elements, it is possible to gain an insight into this evolutionary development process and situate the activity in its historical context.

3.5.4.5 Principle 5: Internalization/Externalization
The Internal Plane of Actions (IPA) is one of the most important principles in Activity Theory as it differentiates between internal and external activities. Activities have a dual nature because they have an internal and external side (Kuutti 1996). This concept of internalization is described in Vygotsky’s (1978) original model where the subject transforms the object using mediating tools, while at the same time, the attributes of the object penetrate the subject and transform his/her mind (Kuutti 1996). This process is referred to as the internalisation process that facilitates the way people potentially interact in reality without having to perform actual manipulation with real objects. Mental stimulations, imaginations, consideration of alternative plans, etc. are examples of internal plane of actions (Bannon 1997). According to Leontiv (1981), the process of internalisation is not just a simple transfer of external activities to a pre-existing internal plane, but rather the process by which the actual internal plane is formed. Vygotsky (1978, p. 56-57) describes the process of internalisation as a series of transformations: ‘an operation that initially represents an external activity is reconstructed and begins to occur internally…an interpersonal process is transformed into an intrapersonal one…the transformation of an interpersonal process into an intrapersonal one is the result of a long series of developmental events’.

Vygotsky also described the concept of internalisation as the underlying mechanism for the origin of mental process. Higher psychological functions (mental or mind) are derived from activities through the process of internalisation. This is in contradiction
to conventional cognitive psychology, which views the mind as generating activity, rather than being generated by it.

It is through activity that subjects learn and internalise concepts that then become a cognitive psychological tool in IPA. The IPA is a concept developed within activity theory that refers to the ability of humans to perform and manipulate an internal representation of external objects before starting an action with these objects in reality (Kaptelinin 1996), as shown in Figure 3.8. The IPA is more general than the mental models because it does not refer to a specific representation, but to an ability to create and transform representations. It is well suited to the analysis of the processes of avoiding costly mistakes and becoming free from the immediate and unstructured problems and situations (Kaptelinin 1996).
Regardless of the tool type used, all tools are transmitters of cultural knowledge (Kaptelinin 1996) and a historical residue of activity development (Kuutti 1996). Psychological tools, in particular, determine the modes of operation and are historically developed possessing cultural aspects. As such, the use of these culture-specific tools shapes the way people act and behave (Nardi 1996a & b; Hasan 1998). Human behaviour is transformed by internalising cultural sign systems, thus shaping mental processes and bringing about individual development (Vygotsky 1978). The set of tools that are available to humans at certain points in time contain the total societal knowledge and reflect the human activities or practices of the time. As these activities evolve historically, so do tools. However, changes in the tools bring about the transformations in the activities themselves. Internalisation is the transfer of these external activities into the internal plane, resulting in the development of the individual’s minds, as depicted in Figure 3.8 (Kaptelinin 1996; Kuutti 1996). However, while tools have the ability to transform an activity, the activity itself affects the way in which the tools are used and therefore shapes the future design of the tool. This reveals two important and interrelated characteristics of tools: their dialectic nature and their historical development. The dialectic nature exhibited by
tools can be seen in their role, shaping an activity and at the same time being shaped by the activity. Tools can be thought of as well-defined knowledge about an activity, implying that in order to understand a tool in its most current form and how it is being used, it is necessary to carry out a historical analysis of the tool and the activity (Bannon and Bodker 1991a & b).

The application of the IPA principle in the context of my research in online health information systems will be explained later in Chapter 7 (Section 7.3.10).

3.5.4.6 Principle 6: Zone of Proximal Development
This principle is widely used when the Activity Theory framework is applied to understanding the dynamic development of child learning, specifically, how learning leads to development of the child. Vygotsky (1987) proposed that one way that children internalise the social processes in order to understand their world is by mimicking adult activity and cultural activity that are beyond their competence. Vygotsky (1987) also formulated and defined the notion of the zone of proximal development as, ‘the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers’ (p. 86). The actual level of achieved development does not necessarily describe development itself, but rather what is already developed or achieved. Vygotsky (1987) also regarded the zone of proximal development as, ‘those functions that will mature tomorrow but currently in an embryonic state’ (p. 169), and, that could be performed by assistance.

The individual development of higher mental functions (internalisation of the mediation tools and their uses) occur through collaboration and social interaction with other humans generated the sector of proximal development for individuals, enabling them to go beyond their current capacity by grasping and constructing new mediating tools and signs (Vygotsky 1978; Zorga 2003).
This concept describes the types of environment that learners develop cognitively, particularly when faced with a new situation. If the learning environment is enriched with the right amount of mature psychological mediating learning tools as well as the social support from others that the learners need for their particular activity then the learners can gain maturity and master the new learning skills in the use of the new tools in this environment (Chaiklin 2003). To reach the learning in the ZPD, the environment does not necessarily need to be filled with more mature people, but they must be able to provide the help and support to enable the learner to develop the particular psychological tools that are needed to move to the next stage of development. With completely the right social support and interactions in the social environment, learners may be able to achieve the needed success in the learning activity (ibid).

Engeström (1987, p. 189) proposed the phased cyclic approach of the ZPD as the cornerstone of the expansive cycle of learning. Engeström’s (2001, p. 137) cycle of expansive learning and transformation is, ‘a collaborative journey through the zone of proximal development of the activity’.

There are seven expansive learning actions through the zone of proximal development of an activity that form an expansive cycle (Engeström 1987), as shown in Figure 3.9.

1. Questioning some aspects of the accepted practices
2. Historical analysis of the actual situation
3. Modelling of a new solution to the problematic situation,
4. Examining the new model
5. Implementing the new model
6. Reflecting on and evaluating the process
7. Consolidating its outcomes into a new, stable form of practice
In Engeström’s expansive cycle of learning, human learning begins in the form of learning operations and learning actions embedded in other activities. The learning activity starts off with an object and has a systematic structure of its own. The learning activity produces a new activity structure (including new tools, new objects, etc.) out of actions incorporated in the activity of question (Engeström 1987).

Engeström (1987, p. 125) further proposed that when learning activity is achieved from action, a new activity is formed whose object ‘appears to the subject first in the form of discrete tasks, problems, and actions’ that are questioned and analysed then transformed into contradictions demanding creative solutions; then expanded and generalized into a qualitative new activity structure within societal productive practice.

**3.5.4.7 Principle 7: Contradictions and Conflicts**

Briefly, the concept of contradictions in Activity Theory is a core key because it makes up a part of the attributes of activity systems (Engeström 1987; 2001). They are simply conflicts, problems, historically structured tensions, virtual disturbances, gaps, dilemma, clashes and breakdowns that provide opportunities for innovations.
and changes to an activity (Engeström 2001). The exclusion of a well-balanced and equilibrium activity system because of the presence of the contradictions is the driving force for change in the elements of activity and innovations in the activity systems (Kuutti 1996; Engeström 2001). In order to analyze the development of an activity system, it is important to identify and resolve contradictions. If there are tensions identified between the elements of an activity system, it is then possible to reconstruct the system in its concrete diversity and richness and its future development (Engeström 1999b). My study will include further explanation and application of this principle in Chapter 7 (Section 7.2).

3.6 Ethical Considerations

Ethics is defined as, “what is or is not legal to do, or what moral research procedures involves” (Neuman 2006, p. 129). Ethics forms an integral part of research planning strategy (Mertens 1998). In qualitative research, participants play a critical role because they are treated as instruments for data generation and analysis (Willig 2001). As a result, one of the purposes of the research is to develop trustworthy understandings in an ethical way (Merriam 1998). In this sense, my research considers the privacy and well-beings of the participants and recognizes the necessity to give a clear guideline of the study to the participants to involve on a voluntary basis (Mertens 1998).

To comply with these ethical considerations, my research followed the ethical research procedures of the ethics guidelines of the University of Wollongong Research and Higher Degree Committee (HREC), in order to conduct the study. Ethical clearance was obtained prior to conducting my research. My research does not deal with invasive information, and thus, ethical problems are not anticipated.

During the data collection stages, the researcher ensured that the participants were fully informed with the research procedure and that they will not be asked to participate in an unpleasant way; instead, they were encouraged to respond voluntarily (Zikmund 2003). Participants also had the right to withdraw anytime without fear of being penalized. Furthermore, the confidentiality, privacy and protection from misrepresentation and exploitation were guaranteed for participants.
by explaining the purpose of the participation and, that there would be no disclosure of their personal information such as names and addresses to anyone by any means (Elmes, Kantowitz & Roediger 1995; Zikmund 2003).

3.7 Chapter Summary
This chapter has described the design of the current study. The design aimed at gaining an understanding of the perceptions of the participants towards this study of social phenomenon. The justification for the choice of the qualitative approach over quantitative methods was presented. This chapter also outlined how the research design related to this case study, which involves the selection for methods of analysis: Q Methodology, usability testing, and content analysis approaches along with the timeline were to undertaken in each approach. The application of methods of analysis, as used in this research study, will be discussed and explained in detail in Chapter 4. The chapter also provide an overview about the theoretical background, known as Activity Theory, its development as well as its principles. The applications of its principles will be explained further in Chapter 7. Finally, the ethical considerations relating to the data collection process were described and explained.
CHAPTER 4

METHODS OF ANALYSIS: USABILITY, Q METHODOLOGY AND CONTENT ANALYSIS

4.1 Introduction

This chapter justifies, identifies, describes and presents in detail the undertaken method of analysis used to solve the research problem and to answer the research questions that had been presented in the literature review in Chapter 2, namely:

4. What are the perceived information and interaction needs that are currently being accommodated or envisaged within public Web-based information systems in a dynamic environment (i.e. healthcare)?

5. What is the level of interactivity features of health websites that are utilizing the interactive capacity of the health Web-based systems?

6. How are the findings of my research to be applied theoretically using the framework of Activity Theory to develop a holistic contextual and dynamic and provide an understanding of the problem?

This chapter presents a detailed description of the methods of analysis adopted for data collection, data reduction, and data analysis from various sets of stakeholders. As explained in Chapter 3, a qualitative approach was adopted in my research to achieve its objectives, which is guided by an iterative model of Miles and Huberman (1994). As mentioned earlier, this model consists of four stages: data collection, then reduction; after that, data display and the drawing of conclusions. Innovative qualitative research methods used in my research are usability testing, Q Methodology and content analysis for data collection and reduction. The use of Activity Theory is necessary for data display and data interpretation to enrich the drawings of conclusions.
My current research seeks to identify the perceptions, attitudes and opinions of a range of diverse users of online health. To fulfil the objectives of my research, the study here undertook the following stages or phases.

- Phase 1: Usability testing of health and palliative care websites
- Phase 2: First stage of Q study.
- Phase 3: Content analysis of health and palliative care websites
- Phase 4: Second stage of Q study.

Usability testing is conducted to address the needs of various users and to suggest areas for improvement, as explained and discussed in the next section. To meet these objectives, various scenarios were created to reflect the realistic situations of using the system being evaluated and to collect helpful feedback from users.

In Q Methodology, as a method of analysis is used, not only is its history discussed, but also the procedures of applying Q Methodology are also explained and, further explanations and justifications for the selection of methodologies are given; and, how it is related and used in my study in sections 4.4 and 4.5.

The fact that online health is a dynamic phenomenon is necessary to explore because of its importance content and layout features using content analysis approaches and examine degree of interactivity within website, which will be explained later in sections 4.6-4.8. Finally, section 4.9 of this chapter introduces the theoretical basis of my study.

4.2 Usability Concepts
The concept of usability was used 50 years ago, but the fortitude of making things usable and useful was very common. Usability has been and still is seen as an ‘end-of-product-cycle’ affair, as it fails to capture the significant user keys that may add great value in early phases of the cycle of the design and decision-making process (Johnson, Salvo & Zoetewey 2007). This does not indicate that usability has to be
conducted only at the early stage of the design, but it may be also necessary to conduct throughout the entire product life cycle (Cordes 2001).

What do we mean when we say something has to have usability? Usability refers to something that is easy to use and learn, being efficient, visually appealing, quick and effective (Preece, Rogers & Sharp 2002; Bara, Dorazio & Lesley 2001). There is no single universally accepted definition of usability adopted for my research, because there are numerous definitions that exist in the literature. However, the most renowned definition of usability concepts comes from ISO9241-11 International Standard Organization (1998) and Jokela et al. (2003, p. 2), which defined usability as, “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.” This implies that there are four elements behind the concept of usability, one is the system itself; the three other elements are external to the system, but more importantly in describing usability: ‘specified users’, ‘specified goals’ and a ‘specified context’.

Furthermore, **effectiveness** is defined as, “the accuracy and completeness with which users can achieve specified goals in a particular environment” (Summers 2001, p. 6). In other words, users can do what you want them to do on your system (Summers 2001). **Efficiency** refers to the resources expended in relation to the accuracy and completeness of goals achieved. In other words, how much effort did the users have to exert before they could successfully complete the required tasks. **Satisfaction** has to do with the users’ attitudes towards the system, whereas context is more or less the whole environment and work system that is used to achieve the goals. Therefore, the two key elements of the usability concept involve the ability of the site or the system to be usable and, should be perceived by the specified users for whom the system has been designed and developed. The scope of the system focus is extended to a wider context or situation within which the system is expected to operate. Therefore, the usability concept is generally applied clearly to the Internet to evaluate Web-based information systems. For my study, the concept of usability will include the ISO 941-11 definition. For additional definitions for the concept of usability, the literature review chapter includes more than just one concepts of usability.
‘Traditional’ usability is system focused and does not take into account the context or the use-situation, where users employ a system to perform real-life activities. An output of traditional usability has been criticised as being insufficient, as it fails to include the interplay between the system and their context of use (Nardi & O’Day 1999; Thomas & Macredie 2002). This implies that usability is needed to evaluate not only the system, but also its usefulness. However, usability is a lot more than just the measurements of how efficient and effective the system is and how satisfied the people are.

4.3 Usability Evaluation Methods
Usability evaluation methods are primarily aimed at assessing and measuring the usability of the systems and can be used at any stage of a system design and development process (Hartson, Andre & Williges 2001). Usability testing methods are for formative qualitative evaluation with the objectives of finding the lists of the usability problems that can be fixed in an iterative design process. Therefore it is all about finding qualitative data about the use of the artefacts and thus, is hard to quantify.

Some researchers consider that usability of the system can be determined by quantitative measurements such as binary task completion, accuracy measures, recall, completeness, quality of the output, ease of use and learning, input rate, preference, perceptions of the outcomes and interactions and more. This leaves out analysis of experiences with users (Hornbaek 2006). However, proper usability testing method should focus on how a researcher can interpret the data in order to fix the problems and improve the system. Usability testing that is about how much someone can learn from usability testing is likely to increase as the user’s expertise, experience and insights grow.

There are two types of usability evaluation methods that are used to evaluate systems, which usually involve an iterative process that include a design phase, evaluation and redesign (Kies, Willigies & Rosson 1998): expert-based and user-
based evaluation methods, as in Figure 4.1. Expert-based evaluation methods usually involved experts or a team of experts to carry out the evaluation process to provide their feedback on the system to further develop it (Nielsen & Mack 1994). Expert-based evaluation methods include heuristic evaluations, checklists (guidelines review), consistency inspection, usability inspection and walkthrough. Heuristic evaluations are commonly used to locate problems prior to user testing due to time and/or budget limitations, whereas checklists and frameworks are used when evaluations are undertaken in industry to provide an easy way to evaluate websites and allow benchmarking across industries (Elliot 2002; Beier & Vaughan 2003).

User-based usability evaluation methods, on the other hand, involve users to conduct tests on a system while being observed. The tests can be conducted in the field or informal settings using the usability testing process. Therefore, my study adopted a usability testing method to identify users’ attitudes toward health Web-based information systems.
4.3.1 Usability Testing

The concept of usability testing is defined as a process that employs participants as representative of the target population to evaluate whether or not a product meets certain usability criteria (Rubin 1994). It is used as a research tool to allow tests to be conducted under generic settings, aiming to identify and uncover issues in the system and focus on formulating solutions regarding the system being evaluated (Rubin 1994; Nielsen 2000b). This implies that usability testing directs and expresses input on how real users use the systems (Nielsen 2004).

Usability testing focuses on the system design assessment to allow designers to make improvement where it is mostly needed and at the same time review different aspects of the design. Andre et al. (2001) describes a User Action Framework (UAF), as in Figure 4.2, in an attempt to explain factors of the design to identify evaluation
principles and usability issues and concepts faced by users. Figure 4.2 illustrates that usability problems can occur at all stages of the process, hence, the focus of my study will be issues that participants come across when evaluating an online system.

Figure 4.2: User Action Framework (Andre et al. 2001)

4.3.1.1 Goals of Usability Testing
Usability testing aims to uncover faults or system errors and areas of improvement that are needed by understanding the behaviour and the needs of users to better serve them. It also measures the users’ perspectives in regards to the evaluated systems including performance or efficiency, accuracy, recall and emotional responses. Therefore, the final design should aim to satisfy end-users by providing useful functionality that meets the needs of the users (Rubin 1994). The literature review chapter will include more on the goals of usability testing, because a usable system results in boosting customer satisfaction, therefore leading to greater loyalty, reduced organizational costs, enhanced quality of the work needed, and increased profits for the organization (ibid).

4.3.2 Applying the Usability Testing Method to my Research
Usability testing typically involves carefully producing a scenario to reflect a realistic situation, in which the person can carry out the required tasks using the
The main purpose of the current study is to focus on the effectiveness of health on Web-based information services. My study adopts an approach that is based on concepts from Activity Theory that view usability testing by taking a realistic and down-to-earth approach, which identifies the purpose of a business’s computer system or website and tests it in a situation that simulates the typical real-life activities of the users. This approach suits the broad perspective of the study and is practical as an ‘Activity Theory Usability Laboratory’ (ATUL) is available to the researcher (Vrazalic & Hasan 2001). ATUL is set up for Human Computer Interaction, Activity Theory and Knowledge Management and for practical usability testing of systems using methods derived from that research (see Figure 4.3). The principal objective of ATUL is to conduct HCI research through formal usability testing and, to produce evaluations in a realistic context, which provides for the analysis of group activities and interaction, using an Activity Theory methodological approach.

Figure 4.3: ATUL Layout (Vrazalic & Hasan 2001)

Usability tests of the palliative care website were conducted in late February 2008 with medical students. All tests were conducted at ATUL and were of one hour
duration each. Subjects were given the Pre-Test questionnaire (Appendix 1), asked to carry out scenarios as contained in Appendix 2. An ATUL facilitator encouraged them to talk out loud as they went through the activity. The computer screen was recorded as a video, together with audio commentary. Once the scenarios were completed (these took 40 minutes), the facilitator asked relevant questions and drew further comments from test subjects. After the completion of the scenario, participants were given a Post-Test Questionnaire to get their comments and feedback on the evaluated system, as in Appendix 3.

4.3.2.1 How many participants are needed?

Usability evaluation of Web-based information systems is essential, because it provides useful feedback from the users to assist the website’s designers and the owner of the system, for the purpose of future improvements. As mentioned earlier, there are different categories of usability evaluation methods, including expert review and participant testing (Dumas and Redish 1994). My study uses the latter in a proper usability-testing laboratory. One of the most frequent questions ever asked is, how many participants are needed?

The involvement of real-life users of the system in the design process will provide a better understanding of their needs and goals, resulting in a more appropriate and useable product (Preece, Rogers & Sharp 2002). In addition to users’ contributions, it is also important to consider user’s expectation and ownership of the system or the product. Therefore, management expectations will ensure that the users’ expectation and expectations are realistic, which can be achieved by involving users throughout the development process. Another way to ensure and manage user’s expectation is through training, which allows users to use the system or product before it goes on the market. The other reason for user involvement is ownership, which gives the users a sense of ownership and receptivity to the product.

Despite the fact that usability testing can be extensive and costly, there is evidence that the best results come from testing no more than five users. Many researchers suggest that 4 to 5 participants will yield 80-85% of the findings in a usability test,
based on using the Poisson binomial probability distribution (Nielsen and Landauer 1993).

The following mathematical formula, proposed by Nielsen and Landauer (1993), indicates that the usability problems in a usability test with $N$ participants are:

$$N (1-(1-L)^n)$$

Where $N$ is the total number of problems in the design and $L$ is the probability of an average number of usability problems from a single participant (see Figure 4.4).

![Figure 4.4: Number of detected Usability Problems by Number of Tested Subjects](image)

According to Virzi (1992), 80% of usability problems would be found with four or five participants, additional participants would not add new information, and, the first few participants are enough to detect the usability testing problems, as in Figure 4.4. These results were confirmed by Nielson (1994a) and Lewis (1994), who found that involving additional participants would result in fewer usability problems in the same usability test.
4.3.2.2 Procedures of Activity Theory Usability Testing

This usability testing, as mentioned earlier is held in The Activity Theory Laboratory (ATUL), a unit of the University. ATUL is set up for Human Computer Interaction, Activity Theory and Knowledge Management and for practical usability testing of systems using methods derived from that research.

The Activity Theory usability testing typically includes the following procedural stages:

1. **Establishing the test goals:** at this stage, testers consult with the client to establish the reasons for the test and the proposed outcomes (Baca & Cassidy 1999; Sears, Jacko & Borella 1997).

2. **Establish the system purpose:** The clients and/or owners are interviewed to determine the business goals that the system is designed to achieve. The information from stages 1 and 2 is used to create a questionnaire for interviewing the user after the test.

3. **Identify User Characteristics:** at this stage, it is important to identify who is going to use the system and the set of potential users of the system. This could range from experts in the field to lay users.

4. **Identify User Activities:** typical user activities are identified including the presumed needs and goals in using the system. What would people want to use the system for? What information would users need to find out?

5. **Devise Test Scenario:** typical scenarios of use are produced at this stage to enable the usability testing to proceed. Tests can be more or less structured as required.

6. **Conduct the Usability Test:** in the ATUL room, the scenarios are explained and given to the subjects who then proceed to carry it out. Simultaneous recording is made on videotape, which includes audio, the computer screen, the user’s facial expressions and hand movements and audio as prompted by the facilitator. The latter keeps the user on the task, by asking general and encouraging questions such as, ‘can you suggest any other ways to do that?’ Where else could you look for it?’ The facilitator takes notes and should be neutral till the participants finish
all scenarios, and, then he or she asks the post-test questions (Dumas & Redish 1994).

7. **Analyse the test records:** the taped record of the usability test is reviewed in the context of the test goals and system purpose.

The pre-test and post-test questionnaires are a proper tool for data collection and provide an assessment of the user’s overall satisfaction. The pre-test questions set the background questions in order to identify the participants profile before the test. After the test, the participants are given a brief questionnaire regarding the usability of the Web-based information service they have just evaluated (Rubin 1994; Dumas & Redish 1994). There are many types of questions that can be asked in the questionnaire, including open-ended questions and closed questions. For this test, I used open-ended questions for the post-test questionnaire and the closed questions for the Pre-test questionnaire.

In addition, the prepared scenarios describe a particular task that a user needs to accomplish during the usability test (Baillie et al. 2003). The major benefits of the scenarios method is that reviewing and evaluating the system is done in terms of the realistic activities of usage. It enables the website developers to see how well the system performs the assigned tasks by involving real participants to carry out the required activities that the system is being designed to do. It also reveals the issues of usability, development and implementation of the system and recognizes the system significance, in processing and carrying out the users’ activities.

### 4.4 Overview of Q Methodology

#### 4.4.1 The Background of Q Methodology

Q Methodology is a scientific study to elicit individual subjectivity, which is defined as a “person’s communication of his/her point of view” (McKeown & Thomas 1988, p. 12) and “judgement based on individual personal impressions, feelings, and opinions rather than external facts” (Akhtar-Danesh, Baumann and Cordingley 2008, p. 2). It is an exploration and comparison of subjectivity, attitudes, beliefs and
opinions from participants (Akhtar-Danesh, Baumann and Cordingley 2008; Robbins 2009).

The history of Q Methodology is relatively new, extending back to 1930 when invented by British psychologist (and also physicist) William Stephenson at Oxford University. He was interested in finding new ways to explore and study people’s behaviour and attitudes. The most famous expert in Q Methodology alive today is Steven Brown of Kent State University, who is actively involved in all of Q Methodology, and still widely and deeply cites the original works of William Stephenson and his belief that Q Methodology is capable of revealing the structure of people’s beliefs and attitudes (Webler, Danielson & Tuler 2009).

The use of Q Methodology as a research technique is evident in situations such as poetic interpretation, perceptions of organizational role, political attitudes and appraisals of healthcare (Brown 1986). The idea behind the development of this methodology is that it is best suited to unravel the subjectivity of human minds, such as experiences, attitudes, preferences, beliefs, opinions and perceptions. At that time, the human mind was difficult to measure and examine using the well-known scientifically conventional quantitative methods that were available at the time. Q Methodology emerged out of such a deficiency. The abilities of Q Methodology to reveal human subjectivity, people’s views, attitudes, opinions, understanding and experiences is what accounts for its popularity in a wide range of social sciences, including information systems and human-computer interactions. Since that time, Q Methodology remains associated with quantitative analysis due to its involvement with factor analysis, in which statistical procedures are needed to reveal the subjectivity involved in a range of fields such as political attitudes, appraisals of healthcare, experiences of bereavement and other perspectives on life (Brown 1996).

4.4.2 Description of the Q Methodology

The letter ‘Q’ represents what Stephenson called ‘Quansal units’ (Quantification of Saliency, or importance), which derived from quantum physics to study the subjectivity of people. In this sense, Q Methodology was employed to uncover the
subjectivity of participants. When Q participants sort statements (which will be discussed later) into categories, statements that are sorted in the middle have low saliency (less important), compared with those sorted at the extremes, which are more salient (more important) (Brown 2008).

The value of Q Methodology lies in its abilities to generate and categorises a range of ideas about the specific topic under investigation. The aim is to uncover valid and authentic opinion, in depth analysis, and, subsequent categorizations. Research can be easily conducted by anyone with a basic knowledge of research statistics through using Q Methodology. Q Methodology provides a foundation for the systematic means to examine and reach understandings about personal experience, which are called a person’s “internal frame of reference” (McKeown & Thomas 1988). The literal meaning of subjectivity is individual point of view and this is always advanced from the point of self-reference (Stephenson 1953).

The concept of Q is similar to the statistical test ‘R’ in that it is used to compute correlations. However, Q and R have many differences was selected as it precede R, as it presents the fact that it is necessarily important to define and reveal perspectives before conducting a survey of the frequency of perspectives in a population (Asah 2008). One of the main differences between the two is that the factor analysis is quiet different as R researchers look for patterns in responses extracted from respondents (subjects) across variables (questions of the survey), while the subjects (Q statements) and variables (people) are inverted (Webler, Danielson & Tuler 2009).

Q Methodology has many purposes, which include assisting the formation of groups on the basis of their perceptions and collective shared thoughts; it is an effective method that allows the study and investigation of certain subjective topics and their discrepancies.

Fundamentally, Q Methodology conventionally involves the sorting of statements in a rank-ordering from ‘most agree’ to ‘most disagree’. The ’statements’ can be collected from a variety of sources and this particular aspect of Q Methodology can be seen as qualitative because it involves collecting thoughts and opinions of people
on a particular issue. The collection of what people think or view as ‘short statements’ is what gives Q Methodology its richness (Meloche 1999). These ‘statements’ can vary from an actual short statement, to pictures or images, sounds, etc. The statements are matters of opinion only (not facts) and the fact that the sorting of statements occurs in a rank-ordering from his or her point of view is what brings subjectivity into the picture.

4.4.2.1 The Strength of using Q Methodology

Q Methodology is qualitative as it extracts qualitative and subjective data, or Q sorts, from participants on their beliefs and values, does not require a large sample to yield valid results and is not indented to generalise the results to a larger population as is the case in conventional methods (Steelman & Maguire 1999; Frantzi, Carter & Lovett 2009). Apart from being qualitative, it is also quantitative in a way that data collection and analysis involve statistical analysis and techniques, which are now widely used in various sciences, including social research science and health economics (Frantzi, Carter & Lovett 2009; Brown 1980; Baker, Thompson, & Mannion 2006; Watts & Stenner 2005). Q Methodology is considered to be a ‘new’ and ‘innovative’, exploratory, and, behavioural research technique (McKeown & Thomas 1988).

The use of qualitative methods in social science and in health services as well as other areas of research with a strong emphasis on quantitative methods tradition raises a conflict (Oakley 2000). Q Methodology is an appropriate method for addressing qualitative research questions, but with statistical simplicity associated with quantitative methods (Baker, Thompson, & Mannion 2006). This implies that Q is not used to substitute qualitative methods, but as a complementary and alternative methodology to enrich standard research (ibid).

Q Methodology has strength over other qualitative methods that are lacking as it provides the classification of qualitative data and enriches the interpretations for any dataset (Stainton 1991). The key challenge of qualitative analysis is to interpret and classify complex datasets and present them in a useful fashion. The difficulty lies in
the ability of solely using qualitative methods to articulate precise analysis and provide clear and complete expressive interpretations. Therefore, many researchers often use reflexivity, triangulation and other techniques to validate the data and produce trustworthy findings. In this sense, Q Methodology allows unexpected accounts and dimensions to emerge because while concourse and Q-sampling depend on the research epistemological approach, the Q-sort is ultimately self-referent. The participants control the classification process.

Another important strength in Q Methodology lies in its suitability as a topic that the respondents are not familiar with or have already constructed a mental picture. To tackle the unfamiliar area, qualitative researchers often developed ways of using repeated interviews with the same respondents, for example, or extend time to allow subjects to further reflect upon their point of views on the topic under investigation. Conversely, Q Methodology does not rely on the subjects to articulate a consistent rationale; rather, the shared perspectives between respondents emerge through the factor analysis (Brown & Duguid 2001).

Q Methodology is more combined with qualitative methods than quantitative approaches. Q Methodology, “combines the strengths of both qualitative and quantitative research traditions” (Dennis & Goldberg 1996, p. 104), and in this respect, it provides a bridge between the two research methods (Sell & Brown 1984).

Although Q Methodology is employed to uncover the subjectivity of participants, another strength of this method is that it does not require shared perspectives to be known or hypothesized in advance (Donner 2001). It also looks at each individual perspective as a whole and does not aim to generate correlations between objective attributes of the individual, such as gender, age and nationality (Steelman & Maguire 1999).

Q Methodology also differs from conventional quantitative methods as it is an intensive approach that typically employs a small number of respondents using many questions, rather than the reactions of a large number of people to a smaller number of questions. The factor analysis in Q Methodology also differs from conventional
methods as the factor analysis represents the variance that is common to the people associated with the factor (Brown 1980; Webler, Danielson & Tuler 2009).

The Q Methodology’s effectiveness is also impeded in its simplicity of use, whereby anyone with basic statistical knowledge will be able to use it and conduct studies on individual experiences. This method allows the participant to sort out a range of information systematically; in this sense, this information could be expressed in statement form on paper. Q sorts allows the researcher to focus on how and why people think the way they do (Valenta & Wigger 1997). Emerging themes allow for theoretical interpretation of factors by examining clusters of individuals who have sorted statements in a similar way. Themes that emerge from the Q sorting assist in the identifications of shared perspectives that may provide testable hypothesis among larger populations (ibid).

4.4.3 Illustration of Using Q Methodology

Q Methodology has been used as an analysis method to systematically study subjective perspectives and group them into like-minded or shared perspectives using a quantitative and mathematical technique called factor analysis. Barkly (1975) and Dennis (1986) illustrated that Q Methodology is an appropriate choice of design and can be applied to study individual attitudes, feelings, values, life experiences such as stress and quality of life, intra-individual concerns such as self-esteem and body image, which involve subjective components. This method allows the researcher to systematically structure classifications of viewpoints about the topic or an issue and identify areas that overlap or differ. The salient key area can be also explored in a way where opposing views can provide new insights into phenomena (Akhtar-Danesh, Baumann and Cordingley 2008).

Q Methodology was developed to study individual attitudes and it has been used to study communication patterns, political opinions, nurse-patient interaction, and, as a tool for hospital strategic planning (Dennis 1986). A thorough review of the literature of the Q Methodology literature points to its potential use in healthcare settings and a number of health services research studies, such as the understanding of pain and quality of care (Eccleston, Williams & Rogers 1997). Q Methodology incorporates
subjectivity concepts and holism, which are important in healthcare assessments. Healthcare is essential to one’s health and well-being, and, culture care is subjectively learned and transmits values that assist and support individuals as well as groups to deal with illness, disability or death (Leininger 1995). Knowledge gained using Q Methodologies may foster the maintenance of the healthcare sector (Dennis 1986).

As discussed early, the advantage of Q Methodology is that it does not require a large population to produce meaningful results. A Q sample of 30 to 50 individuals can produce an accurate picture of the range of views on a topic or an issue (McKeown & Thomas 1990). The Q Methodology involves the use of distinctive sets of psychometric and operational principles, which when combined with specialized statistical applications of correlation and factor analysis, provides researchers with a systematic and rigorously quantitative means for examining human subjectivity. The crucial premise of Q Methodology is that subjectivity is communicable to others when subjectivity is expressed from a self-reference or point of view. The essence of Q Methodology is to ensure that self-reference is preserved and not compromised or confused by external investigation (Brown 1986). There are three basic stages in Q Methodology: the Concourse, the Q Sort and factor analysis.

4.4.4 Stages of Q Methodology

4.4.4.1 Stage 1: The Concourse
Stephenson’s concourse theory contains explicit statements of interdependency of thoughts and emotions. Stephenson calls the implications of the context of emotions’ effect as ‘affectability’, which means belief, feeling and self-references that support the judgement, reason and comprehension (Brown 1986). The literal meaning of the concourse is a gathering of opinions. The concourse is the starting point of every Q study, as it compromises the set of views and beliefs, rather than facts, about a particular topic of concern.

Q Methodology allows for free expression. In the first stage of Q Methodology, the concourse (a conversational brainstorming session) occurs in a social context and is
similar to a focus group or Nominal Group Process and is typically done as a group session, as it is frequently possible for the participants to think of new ideas that they have not had before as a result of the group (brainstorming) activity (Brown 1993). The eliciting activity can in practice vary from an actual discussion or interview to a review of a source (Stephenson 1990). The collection of statements need not occur in a single session, but may transpire over time or amongst various groups. However, it is typically on the same topic.

The expressed thoughts were not limited to their personal experiences, but would certainly be influenced by it. As a rule, a Q sample from 30 to 50 participants can produce an accurate picture of views on a topic, although much smaller samples are common and useful (McKeown & Thomas, 1990). The collected statements are then redefined and clarified to remove duplicates and combined into one meaningful statement or simply eliminated because of the irrelevance to the topic of interest. The collection of refined ideas was derived and drawn from a concourse known as Q sample, which is usually fewer in number than the original concourse and more defined. Different methods can be used to develop statements, such as interviews, talk shows, literature, newspapers, focus groups and expert opinion (Brown 1996; Dennis 1986; Valenta & Wigger 1997). The statements (i.e. concourse) are not restricted to words, as it might also be collections of arts and paintings, and, photographs (Akhtar-Danesh, Baumann and Cordingley 2008). The aim of the Q set is to represent as wide range of viewpoints as possible during the concourse.

In the process of generating and collecting statements from participants, Zing technology can be used as a way to conduct the concourse session. Zing technology provides a shared conceptual space where participants are able to simultaneously view and contribute ideas as they are created (Lewis & Newton 1995). Zing software is designed to assist teams to create new knowledge together. It is similar to groupware, instructional technology, group decision, group decision support systems (GDSS), decision support systems (DSS), electronic meeting systems and a team learning systems.

Zing technology consists of a mix of hardware and software distributed to the groups and a common projected screen, which display the contributions as they are generated to allow for immediate collective group brainstorming (generation of
useful ideas), and, decision-making for all to see (Meloche et al. 2007). Hardware enables multiple keyboards to control the cursors on a PC or laptop through which the Zing software can be loaded and projected into a screen to be viewed by the participating group. Questions that facilitate the desired group discussion session are loaded and each participant types in ideas and responses on their own keyboard into their own anonymous window. When ready, they then fire up to the public section above. These statements can then be reviewed, summarised and stored by the group. The ability to view all the ideas as they are created brings them to the attention of all participants and promotes assimilation and integration (Elliott 2003b).

Zing technology offers many advantages over other qualitative data collection conventional methods. Zing is faster and more efficient in that many useful responses are generated in an hour and collected in electronic form and there is no typing required on the part of the researchers. The wording remains exactly as the participants intended and all participants can enter data thoughtfully and simultaneously, but only with other ideas from the general discussion. What is more important is that the system we have with wireless keyboards is engaging, stimulating and communicating, discussed among participants, and, leads to a large number of useful ideas expressed as statements (Meloche et al. 2007).
4.4.4.2 Stage 2: Q Sort

In the second stage of Q Methodology, the Q sort occurs on an individual basis. Before starting the Q sort process, participants were given an instruction sheet to guide them throughout the process (see Appendix 6). Participants sort the statements from their own judgement or point of view on a topic, according to some preference, judgement or feeling about them, mostly using a quasi-normal distribution. The Q sort proceeds in stages similar to that in the general survey methodology. In the first stage of the Q study, that is, the research in which Q sorting will be used, must be properly designed. In the second stage, the Q sort must be properly administrated. In the third stage, the Q sort may be analysed. Without completing the first two stages successfully, the validity of insights drawn from the analysis may be compromised (Brown 1980). By Q sorting, participants give their subjective meaning to the statements, and, by doing so reveal their subjective point of view or personal profile.
The participants are asked to rank order statements and all statements are typically sorted in accordance with agreement/disagreement (Stephenson 1953). As instructed in Appendix 6, to simplify the sorting process, the respondents start by separating all the statements into three groups: disagree, neutral and agree. In the following iterative process, each group would be examined carefully and distinctions made within the groups, eventually leading to each space in the distribution being filled. After the separation, the respondents are asked to rank them in an order that reflects their view of the statements, usually from ‘strongly disagree’ to ‘strongly agree’. Participants must then go through the statements deciding what must be moved (Brown 1980). For example, participants are asked to sort statements in accordance with the degree of concurrence/agreement with the statements and the degree of disagreement. +5 is high agreement and –5 is high disagreement, with the scales between –5 and +5 reflecting the shades/levels of agreement, as shown in Figure 4.6. The largest number of statements will be placed in the centre and the least amount of statements will be placed at each extreme point (Meloche 1999).

![Figure 4.6: Q Sort Grid for Ranking of the Statements](image)

The above diagram demonstrates a sample of a Q grid (see Appendix 7 for a complete Q grid) the participant uses to record the order of the statements. Grids are
created to correspond with the set of statements, and, the statement number would be placed in one of the cells of the grid. The above Q grid example is created to accommodate 50 statements and the set of statements are ‘sorted’ in correspondence with the grid. In this case, 2, 3, 4, 6, 6, 8, 6, 6, 4, 3, 2, 6, 4, 3, 2, would represent the number of cells in each column. This method of using a grid is referred to as a forced sort, because only one statement must be placed in a single cell. To do so, participants should have to make the best choices possible within the options available. This forced distribution requires a decision which impacts on the interpretations of the -1, 0 and +1. Q samples may be intentionally neutral or have leftovers with little value (Stephenson 1974).

Since Q sorts can be affected by social desirability, Q-sorting conditions can be reframed to capture social desirability. This implies that after sorting, follow-up research (such as interviews) can be conducted to capture the subjects’ reasoning for ordering or ranking various Q samples in their unique ways. A Q sample is the finalised list of statements obtained after the researcher carries out a process to evaluate the statements to see if they are related to the study topic. Furthermore, it might be beneficial for the researcher to have independent experts to identify the viewpoints and remove duplicates. However, the pilot phase is usually conducted in situations where are several statements in which experts cannot agree on how close they are (Akhtar-Danesh, Baumann and Cordingley 2008).

Furthermore, there are two techniques used to express Q samples: unstructured and structured. The unstructured approach is applied by selecting relevant statements to the topic and being representative in terms of covering all major ideas and viewpoints, whereas the structured approach structures statements to meet conditions defined by researchers based on hypothesis considerations (Akhtar-Danesh, Baumann and Cordingley 2008).

**4.4.4.3 Stage 3: Factor Analysis**

Factor analysis is “a method of reducing a data set to a simple structure of factors based on correlations between larger numbers of variables” (Baker, Thompson, &
Mannion 2006, p. 5). Once the Q sort is completed, the final stage of the Q Methodology is factor analysis, which is statistical analysis via inter-correlations among the sorts and sorting them into factors that reflect the views of groups of participants. The first two stages are usually conducted by a researcher involving respondents, but the third stage only involves the researcher in analysing the data collected from the Q sort. While factor analysis is done by items in conventional methods, Q Methodology utilizes person factor analysis, focusing on the patterns between respondents (ibid).

The cluster or patterns of responses of subjectivity are based on statistical similarities and dissimilarities among participants. The result of a Q study is a description of the diversity of coherent opinions on a particular topic, which are obtained as ‘factors’ (Meloche 2003). In Q Methodology, factor analysis gives information about similarities and dissimilarities in views on a particular subject. For example, the participants ranked the statements into similar orders of preference. Each factor represents a different type of opinion on a particular subject. If each participant has her/his own specific likes and dislikes, as Stephenson (1953) argued, then their profiles will not correlate. However, if significant clusters or patterns of correlations exist, they could be factorised and individuals could be measured with respect to them. What matters is the correlation between total responses of the individual, not the correlation between isolated statements, because the subject not the statement that is the variable. Basically, factor analysis uses a correlation matrix of Q sorts, proceeds to partial out the shared variance mathematically among the Q sorts, and converges on a first dimension or factor that accounts for the most shared variance. This process continues until all factors are identified. The number of values above one produced at the correlation matrix stage can be used as heuristics to inform the number of factors (Brown 1980).

This original set of factors is then rotated to reach to the final set of factors. This rotation enables researchers to muddle about the sphere of opinion and, examines it from different perspectives. However, the analysis is the longest part of the task and the level of difficulty experienced will depend on the relative clarity of the factors that are produced. The explanations of the Q sort, which are followed by
interviewing, can be helpful in the interpretation of the factors. The resulting factors will represent a ‘shared’ understanding. The analysis of the sorts tends to establish a number of factors varying from 1 to 9, and, the factors represent a way of understanding the topic under investigation that is held and represented by the individuals (McKeown 1990).

4.5 Q Methodology as applied to my Research

The purpose of my research is to investigate the current issues of online health by examining the attitudes of various stakeholders. Therefore, people are central to the analysis. Q Methodology can provide a deeper understanding of personal thinking and ideas, which is the main focus of my research. Subjective views are necessary to improve the delivery of healthcare and its services.

Q Methodology has a systemic procedure that allows for exploration of the views held by the subjects. This process per se involves discovery and dissemination of knowledge as well as people involvement and interaction, such as community support, open discussion and reflection (Meloche et al. 2007). Participants can join the research at any step of Q processes, within their interests to create and exchange ideas throughout the whole process.

Q Methodology is closely aligned with Miles and Huberman’s (1994) model, as depicted in Figure 4.7. The iterative model of Miles and Huberman (1994) consists of four sequential stages: data collection, data reduction, data display and the drawing, and, verification of conclusions. Q Methodology involves data collection, which is conducted through interviews and the concourse stage of Q Methodology to generate as many statements or Q sorts from participants as possible. Data reduction is conducted during the concourse when the collected statements are redefined and modified to eliminate repetitions. Entering data through the PCQ statistical software also requires further data reduction (ibid). The PCQ method is a “frequently used program developed by Schmolck (2002) and can be download freely from his website” (Baxter et al. 2009, p. 3). Data display is used and applied when Q sorts are keyed into PCQ statistical software and factor analysed accordingly, in order to
categorise the views into more defined perspectives. *Drawing/Verifying of conclusions* stage occur when data is analysed and reviewed. In this sense, qualitative data analysis is continuous and iterative (ibid). This is important for my study as it allows the researcher to explore the data and literature in a more revealing fashion.

For my research study, the concourse group was encouraged to produce as many statements as they could and freely express the range of their thoughts to evaluate the health Web-based information system. Since the Q Methodology allows for free expressions, participants are encouraged to produce as many statements as they can and fully express their thoughts about the strengths and weaknesses of the current health information system as a communication and information source, as well as their suggestions to improve the current WBIS. Apart from statements collected during the concourse, other statements are also taken from secondary sources, such as journal articles, for my research study. It is interesting to note that the participants in my research study, who were not only involved in the generation of the statements, also exhibited interest and full involvement in the statements sorting process.
For the Q sorting process, the researcher has designed Q flash where collected statements and Q grid can be presented and accessed online, as shown in Figure 4.8. Participants may access a soft copy of the Q sorts online that are linked to the university website, which makes the Q sorts a lot easier to access, because participants can view the rank of the statements and change the place of any statements any time. After the completion of the Q sort, participants sent the final Q grid via email to the researcher.

Figure 4.8: an Example of a Completed Online Q Sort using Q Flash

The use of Zing technology as a tool in my research assists in the generations of statements in the concourse stage of Q Methodology. Zing assists participants in creating immediate new knowledge, accelerates knowledge sharing, and, ultimately transforms organisational practice and guides discovery (Fitzgerald & Findlay 2004). Several researchers illustrate the use of zing technology in self-expression, self-reflexivity and co-creation (Elliot 2002 & 2003b; Elliot et al. 2004; Fitzgerald & Findlay 2004).
A factor analysis has been applied to analyse data from Q sorts to achieve the aims of my research and concentrate more on the respondent’s self-reference and shared perspectives, so patterns can be discovered from responses without prior formulation (Stephenson 1953). The participants’ responses were statistically analysed to find correlations and identify factors that are common to the sorts of several individuals (ibid). Each factor normally consists of more than one person. It is the correlation between sorts that determines the factors and the difficulty of the analysis depends on the relative clarity of the factors that are produced. The analysis is the longest part of the task and the level of difficulty experienced will depend on the relative clarity of the factors that are produced. “PCQ” software is used to assist with the mechanics of the analysis. In factor analysis, which is conducted through the PCQ method, there are two methods of rotations are available in this program: varimax rotation and judgemental (manual) rotation (Watts & Stenner 2005; Baxter et al. 2009). The researcher often checked out both solutions. The only difference between the two components is that judgemental rotation enables the researcher to view the factors from different angles before arriving at a factor solution and thus, the researcher as analyst, has more control over the solution, whereas the varimax rotation results in higher explained variance and structure, which maximizes the similarities and differences among factors.

Once a suitable simple factor structure is identified, the researcher examined who loaded significantly on each factor to determine what similarities their rankings share. The number of factors identified depends in part upon the degree of agreement amongst subjects, and, in part on how much detail the researcher feels is useful to analyse. The factors are not necessarily mutually exclusive in that a given statement or a given individual may appear on more than one factor.

4.5.1 Implications
The application of Q Methodology in my study is not to substitute qualitative conventional research methods, but to offer a complementary and alternative approach to examine and evaluate the views on online health, and, its findings have potentially important implications for designing, developing and implementing an
online health system.

The reasons for Q Methodology adoption is reflected in its usefulness, as it applies in my research, which is summarized as follows:

- Q Methodology provides the strengths of both qualitative and quantitative research methods. It is qualitative as it uncovers and explores the subjectivity of participants on their beliefs and value. However, statistical techniques are used to reveal the structure of viewpoints. Therefore, Q Methodology can be used to explore online health phenomena and gain insights to generate theory and hypothesis.

- Q Methodology is an intensive method to provide an in-depth understanding of the phenomena that enriches the interpretations of how at least one person thinks about the topic under investigation. As an intensive method, it requires only a small number of participants to complete the Q sorts and generate meaningful results (Stainton 1991).

- Q Methodology seeks to understand how an individual thinks by structuring their thoughts and points of view on the topic under investigation. Therefore, the results of Q Methodology will articulate how an individual or individuals think, with shared and common views.

- Q Methodology includes a well-defined series of stages and steps that involve open discussion, reflection, idea generations and individual decision making to guide and enable participants to use and share knowledge and interactions with each other.

- In the data analyses part of Q Methodology, it uses correlations and by-person factor analysis, where statistical data analysis does not look upon variables (see Appendix 4 and Appendix 5 for statements), but rather by people as variables and how people correlate with each other to find similar, shared perspectives rather than objectively viewing people in terms of age, gender, social status, etc.
In Q Methodology, the case studies collect data in more efficient and faster ways by using zing technology in an electronic form. It is an easy and valuable way, which consumes relatively less time to open up discussion on the topic of interest and to capture thoughts from participants than conventional quantitative methods, such as a survey.

Q Methodology is designed to study subjectivity, where emerging ideas and themes allow for theoretical interpretation, particularly Activity Theory, as it places people at the centre of the analysis and intents to transform the object of collective activity in a productive way.

Q Methodology and Activity Theory align together in a way, in order to provide an appropriate technique for conducting research and useful descriptive frameworks for interpreting and presenting the outcomes of my research.

To sum up, Q Methodology enables my research to systematically and orderly elicit subjectivity from participants. The focus of Q Methodology is on the similarities and differences to elicit diversity of viewpoints and avoids the tendency to concentrate primarily on commonalities among them (Akhtar-Danesh, Baumann and Cordingley 2008). The Q sample is wholly subjective and is composed of reflective viewpoints of participants on the topic of the study (Brown 2008). The Q sorting process is an active process where participants sort and prioritize statements (see Appendix 4 and Appendix 5), and, where each statement is ranked in relation to other statements, thus, this process identifies the statements that participants agree/disagree with the most, and, the factors that are extracted based on their priorities (Meloche et al. 2007).

My study adopted Q Methodology in the sense that it does not only looks at the explicit subjective views, but is focused on participants’ interaction and involvement. While the concourse stage occurs in a social context, the sorting process of Q Methodology occurs on an individual basis. Q Methodology is a feasible and
effective method for turning subjectivity into objective outcomes due to its hybrid qualitative and quantitative techniques embedded within it. It is an efficient way to determine human perceptions and interpersonal relationships that are characterised by its subjectivity, without getting trapped in the dilemma of either of these two extremes (Chinnis et al. 2001; Duenckmann 2010). Q Methodology is seen as a more robust and rigorous method than alternative method to measuring subjectivity and attitudes of individuals (Cross 2005).

4.6 Concepts of Content Analysis

Content analysis has existed for centuries. A wide range of researchers have been using it since the 1930s in many disciplines and areas of research (Krippendorf 2004). Although the literature has proposed a number of definitions for content analysis, my study selected and discussed certain definitions because of their importance in justifying the approach adopted in my research. These definitions also serve to illustrate why a particular definition adopted in my study was selected.

In the Webster’s Dictionary of the English Language (1961 edition), the concept of content analysis is defined as “analysis of the manifest and latent content of a body of communication material (as a book or film) through classification, tabulation, and evaluation of its key symbols and themes in order to ascertain its meaning and probable effect” (Krippendorf 2004, p.17).

Two common approaches are generally used to describe content analysis: ‘form oriented’ to represent objectively, as it involves quantification of content and, ‘meaning oriented’ to reflect subjective analysis. Both approaches proposed by Smith and Taffler (2000) are described as word-based content analysis approaches.

Content analysis is defined as a, “research technique for the objective, systematic and quantitative description of the manifest content of communication” (Berelson 1952, p. 18). Based on Berelson’s definition, Budd, Thorp & Donohew (1967, p. 2) classified content analysis as, “a systematic technique for analysing and quantifying message content and message of handling. It is tool for observing and analysing the overt communication behaviour of selected communicators.”
Kerlinger (2000, p. 525) defined content analysis as, “a method of studying and analysing communication in a systematic, objective, and quantitative manner for the purpose of measuring variables.” Walizer & Wienir (1978, p. 343) defined it as, “any systematic procedures devised to examine the content of recorded information.” Carney (1972) and Krippendorf (2004) have criticised these definitions as they rely solely on text and quantitative attributes. In turn, Berelson (1952) provided a justification for the use of objective content analysis approach as quantification is needed to test statistical hypotheses.

The subjective content analysis approach focuses on the underlying meanings and themes in the text under investigation and hence requires researcher’s judgemental input when analysing the meanings (Smith & Taffler 2000). One of the earlier and broader definitions of content analysis comes from Holsti (1969, p. 14), who describes it as; “any technique for making inferences by objectively and systematically identifying specified characteristics of messages.” Based on Holsti’s definition, the technique of content analysis is not only restricted to text, but also as a research tool to analyse other types of sources, such as drawings, video tapes or websites (Krippendorf 2004; Carney 1972).

The ‘traditional’ content analysis approach has been used as an analysing tool, which is applied to study a media centric Methodology (Neuendorf 2002). In 1910, sociologist Weber used this technique in mass media studies and indicated the usefulness of using such a technique in allowing us to discover and describe the focus of individuals (Krippendorf 2004).

With the introduction of Web-based information systems, content analysis has become a significant research method (Neuendorf 2002). Till today, content analyses are still the most popular and are recognized as an important research technique and extensively used in various fields, for instance, in marketing, communication, social sciences, healthcare and other fields. Online studies include McMillian (1998), Foster, Jackson & Martin (2008), and Jung, Youn & Chang (2009) in health websites and related to health issues; Charrer 2002; Zhang and Flemming 2005; Askelson et
al. 2009 in journalism; in sociology, such as Hayes-Smith & Hayes-Smith (2009); online media websites like Newhagen, Corders & Levy (1995) and Trappel (2008). Most of the research applied the interactivity concept or dimension to measure the quality and effectiveness of the website.

Recent content analysis literature suggests the focus of content analysis. In the field of social science, content analysis is a methodological measurement of materials using, “a set of explicitly formulated rules’ to investigate ‘the presence, intensity, or the frequency of some characteristics” (Shapiro & Markoff 1997, p. 11). Indeed, this method involves comparing and categorizing a set of data.

Content analysis is defined as, “a research technique for making replicable and valid inference from text (or other meaningful matter) to the context of their use” (Krippendorf 2004, p. 18). This definition focus closely aligns the meanings of texts and particular contexts or purposes. The definition of content analysis adopted in my research is Krippendorf’s (2004) definition, because it allows for an examination of both text and visual image dimensions to make implications about the meaning of the messages conveyed, which defined a website.

4.7 The Rationale of Applying Web Content Analysis Method

Berelson (1952) suggested five main purposes of content analysis: to describe substance characteristics of message content, describe the form of characteristics of message content, make inferences to producers of the content, make inferences to audiences of content, and, predict the effects of the content on audiences.

In general, content analysis has four key advantages or strengths: firstly, it is has the attractive feature of being unobtrusive; secondly, it can handle unstructured matter (or being flexible); thirdly, it is context sensitive, and, therefore can process symbolic data; and fourthly, it is useful in dealing and coping with large volumes of data (Krippendorf 2004).
Holsti (1969) summarized three purposes or uses of content analysis: describing the five characteristics of communication, making inferences about the antecedents of content, and, making inferences about the effects of communication. Wimmer and Dominick (2002, p. 142) identified five purposes of content analysis: describing communication contents, testing hypotheses of message characteristics, comparing media contents to the ‘real world’, assessing the image of particular groups in society, and, establishing a starting point for studies of media effects.

The term ‘new media’ was defined by Rice (1984, p. 35) as consisting of communication technologies that “allow or facilitate interactivity among users or between users and information”. What makes the analysis on the features of the new media differ from the traditional media (non-interactive media) is that it requires a common approach related to researching the websites. Initial empirical work focused on categorizing these features (Holzer & Kim 2005). The environment of the WWW, however, shows some unique characteristics that are different from traditional media. Newhagen and Rafaeli (1996) distinguished five central dimensions in which WWW-based communication differs from traditional media. Those dimensions are multimedia, hypertextuality, packet switching, synchronicity, and, interactivity. Newhagen and Rafaeli (1996) argued that, unlike other media, all the five qualities originated from engineering and deserved descriptive scrutiny (Newhagen & Rafaeli 1996, p. 2).

Ever since the presence of the World Wide Web and websites, many researchers investigated and examined features of websites by applying a content analysis technique and, illustrated some of most common features of effective and successful websites (Borasky 1997; Neuendorf 2002; Osorio 1998; Resnik & Stern 1997). Certainly, those researchers applied the content analysis tool for various reasons. Some of these reasons are assessing and determining the quality of websites. Researchers have paid more special attention to the interactivity feature of websites, which are considered as being the most distinguishing characteristic (Conway & Dorner 2004; Ghose & Dou 1998; Ha & James 1998; Hoffman & Novak 1996; Liu
These advantages allow researchers to investigate and examine the content of information by combining the characteristics of the Web, which are ubiquity, volatility (instability), globalization, and, interactivity (Weare & Lin 2000). The last strength is especially suited to the Web as new information grows exponentially on the Web. Researchers have studied the content analysis of websites in order to measure their interactive features (Ha and James 1998).

4.8 The Procedures of Applying Content Analysis

Even though content analysis is one of the most popular research methods to study the Web, few studies have focused researchers on applying content analysis into the dynamic environment of Web-based applications. Research with some or all of these purposes can add value to understanding the evolving communication environment of the Web. As such, website content analysis has become perhaps one of the most potential areas for research, but there is limited research in this area (Adam & Deans 1999; Palmer & Griffith 1998; Sheehan & Doherty 2001).

Although the advantages of content analysis are tremendous, challenges remain in doing the websites content analysis, however. With the expansion of the available websites on the Internet, the available directories remains incomplete and overlapping, therefore, selecting true random samples have become impossible (Bates & Lu 1997). In addition to the sampling process, coding of a website includes time-consuming and biases on sample size (Ha & James 1998). As a result, McMillan (2000) recommended five primary steps that should be performed when conducting content analysis research for the Web-based applications. The starting step in content analysis is to formulate a research question and/or hypothesis. Selecting a sample, defining categories, coding a process and reliability are the other steps. The final step is analysing and interpreting data. Moreover, Krippendorf (2004) added another step to the process, which identifies the unit of analysis. Similarly, Weare & Lu (2000) argued that researchers should be aware of the evolving characteristics of Web-based applications and allow room for new features,
which entailed greater emphasis on sampling, unitization (or unit of analysis), categories, and coding in improving the quality, effectiveness, and, the validity of that particular content analysis.

Hence, my research applied and followed these steps to ensure the smoothness of the structure in the process of conducting content analysis on the websites. Apparently, the steps are:

1. Formulating research question
2. Sampling
3. Developing categories
4. Coding units and units of analysis
5. Coding procedure
6. Analysing the collected data and drawing the conclusions

4.8.1 Step 1: Formulating the Objective of Web Content Analysis

This study aims to investigate the content of online health website. To be specific, what is the nature of the content of health websites in general, and palliative care websites in particular? To answer the proposed question, the first step undertaken was to define the content analysis process. My study conducted mixed-method content analysis approaches, meaning that it applied quantitative and qualitative content analysis towards online health websites as well as palliative care. The rationale behind the choice of Web content analysis is due to the reason that it is effective and suitable in exploring the content and capturing patterns and identifying textual and graphical data in the new media within a specific time-frame. This approach assists my study in achieving the main objectives, which include exploring and understanding the interactivity as well as new features offered in the online health trends.

4.8.2 Step 2: Sampling

The most crucial step in Web content analysis is forming a sample which is defined as a process of selecting sub-units to study a larger population (Riffe, Lacy & Fico
Barbie (1999, p. 201) defined sampling as the “process of selecting observation”, whereas the population is ‘theoretically specified aggregation of study elements’.

Drawing a sample is one of the most difficult steps of Web content analysis because of the lack of a standard method that guides the sampling process (Jones 1999). Another reason is the incompleteness and overlapping in the available directories (Bates & Lu 1997). It is also difficult to draw a meaningful sample from the researcher’s perspective (Neuendorf 2002). Consequently, the researchers tend to apply explicit rules to analyse text or communication media prior to data collection (Jones 1999). As I have been plagued by difficulties in establishing a sampling frame with a reliable list of the sampling frame, creating one of the health websites worldwide has required a creative approach and new criteria that need to be met.

For my study, there have been no reliable lists of health websites worldwide as well as palliative care websites that can be considered as a representative sample, and, most available lists involve a certain fragility of sampling. I faced enormous obstacles in the sampling process and it took considerable time and effort to obtain enough information to draw an overall description and understanding of health websites, without becoming overwhelmed from the outset.

In relation to my study, two common methods are used to define a sampling structure. One is to use an online list of websites in a given category or directory, and another popular technique is to use search engines such as Yahoo and Google to identify websites (Krippendorf 2004; Ghose & Dou 1998). Given that the established online health websites were not comprehensive enough to design samples, my study used search engines for sampling in order to identify websites that met relevant criteria. Search engines, especially Yahoo and Google, are often used in research as they provide the largest database and a higher ranked list of websites (Lawrence & Giles 1998). Moreover, Yahoo and Google are selected because they cover many countries in the English language, as these search engines are universally available and accessible, and, they provide wide range of health websites.
The selection criteria for inclusion in my study required that the website be 1) written in the English language or any other language the researchers are familiar with; 2) the website should offer non-topic specific meaning and general health information and not be too focused on certain groups of patients or diseases.

In my study, content analysis was conducted to assess the websites’ commonalities and differences. In total, the sample size of palliative care websites consisted of 2 governments, 27 non-profit, and, 1 commercial websites across 12 countries of the world (Australia, USA, UK, NZ, Canada, Japan, Singapore, India, Russia, South Africa and Malaysia). The 30 palliative care worldwide sites accessed from an international directory are shown in Figure 4.9.

![Figure 4.9: The International Directory of Hospice and Palliative Care Websites](image)

To access health websites, my study used the search engine, Google, to locate the top 20 popular health websites for the year 2009 and called eBizMBA. Online health websites were ranked by a combination of continually updated traffic statistics, as shown in Figure 4.10. The website was also revisited in the year 2010, as it keeps
updating its lists to include what I missed out in 2009, as the most used and popular health websites such as yahoo health website. The remaining health websites are selected using the Google search engine as the most popular, accessible and universally used technique. The sample size of health websites worldwide is 35, of which 15 governments, 13 commercial and 8 were non-profit health websites, covering nine countries around the world: Australia, USA, UK, Canada, Germany, New Zealand, India, Singapore and Malaysia. Therefore, the sample was chosen both for the purpose of the study and for convenience.

![Image](image_url)

Figure 4. 10: The International Directory of the Top 20 Most Popular Websites

### 4.8.3 Step 3: Developing Categories

To develop the categories for my study, there is a need to define conceptualisation of my study. Babbie (1998) defined conceptualisation as the process that should be followed to clearly specify the research and eliminate any misconceptions that may be presented. Operationalization, on the other hand, is the major step following conceptualisation that aims to construct measurable concepts, which will be discussed later in the section.
In my study, the selection of chosen health and palliative care websites were evaluated and analysed by the presence or the absence of certain criteria in interactive features, based on Heeter’s six interactivity dimensions. The reasons for the use of Heeter’s (1989) six dimensions of interactivity are that her dimensions are specific and measurable, encompass all new media, and, are concerned with both sides of a two or more directional flow of information (Kenny, Gorelik & Mwangi 2000). In addition, many researches have adopted Heeter’s study for the same reason (Ha and James 1998; Jensen 1998; McMillan 1999; Massey & Levy, 1999; Massey 2000; Dholakia et al. 2000; Downes & McMillan 2000; Kenny, Gorelik & Mwangi 2000; Paul 2001; Leung, Chan & Wu 2002; McMillan & Hwang 2002; Gustavsen & Tilley, 2003; Chou 2003; Chen & Yen 2004; Rahman 2008; and others). Details on the discussions of the relevant literature have been covered in the literature review chapter. These researchers have further enriched the concept of interactivity by applying it in various studies involving the Internet, graphic audio and video technologies within different disciplines and fields such as marketing, information systems, journalism, computer-mediated communication (CMC), advertising, education, public relations and broadcasting and electronic media.

My study adapted the pioneering work and the most worthy of consideration when studying interactivity via websites using content analysis, as described by Heeter (1989). Heeter (1989) identifies and supplies six-dimensional definitions of interactivity, which includes content availability and choice, effort users must exert, responsiveness to the users, the ease of adding information, monitoring the information and the system use, and, facilitation of interpersonal communication (Heeter in Jensen 1998). My research modified Heeter’s list to include:

1) **Other/unexpected interactive options**: this category accounts for other or unexpected interactive options or new features.

### 4.8.3.1 Content Availability and Choice

This dimension, Heeter notes, refers to what Rice (1984) called, ‘amount of choice available to the user’. It can also be related to the notion of selectivity, defined as, “the extent to which users are provided with a choice of available information”
(Heeter 1989, p. 222). According to Kenny, Gorelik & Mwangi (2000), complexity of choice is higher when users have more choices to navigate through the site, have more hyperlinks on the website, are more able to choose to use a text or graphics browser, receive information in English language or any other different language, or, utilize a search engine to locate the information the user wants.

4.8.3.2 Effort of Users

The second dimension has to do with the “amount of effort a user of a media system must exert to access information” (Heeter 1989, p. 222). This refers to Paisley’s (1983) idea that interactivity can be viewed as, “the ratio of user activity to system activity” (in Kenny, Gorelik & Mwangi 2000, p. 5). Within this dimension, VCRs are more of an interactive form of media than broadcast media because users have to go to the store or tape the desired program instead of merely switching channels. It is interesting to note, though, that according to this definition, both VCRs and broadcast media are considered interactive. According to Kenny, Gorelik & Mwangi (2000), this dimension concerned with the effort users must exert is all about how easy or difficult it is to find information on a particular site and measure it based on how many clicks it takes to find specific information. Therefore, the more clicks it takes to find information, the more difficult it is to find information and as a result, the more effort exerted by users, which in turn makes the site less interactive in this regard, and, vice versa. On the other hand, McMillan (1998) defines this dimension by how many tools are provided on a site to help users navigate the site. This dimension is, therefore, measured based on the number of predetermined list of navigational tools that existed on the site. The more navigational tools at a particular site, the less effort must be exerted by users in finding information, and therefore, the lower interactivity of that site, and, vice versa. This is because the availability of navigational tools makes the novice user more comfortable in using the site and therefore, reduces the number of choice the user can make.
4.8.3.3 Responsiveness

The third dimension concerns the responsiveness to the user, that is, “the degree to which a medium can react responsively to a user” (Heeter 1989, p. 223). This definition integrates Rafaeli’s (1988) definition of interactivity as, how responsive is a medium to a user. Within this dimension, a high level of interactivity is achieved when the roles are interchangeable, e.g. between end users or between the source and the receiver. According to Kenny, Gorelik & Mwangi (2000), this dimension is reflected on site when they introduce a human element, or, use technology to respond to user queries.

4.8.3.4 Monitoring of Information

Heeter’s fourth dimension of interactivity considers the potential of a system to track users, as described by Jensen (1998), as a form of feedback that automatically and constantly registers all user behaviour while on the media system. The use of a monitoring device on the site, as the site operator/webmaster can record, who has visited the site and which part of the site they visited (Kenny, Gorelik & Mwangi 2000). Although the measures of monitoring information and system use are relatively simple measures of monitoring, they are, however, functional as indicators of the level of attention site creators are paying to the audience and the content of the site.

4.8.3.5 The Ease of Adding Information

The ease of adding information to the system refers to how a mass and undifferentiated audience can access websites. Heeter (1989, p. 224) defined this dimension as “the degree to which users can add information that a mass, undifferentiated audience can access” is the fifth dimension of interactivity. Some websites, i.e. online newspapers, allow users to add Web pages, hobby or special interest pages, announcements of births, marriages, death and reviews of games, movies and other forms of entertainment events; some websites allow users to add stories about their illnesses (Kenny, Gorelik & Mwangi 2000).
4.8.3.6 Facilitation of Interpersonal Communication

Facilitation of interpersonal communication is the degree to which a media system facilitates interpersonal communication between specific users. Facilitation of interpersonal communication (email and so on) constitutes Heeter’s sixth dimension of interactivity. According to Kenny, Gorelik & Mwangi (2000), the presence of interactive options such as chat rooms, discussion groups, bulletin boards, feedback mechanisms, emails and full motion video displayed on the home page facilitate the communication between users and site providers and attracts more users to the site, and therefore, facilitates interpersonal communication.

4.8.4 Step 4: Coding Units and Units of Analysis

The context unit used for my study is the website, which is defined as a “hierarchy of information, connected via hyperlinks to an infinite number of other sites” (Okazaki & Rivas 2002, p. 383). Healthcare and palliative care or hospice organizations’ websites were chosen for analysis in order to examine their benefits and suggest ways to improve them. They provide a number of benefits, such as detailed information for information-seeking consumers. This intensive and rich information source encourages repeat visits due to its effectiveness in meeting the needs of information seekers. The websites can also serve various communication and social channels and functions (Cho & Cheon 2005).

Considering the magnitude and changing nature of websites, some creativity would seem to be needed in defining the unit of analysis, and then, careful and consistent manipulation and consideration are required to overcome some of the complexities in conducting Web content analysis.

For my study, some of Heeter’s original categories have been modified to include more current interactivity tools to reflect the ever-evolving technologies applied. These major features were measured as follows:

4.8.4.1 Content Availability and Choice:

1. Provide a language choice option in the front page with either a Yes or No answer
2. Provide a useful search engine in the front page with either a Yes or No answer
3. Number of relevant links from the first page of the site, links within sites, hyperlinks within the same issue with either a Yes or No answer
4. Offer a site map (Yes or No answer)
5. Number of health information in Audio and/or video placed on the front page
6. Number of health-related information with picture/s available on the front page
7. Provide health-related information with photo gallery (Yes or No answer)
8. Provide latest news on health issues on the front page with either a Yes or No answer
9. Provide a text option placed on the front page to change the size of the text for people with disabilities or vision problems
10. Provide a print friendly option on the front page
11. Take into account users’ browsers and connection speeds when downloading from the Web-page

4.8.4.2 The Effort that the User must exert to Access Information:
1. Provide a menu bar on the first page of the site that provides a brief description of the sections of the site
2. Have links to primary sections of the site
3. Provide a menu bar on subsequent pages and the presence of a hot link that takes the visitor directly back to the home page

4.8.4.3 Responsiveness to the User:
1. Do editors or webmasters respond to the emails sent?
2. How long does it take until they respond to users (within seconds, minutes, hours, or days)?
3. Provide a help page on the front page
4. Provide a user queries service, such as a ‘feedback form’ for eliciting inputs from users
5. Provide an ‘about us’ section that has information to ‘contact us’
4.8.4.4 Monitoring Information: Customization and Management of Information:

1. Personalization: does it require registration from users?
2. Hits counters, which appears at either side of the front page to inform and display the number of visitors accessing the website at a particular time
3. Provide a privacy link, which is usually at the bottom of the front page
4. Provide a clear message of when is the last time the content of the site was updated
5. Has a cookie to monitor users’ profiles

4.8.4.5 The Easiness of Adding Information by Users:

1. Provide a public bulletin board for posting messages (Yes or No)
2. Provide FAQ/FRQA and any other means for users to add information to the site (Yes or No)

4.8.4.6 Facilitation of Interpersonal Communication:

1. Provide chat rooms (Yes or No)
2. Provide discussion groups (Yes or No)
3. Provide feedback mechanisms (Yes or No)
4. Provide email addresses (Yes or No)
5. Provide full motion video (Yes or No)

4.8.4.7 Other/Unexpected Interactive Options:

This category accounts for other or unexpected interactive options and/or new features.

4.8.5 Step 5: Coding Procedures

Although one coder was in-charge of this procedure, coding procedures still needed to ease up on the coding process. Only one coder was involved, so the issue of reliability among coders is not presented. Examining the Web can be exhaustive and time consuming (Ha & James 1998; McMillan 2000).
In most coding categories, as mentioned earlier, the coder just needs to acknowledge the presence or the absence of certain features measurements based on the six Heeter interactivity dimensions. The majority of the answers were either yes or no types.

Websites vary in their importance in terms of their size and the amount of information they contain; some have only the homepage (or front page) and others include all the pages and contain considerable information (Ha and James 1998). McMillan (2000) finds that many website studies only code the front page, which serves as the ‘front door’ to Internet users. However, he believes that coding the entire website is crucial in order to get the clearest picture of how it is being used by organizations to communicate effectively with its consumers and whether these organizations are utilizing the websites to its maximum potential. Following McMillan (2000), my study does not limit itself to the homepage, because the content of the homepage was too limited, especially in palliative care websites and did not necessarily reflect the breadth and scope of content available on a given website, the entire website was coded, including all links and pages associated with that particular website without going beyond the main address. In addition, this method of drilling down the homepage as well as all pages has been used in previous studies to obtain one of the most comprehensive overviews of the website (Chan-Olmsted & Park 2000) and to overcome poor usability.

To begin, the coder saved Web addresses for the selected palliative care as well as health websites (for example, http://www.caresearch.com.au) was saved in the computer by adding it to the ‘favourite’ function in the desktop as a default page to standardise and ease the process of coding). For my study, the researcher started with palliative care websites, which were saved in the month of September 2008. Then, the collected data was captured and keyed into an Excel spreadsheet. The coding was completed from September through December 2008. Each website was entered through the homepage then navigated through for approximately 30 minutes. Pages were, therefore, explored in a more detailed fashion, within a given time limit. Similarly, health websites were saved in January 2009, and, coding started from
February through to April and completed in June 2009. The same lists of health websites were revisited and modified in June 2010.

There can be difficulty in evaluating the ever-evolving characteristics of the websites. For this reason, this can be an obstacle when searching for a perfect list of a sampling frame, which makes it difficult to develop samples of inspection, as updating is inherent in Web-based media. In short, the websites vary significantly in terms of size, content, structure, as well as their evolving nature, in that new websites are created daily, and, others disappear, or the content changes.

4.8.6 Step 6: Analysis and Interpretation of the Data Collected

The collected data from these observations were first converted into numeric codes and the ‘yes’ or ‘no’ answer. The main reason for coding this way is to facilitate the understanding of the changes of the websites features. The coding analysis was performed using simple statistics such as mean, average and percentage using Microsoft Excel spreadsheets. These data were converted and represented into tables and graphs for ease of data interpretation.

4.9 Theoretical Basis of my Study

In forth coming Chapter 7, Activity Theory will be introduced and presented as the theoretical basis for my research. In this description, activity is considered as the ‘holistic unit of analyses’ that is used to analyse and explain the activity of the users or ‘what people do’ as a dialectic relationship between the subject and the object with an understanding of how users collaborate with the assistance of mediating tools in complex and dynamic environments.

In my research, this researcher used Activity Theory framework to present and provide a deeper insight into the relationships within the activity systems involving online health. This is done using the three factors extracted from factor analysis in Q Methodology, as will be described in Chapter 5.
My research elicited the relationships between the component of elements of subjects, object, tool and outcome by applying an Activity Theory framework using the first, second and third generations of the Activity Theory Framework.

This is useful because Activity Theory provides a context in which the system can be evaluated and hence, assists and enables designers to develop an in-depth understanding of user’s activities. In this sense, Activity Theory can offer groundwork to website designers in order to reduce the gap between social use as well as technical and design issues in website development processes.

4.10 Chapter Summary

This chapter has provided not only an overview of the methods of the analysis as used in my research, but also presented a detailed description of each method of analysis. To reach the objectives of my study, this chapter demonstrated the importance of exploring the subjectivity of users’ attitudes towards online health as an important social phenomenon. Therefore, the interpretive qualitative methods of analysis involving scenarios-based usability testing, Web content analysis and Q Methodology are needed to comprehensively explore and deepen our understandings of this particular health setting.

This chapter has also provided not only concepts and procedures of how each method are performed, but also provided rationale behind applying each selected methods of analysis and, described how they are applied in my study.

This chapter has also introduced the theoretical basis that is used in my study. My study applies the framework of Activity Theory to assist in the interpretation and display of the data because it is used as a descriptive and clarifying tool of analysis to reveal subjective views, attitudes, opinions and understanding that users may hold towards e-health.

In this sense, this chapter has prepared the basis and the foundation of the forthcoming chapters, which reports on the data findings and analysis along with the theoretical perspective. Therefore, the next chapters are set to presents the data
analysis and data discussions for each selected methods of analysis (Chapter 5 and Chapter 6).
CHAPTER 5

RESULTS AND ANALYSIS

5.1 Introduction

This chapter presents the results and the findings of the study conducted using the qualitative and innovative research methods as described in Chapter 4: Methods of analysis. The methods of analysis include usability testing, Q Methodology and content analysis.

As introduced earlier in Chapter 3, my research was conducted in 4 Phases, as shown in Table 5.1.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Scenario-based usability testing of health and palliative care websites</td>
<td>Autumn 2008</td>
</tr>
<tr>
<td>Phase 2</td>
<td>First stage of Q study.</td>
<td>Spring 2008</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Content analysis of health and palliative care websites</td>
<td>Winter 2009 and Spring 2009</td>
</tr>
<tr>
<td>Phase 4</td>
<td>Second stage of Q study.</td>
<td>Summer 2009 and Autumn 2010</td>
</tr>
</tbody>
</table>

5.2 Phase 1: The Results of Scenario- Based Usability Testing

As stated in Chapter 4, my research is designed to assess online health websites, as a tool or resource for health information, taking into consideration that Internet and electronic sites are common sources of online health that are available to the public. The ultimate aim is improve the delivery of healthcare services and establish more understanding of the relationship between health providers and patients' families in the healthcare environment, and, to come out with the best means for providing health information on the Web in a satisfactory manner, which meets the expectations and needs of its current and potential users.
The website evaluated in Phase 1 is an Australian public website, Caresearch that is significant in providing accurate information on palliative care health services in Australia as well as related issues important at national and international levels. Hence, it all helps to improve the medical services provided to recipients of care and better recognise the needs of the specialists and workers in the health settings.

As mentioned in Chapter 4, the usability tests for my research were held in The Activity Theory Laboratory (ATUL), a unit of the University of Wollongong to produce evaluations in a realistic context, which provides for the analysis of group activities and interaction. In the ATUL, the scenarios are explained to the subjects who then proceed to carry it out. Simultaneous recording is made on videotape of the audio, the computer screen, the user’s facial expressions and hands movements and voice as prompted by the facilitator.

Collected data from the pre-questionnaires (see Appendix 1) was used to identify the background of the participants’ profile, the test’s subjects involving six university medical students who have English as a first language, except one who has English as a second language, as described in Table 5.2 below. The test subjects were all computer literate and knowledgeable about medical terms and topics. However, they had not had much to do with the palliative care settings. The participants found this website as a resource that they may use themselves, but they seemed to consider this site as one that would be useful for others, including patients, carers and community workers.
Table 5.2: Demographic Details of the six Subjects used for the Usability Tests of Caresearch website

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Gender</th>
<th>Highest level of education</th>
<th>Computer Literacy</th>
<th>First Language</th>
<th>Current Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-45</td>
<td>F</td>
<td>University Bachelor Degree</td>
<td>Expert</td>
<td>English</td>
<td>B Medicine 2nd Year</td>
</tr>
<tr>
<td>Under 25</td>
<td>M</td>
<td>University Bachelor Degree</td>
<td>Expert</td>
<td>English</td>
<td>B Medicine 2nd Year</td>
</tr>
<tr>
<td>Under 25</td>
<td>M</td>
<td>University Bachelor Degree</td>
<td>Fairly Good</td>
<td>Other languages</td>
<td>B Medicine</td>
</tr>
<tr>
<td>25-45</td>
<td>F</td>
<td>University Bachelor Degree</td>
<td>Fairly Good</td>
<td>English</td>
<td>B Medicine 1st Year</td>
</tr>
<tr>
<td>Under 25</td>
<td>M</td>
<td>University Bachelor Degree</td>
<td>Fairly Good</td>
<td>English</td>
<td>B Medicine 2nd Year</td>
</tr>
<tr>
<td>25-45</td>
<td>F</td>
<td>University Bachelor Degree</td>
<td>Fairly Good</td>
<td>English</td>
<td>B Medicine</td>
</tr>
</tbody>
</table>

5.2.1 The positive Views of the Website

As described in the previous chapter (Chapter 4), the subject were given six scenario (see Appendix 2) in a form of storytelling to test the website using activity-based usability testing from the end user’s perspective. After being given the scenario that describes the activity to be carried out on the website, participants were given a post-questionnaire to identify issues on the website and reveal their attitudes toward the website. The post questionnaires are included in Appendix 3.

The participants were almost all surprised that a government agency would provide resources to the public and invest time and effort in this valuable source.

The participants were unanimous in their liking for the aim of the site to bring all this information on one ‘stop and shop’ site. They liked the page layout and colour scheme as well as the style of language used in the content of the pages and, commented that it was sympathetic and easy to follow without being patronising or trivial. In addition, they liked the design.

The online health website was generally okay for browsing. The navigation within the submenu was well and the test subjects could find things quite quickly. The links
to external sites function properly. The lack of the prominent CareSearch menus proved a good flag to tell the user that they had left the site.

The following are some positive responses of participants about the CareSearch site:

- **It is intensive and innovative website because it contains huge amount information.** Who made this brand new website?
- **Definitely, it is probably mostly useful for patients.** It has a lot to offer for medical students, but I was looking at it from this perspective.
- **The best thing that I like about this site that it is very good classification of information.** It is very easy to find information needed. The language used is simple and relevant to what I’m looking for. In fact, I would like to use it myself.
- **I was able to get information I was searching for quite easily and quickly.**
- **The website (Caresearch) has a simple design and the navigation design makes it easy to access general Information**

### 5.2.2 The negative Views of the Website

The subjects commented that the extensive coverage of the site made for quite a complicated site and most were not sure where to find things from the main menu. Once they were into the right submenu, navigation, in general, was not a problem, but finding the right main menu to start with was problematic. Trial and error was used a lot.

All participants found the wording in the main menu confusing when looking for something specific. Most of the time the participants used trial and error or the local search facility because the information they were looking for were not in the right place. Indeed, half of the participants naturally used the search function as often as the menus when looking for something.

The following are some negative responses of participants about the Caresearch site:

- **Menu arrangements were difficult to follow.** But once you get to the submenus it is easy to find your way around and flip around the pages.
- The wordings need to improve because it is kind of confusing once you search for something really specific.

When participants were asked about their suggestions to improve the Caresearch site, they all suggested that there could be an opening room for discussion forums, online chat, and online support groups amongst patients and carers, but not among physicians, as they would be too busy and this was not their main area at present. They also suggest having a section for the public to pose questions (FAQ), in which the site would respond to them. In addition, one student suggested that it is useful to have a job section that provides users with some information about job vacancies, positions and applications.

5.3 Phase 2: The First Stage of Q Study Results

This section presents the results and the finding of the study conducted using the second method outlined in the Methods of Analysis chapter (Chapter 4). Earlier in Phase 1, usability testing of health websites using the Australian Caresearch website search engine as part of the preliminary study (refer to Phase 1: Results of Scenario-Based Usability Testing). The results revealed descriptive analysis to enable the researcher to have a clearer and broader view of the nature of the health websites. Meanwhile, in Phase 2, the Q Methodology was used to divulge an understanding of users’ perceptions towards online health.

This Q Methodological study was chosen and had proven to be a very useful research method to systematically explore the perceptions of a wide range of people in a rigorous manner as its main strength. In addition to that, Q Methodology does not require a large population sample, in which 30 to 50 individuals would be sufficient to be effectively applied to produce meaningful results (McKeown & Thomas 1998).

In Phase 2, participants are instructed to freely express their thoughts on their desired elements on the website based on their experience of the current Caresearch website as an example of public health websites using Zing technology, as illustrated in Chapter 4. There were a total of 50 statements (see Appendix 4), which used the first
Q sort that was conducted in the spring of 2008. The participants in my research study were not only involved in the generation of the statements, but also exhibited interest and full involvement in the second stage, the statements sorting process.

5.3.1 Phase 2: The Participants

Thirty-seven participants successfully sorted 50 statements that were collected to reflect the range of views that the concourse participants held on their perceptions towards online palliative care as an example of a health website. Each participant averaged 1 hour to complete the study. The majority of participants were male (51%), whereas 49% of them were female. The male ages ranged from 22-42 years old; whereas female ages ranged from 22-50 years old.

5.3.2 Phase 2: The Q Sort Results

The participants’ responses were statistically analysed to find correlations and identify factors that are comprised of (similar) sorts of several individuals (Stephenson 1953). The analysis is the longest part of the task and the difficulty will depend on the relative clarity of the factors that are produced. PCQ software is used to assist with the mechanics of the analysis, as discussed in Chapter 4.

Each factor would typically be comprised of several sorts (people). After using the varimax rotation for a simple factor structure, the researcher then examined who loaded significantly on a particular factor to determine what similarities their rankings share. The selection of the factors is primarily a result of the correlation, as it is the correlation or similarity of the sorts that determines the factors. The number of factors identified depends in part upon the extent or degree of agreement amongst subjects, and, in part on how much detail the researcher feels is useful to analyse. The factors are not necessarily mutually exclusive in that a given statement or a given individual may appear on more than one factor.

For my study, after the examination of various possible factor solutions, a 4-Factor solution was selected. The reasons for selecting the four-factor solution, as shown in Table 5.3, are this factor was considered to explain 33 percent of the variation in the respondent set, with a total of 26 out of 37 participants loading significantly on the
factors. The remaining 11 sorts indicated either little significance or were confounded. A sort is said to be confounded when it exists on two or more factors.

Table 5.3: A Comparison between 3 to 7 Factor Solutions

<table>
<thead>
<tr>
<th>No. of Factors</th>
<th>Variance (%)</th>
<th>No. of Confounded</th>
<th>No. of non-significant</th>
<th>No. of Sorts</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>23</td>
<td>2</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>33</td>
<td>2</td>
<td>9</td>
<td>26</td>
</tr>
<tr>
<td>5</td>
<td>38</td>
<td>0</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>1</td>
<td>7</td>
<td>29</td>
</tr>
<tr>
<td>7</td>
<td>46</td>
<td>1</td>
<td>6</td>
<td>30</td>
</tr>
</tbody>
</table>

5.3.2.1 Four Factor Solution Data

In my study, four interpretable factors were extracted. Table 5.4 provides one consensus item and their factor scores. Consensus items are those in which all participants held similar opinions. Obviously, the consensus statements neither help to define the characteristics of the sample population nor are they useful for defining the differences among or between factors.

Table 5.4: Consensus Statement on the 4-Factor (Varimax)

<table>
<thead>
<tr>
<th>No. Statements</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Increase accessibility to the website by (e.g. option for text vs. graphics).</td>
<td>-2</td>
<td>-1</td>
<td>-2</td>
<td>-1</td>
</tr>
</tbody>
</table>

The distinguished items, as in Tables 5.5-5.8, on the other hand, are the statements that can be extremely useful when it comes to distinguishing between factors and considering the differences in the normalized Z-scores item by item for the entire Q sample. Statements with large normalized Z-scores, with either a high positive or negative score, can clarify and explain the differences between the factors.
Table 5.5: 5 Items that distinguish Factor 4 from all other Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>The website should be enriched with more media and quality graphics and pictures</td>
<td>-1</td>
<td>-1</td>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>29</td>
<td>Provide scenarios of different users, i.e. patients and healthcare providers on how to use the health website</td>
<td>0</td>
<td>-2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>41</td>
<td>Fast introduction to the site and the purpose of the site should be available</td>
<td>-1</td>
<td>2</td>
<td>2</td>
<td>-5</td>
</tr>
<tr>
<td>44</td>
<td>A 'contact Us' section should be available</td>
<td>-1</td>
<td>2</td>
<td>2</td>
<td>-5</td>
</tr>
<tr>
<td>50</td>
<td>A section of ‘Frequently and Recently Asked Questions’ should be available</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>-4</td>
</tr>
</tbody>
</table>

Table 5.6: 4 Items that distinguish Factor 3 from all other Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Make the layout simple, clear and attractive</td>
<td>3</td>
<td>1</td>
<td>-4</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>Access should be provided within information</td>
<td>1</td>
<td>0</td>
<td>-5</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>Provide language option for non-English speakers</td>
<td>4</td>
<td>1</td>
<td>-3</td>
<td>1</td>
</tr>
<tr>
<td>48</td>
<td>The site should contain stories on what it’s like to be ‘healthcare providers’</td>
<td>1</td>
<td>-1</td>
<td>5</td>
<td>-2</td>
</tr>
</tbody>
</table>

Table 5.7: 6 Items distinguish Factor 2 from all other Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Provide discussion forums, chat window and interactive tools</td>
<td>3</td>
<td>-4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>The website should be enriched with more media and quality graphics and pictures</td>
<td>-3</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>The site should contain sections on services for relatives (emotional counselling, financial services, etc.)</td>
<td>4</td>
<td>-5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>33</td>
<td>Clear and simple language must be used</td>
<td>5</td>
<td>1</td>
<td>-4</td>
<td>-3</td>
</tr>
<tr>
<td>40</td>
<td>Links to updated events should be available</td>
<td>-5</td>
<td>3</td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>47</td>
<td>The site should be colourful and jazzy</td>
<td>-5</td>
<td>4</td>
<td>-4</td>
<td>-2</td>
</tr>
</tbody>
</table>

Table 5.8: 4 Items that distinguish Factor 1 from all other Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Provide a comprehensive service</td>
<td>-3</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>33</td>
<td>Clear and simple language must be used</td>
<td>5</td>
<td>1</td>
<td>-4</td>
<td>-3</td>
</tr>
<tr>
<td>44</td>
<td>A 'contact Us' section should be available</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>-4</td>
</tr>
<tr>
<td>45</td>
<td>An ‘Ask a healthcare Professional’ facility should be available</td>
<td>4</td>
<td>-3</td>
<td>-5</td>
<td>-4</td>
</tr>
</tbody>
</table>
Factor Correlation

The factor correlation is a statistical relationship that exists between the factors and expresses the relationship between factors. It is useful to think of a correlation as a very specific expression of a relationship and connection between sorts as reflected by their presence in the factors. The collection of all of the sorts, as presented in a Table 5.9, shows that the correlation provides the basic statistical relationships from which factors are extracted. Consequently, a high correlation between factors indicates similarity between the sorts; a low correlation indicates the difference between the sorts, and a perfect correlation of 1.0 is a rare incidence. Table 5.9 displays the various correlations between these factors ranging from -17 between Factor 1 and Factor 3, -17 between Factor 1 and Factor 3, -5 between Factor 1 and Factor 4 and so on. The reason behind these variations in the correlation becomes clearer as we re-evaluate each factor and contrast them.

<table>
<thead>
<tr>
<th></th>
<th>Factor 1 or A</th>
<th>Factor 2 or B</th>
<th>Factor 3 or C</th>
<th>Factor 4 or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>0</td>
<td>-7</td>
<td>-17</td>
<td>-5</td>
</tr>
<tr>
<td>Factor 2</td>
<td>-7</td>
<td>0</td>
<td>10</td>
<td>-46</td>
</tr>
<tr>
<td>Factor 3</td>
<td>-17</td>
<td>10</td>
<td>0</td>
<td>-5</td>
</tr>
<tr>
<td>Factor 4</td>
<td>-5</td>
<td>-46</td>
<td>-5</td>
<td>0</td>
</tr>
</tbody>
</table>

5.3.3 Normalized Factor Scores

The preliminary Q Study involved thirty-seven participants who successfully sorted 50 statements that were collected to reflect the range of views that the concourse participants held on their perceptions towards online palliative care. Each participant averaged 1 hour to complete the study. The majority of participants were male (51%), whereas 49% of them were female. The male ages ranged from 22-42 years old, whereas female ages 22-50 years old.

Analysis of the sort data provided by 37 participants revealed that 10 participants (or 27 percent) dominantly loaded on Factor A, ‘Interactive Users,’ five (14 percent) loaded on Factor B, ‘Superficial’ users, seven (19 percent) loaded on Factor C, ‘Traditional Medical’ users, and only four (10 percent) loaded on Factor D, ‘Service-Oriented’ users.
A four factor solution was adopted as it appeared to most clearly represent the views of participants. Therefore, the users’ perceptions towards online health information were analysed and interpreted based on the four factor types that emerged. The initial results are under review for *Australasian Journal of Information Systems*, Banna, Hasan, and Meloche (2008).

5.3.3.1 Factor A: Interactive Users

The participants in Factor A also strongly believed that online palliative care should offer useful content and layout. For example, statement No. 2: ‘Make the layout more simple clear, and attractive’, and statement No. 33: ‘Clear, and simple language must be used’. While statement 50 requires easiness of adding information such as FAQ, statement 17 asks for financial and emotional support services. In addition, the participants expecting the website to better address a wider spectrum of users’ needs, i.e. non-English speakers’ users, No. 19: ‘Give a language option to non-English speakers).

Those in Factor A recognized the online palliative care website should be a valuable resource of information. That is why they chose statement No. 34: ‘Provide explanations of the roles of different specialists so patients and their families know where to go’ to make the website more useful and functional. Furthermore, they favoured fast and effective search engine (No. 26), because it is important for them to be able to save time and effort. However, they were also concerned with the issue of security and protection (No. 49). More importantly, this group believed that a section on ‘Ask an expert’ or ‘healthcare professional’, as in statement 45, is essential to enable patients to make better health decisions. This group also recognized the importance of having a discussion forum and other interactive tools in the site, as revealed in statement 4. Therefore, they were considered as ‘Interactive Users’.

Demographic results showed that of the 10 participants loading on Factor A, 60% were females and 40% were males. There were a total of 7 graduate students: two students were 25 and below, two students were aged 26-30, two students were 31-35, and, one student was age 36 and over. The reminders were two undergraduate
students: one student aged between 31-35 years old and the other between 36 to 40 years old. It is interesting to note that there were a total of 6 international students and 3 domestic students. Furthermore, 8 participants were unemployed; one student was a part-time tutor and one was a dentist.

Table 5.10 contains a total of 18 statements from Factor A: 10 statements strongly agreed with and 8 statements strongly disagreed with. After reviewing the participants’ factor loadings, the largest factor was labelled as ‘Interactive Users’. A Z-score is used as a criterion for selecting statements, as in Table 5.10.
### Table 5.10: Factor A: Array of Z-Scores (±1), Statements and Categories

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Agreed Statements</th>
<th>Z-score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>A section of ‘Frequently and Recently Asked Questions’ (FRAQ) should be available</td>
<td>1.882</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>33</td>
<td>Clear and simple language must be used</td>
<td>1.795</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>45</td>
<td>An 'ask a healthcare professional' facility should be available for patients</td>
<td>1.471</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>19</td>
<td>Give a language option for non-English speakers</td>
<td>1.427</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>2</td>
<td>Make the layout simple, clear and attractive</td>
<td>1.233</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>4</td>
<td>Provide discussion forums, chat windows and interactive tools</td>
<td>1.233</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>17</td>
<td>The site should contain sections on services for relatives, i.e. emotional counselling, financial services, etc.</td>
<td>1.233</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>34</td>
<td>Provide explanations of roles of different specialists so patients/families know where to go</td>
<td>1.211</td>
<td>Customization and Management of Information</td>
</tr>
<tr>
<td>49</td>
<td>There should be a statement about encryption or any security protection used</td>
<td>1.2</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>26</td>
<td>It should provide an effective and fast search engine</td>
<td>1.125</td>
<td>Content Availability and Choice</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Disagreed Statements</th>
<th>Z-score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>The site should be more colourful and jazzy</td>
<td>-2.26</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>40</td>
<td>Links to updated events should be available</td>
<td>-2.119</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>37</td>
<td>Option to change font, size and PDF should be available</td>
<td>-1.546</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>30</td>
<td>Job links are needed</td>
<td>-1.438</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>10</td>
<td>The home page in the main menu should be located at the top rather than the bottom</td>
<td>-1.384</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>15</td>
<td>More work is needed on the arrangements of icons and wordings at the home page is needed to give it a more orderly look</td>
<td>-1.287</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>46</td>
<td>It should provide a forum for healthcare workers to post their ‘opinions’</td>
<td>-1.092</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>12</td>
<td>The site should cover more information and a wide variety of topics</td>
<td>-1.038</td>
<td>Content Availability and Choice</td>
</tr>
</tbody>
</table>
5.3.3.2 Factor B: Superficial Users

There were five participants on Factor B. Table 5.11 contains nine strongly agreed statements and nine strongly disagreed statements. The participants in Factor B recognized the importance of the surface or the front end feature of online palliative care websites, such as being coloured and jazzy, having a pleasant and visually appealing design, more links, simple printing and downloading, and no pop-ups, as in statements (No. 39, 47, 43, 40, 20, 8). Participants were concerned about the ‘contact us section’ and ‘information and a variety of topics’ that should further enrich the palliative care website (No.12, 44). In addition, this group needs palliative care websites that provides them with more links on updated events, recent research articles for evidence based medicine and student health organizations and universities as in statements (No. 40,20,31). Therefore, Factor B has been labelled as ‘Superficial’ users.

On the other hand, this group in Factor B ignores the interactivity features, as in statements (No. 46, 17, 4, 45) and the updating function, job links, option to change some features, have more links and add an appropriate name for the website, as reflected in statements numbers 27, 30, 37, 22, 1.

Demographic results revealed that out of five participants in this factor, two international students were aged over 35 years old and one domestic student was below 25 years of age. This factor comprised of 2 females (40%) who were part-time tutors and post-graduate students in the meantime and, 3 males (60%): one postgraduate student, one manager (age 36-40) and one medical doctor (age 36-40).
Table 5.11: Factor B: Array of Z-Scores (±1), Statements and Categories

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Agreed Statements</th>
<th>Z-score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>I would like to be able to download and print simple fact sheets (printer-friendly)</td>
<td>1.955</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>12</td>
<td>The site should cover more information and a wide variety of topics</td>
<td>1.865</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>44</td>
<td>A ‘contact us’ section should be available</td>
<td>1.584</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>47</td>
<td>The site should be more colourful and jazzy</td>
<td>1.428</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>43</td>
<td>Avoid the ‘pop-ups’ advertisements</td>
<td>1.373</td>
<td>Efforts of Users</td>
</tr>
<tr>
<td>40</td>
<td>Links to updated events should be available</td>
<td>1.3</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>20</td>
<td>It should provide links to recent research articles for evidence based medicine</td>
<td>1.264</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>8</td>
<td>The website design should be pleasant, attractive and visually appealing</td>
<td>1.229</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>31</td>
<td>Provide links to student health organizations/universities</td>
<td>1.108</td>
<td>Content Availability and Choice</td>
</tr>
</tbody>
</table>
There were seven participants on Factor C. Table 5.12 contains seven strongly agree statements and seven strongly disagree statements. The participants in Factor C recognized typical functions that would be sought by medical practitioners or palliative care providers, as in statements numbers 48, 16, 21 and 20. This group also prefer no pop-ups advertisement as shown in statement 43. In addition, these participants were concerned with the ‘contact us section’ and ‘printer friendly’ functions (No.39, 44). Therefore, Factor C has been labelled as ‘Traditional Medical’ users.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Disagreed Statements</th>
<th>Z-score</th>
<th>Category &amp; Subcategory</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>It should provide a forum for healthcare workers to post their “opinions”.</td>
<td>-1.973</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>17</td>
<td>The site should contain sections on services for relatives, i.e. emotional counselling, financial services, etc.</td>
<td>-1.798</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>37</td>
<td>Option to change font, size and PDF should be available</td>
<td>-1.703</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>4</td>
<td>Provide discussion forums, chat windows and interactive tools</td>
<td>-1.591</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>1</td>
<td>Choose a more appropriate name for the website, i.e. Palliative care of New South Wales instead of Care search</td>
<td>-1.353</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>22</td>
<td>Provide more links to overcome the information intensity</td>
<td>-1.207</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>30</td>
<td>Job links are needed</td>
<td>-1.172</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>45</td>
<td>An 'ask a healthcare professional' facility should be available for the patient</td>
<td>-1.147</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>27</td>
<td>There should be a date of when the website was created and a date for the last update</td>
<td>-1.141</td>
<td>Customization &amp; Management of Information</td>
</tr>
</tbody>
</table>

### 5.3.3.3 Factor C: Traditional Medical Users

There were seven participants on Factor C. Table 5.12 contains seven strongly agree statements and seven strongly disagree statements. The participants in Factor C recognized typical functions that would be sought by medical practitioners or palliative care providers, as in statements numbers 48, 16, 21 and 20. This group also prefer no pop-ups advertisement as shown in statement 43. In addition, these participants were concerned with the ‘contact us section’ and ‘printer friendly’ functions (No.39, 44). Therefore, Factor C has been labelled as ‘Traditional Medical’ users.
On the other hand, this group in Factor C strongly ignores the interactivity feature with the public (No. 45) and, the accessibility of information to be provided for the public (No.18). In addition, this factor also ignores the superficial features such as coloured design, simple layout, clarity of the language usage, and change of the language option (No. 47, 2, 33, 19). Furthermore, this factor does not pay any attention to ‘provide explanations of roles of different specialists so patients/families know where to go’ (No. 34).

Demographic results revealed that out of seven participants in this factor, 4 are international students: one postgraduate and part time tutor and two are unemployed graduate students, and, 2 are domestic students: one medical student aged 25 years and below and one part time tutor. 4 females (57%): three post graduate students and one full-time academic lecturer, and 3 males (43%): one medical student (age 25 and below), two graduate postgraduate students (age 26-30).
Table 5.12: Factor C: Array of Z-Scores (±1), Statements and Categories

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Agreed Statements</th>
<th>Z-score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>I would like to be able download and print simple fact sheets (printer-friendly)</td>
<td>0.395</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>48</td>
<td>The site should contain stories on what it is like to be a ‘healthcare worker’</td>
<td>0.349</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>44</td>
<td>A ‘contact us’ section should be available</td>
<td>0.34</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>16</td>
<td>The organization or content provider should be recognizable to the user, i.e. AMA, or national academic or professional institutions</td>
<td>0.324</td>
<td>Customization and Management Information</td>
</tr>
<tr>
<td>43</td>
<td>Avoid ‘pop-ups’ advertisements</td>
<td>0.311</td>
<td>Efforts of Users</td>
</tr>
<tr>
<td>21</td>
<td>It should have networks with links to other regional general practitioners, nurse and allied healthcare providers</td>
<td>0.309</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>20</td>
<td>It should provide links to recent research articles from evidence-based studies</td>
<td>0.279</td>
<td>Content Availability and Choice</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Disagreed Statements</th>
<th>Z-score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Access should be provided within information booths in hospitals waiting rooms</td>
<td>-0.436</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>45</td>
<td>An ‘ask a healthcare professional’ facility for patient should be available</td>
<td>-0.416</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>47</td>
<td>The site should be more colourful and jazzy</td>
<td>-0.414</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>33</td>
<td>Clear and simple language must be used</td>
<td>-0.361</td>
<td>Efforts of Users</td>
</tr>
<tr>
<td>2</td>
<td>Make the layout simple, clear and attractive</td>
<td>-0.359</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>19</td>
<td>Give a language option for non-English speakers</td>
<td>-0.298</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>34</td>
<td>Provide explanations of roles of different specialists so patients/ families know where to go</td>
<td>-0.269</td>
<td>Efforts of Users</td>
</tr>
</tbody>
</table>
5.3.3.4 Factor D: Service-Oriented Users

Table 5.13 contains a total of 9 statements for Factor D: 5 strongly agree statements and 4 ‘strongly disagree’ statements. There were four participants on Factor D. The participants in Factor D recognized the importance of palliative care service such as financial and emotional support and job links (No. 30 and 17). Because these participants were those who received palliative care services, i.e. workers, patients and carers, this group prefer a service for ‘how is it to be patients and healthcare workers’ as in statements (No.29 and 28). Therefore, Factor D has been labelled as ‘Service-Oriented’ users.

On the other hand, this group in Factor D strongly ignores interactivity features such as ‘FRAQ’, ‘contact us’ and ‘ask a healthcare facility’ (numbers 50, 44, 45). In addition, this factor also ignores having a ‘fast introduction to the site and purpose of the site’ (No. 41), which should be available. Demographic results revealed that out of four participants in this factor, one was a medical doctor (age 26-30), one was a pharmacist (age 36-40), one was a full-time academic lecturer (age over 41), and, one an international postgraduate student aged between 31 to 35 years old.
Table 5.13: Factor C: Descending Array of Z-Scores (±1), Statements and Categories

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Agreed Statements</th>
<th>Z-score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Job Links are needed</td>
<td>0.196</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>17</td>
<td>The site should contain sections on services for relatives (emotional counselling, financial services, etc.)</td>
<td>0.164</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>29</td>
<td>Provide scenarios of different users, i.e. patients, and healthcare providers on how to use the health website</td>
<td>0.14</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>28</td>
<td>The site should contain stories on what it is like to be a ‘patient’.</td>
<td>0.133</td>
<td>Content Availability and Choice</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Strongly Disagreed Statements</th>
<th>Z-score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Provide discussion forums, chat windows and interactive tools</td>
<td>-0.132</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>41</td>
<td>Fast introduction to the site and purpose of the site should be available</td>
<td>-0.219</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>50</td>
<td>A section of ‘Frequently and Recently Asked Questions’ (FRAQ) should be available</td>
<td>-0.21</td>
<td>Easiness of adding Information</td>
</tr>
<tr>
<td>44</td>
<td>A 'contact us’ section should be there</td>
<td>-0.156</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>45</td>
<td>An 'ask a healthcare professional' facility for patients should be available</td>
<td>-0.146</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
</tbody>
</table>

5.4 Phase 3: The Results of Web Content Analysis

As explained in Chapter 4, content analysis was conducted to assess the content and the layout of health and palliative care websites. In total, the sample size of palliative care websites is 30 palliative care worldwide sites accessed from an international directory, which was conducted in the winter of 2009. The content analysis of the health websites, on the other hand, was conducted in the spring of 2009, while in the meantime the list was updated in the winter of 2010. As suggested in Chapter 4, the
content analysis was structured by mapping out Heeter’s (1989) six dimensions of interactivity, namely, content and availability of choice, effort users must exert, responsiveness to the users, and the ease of adding information, monitoring the information and the system use, and, facilitation of interpersonal communication. In addition to the six interactivity dimensions, my study included an additional dimension to include the unexpected features that my research ignored. My research also explained and applied the concept of interactivity continuum.

In my study, as mentioned in Chapter 4, the total sample size of 30 palliative care websites consisted of 2 governments, 27 non-profit and 1 commercial websites across 12 countries of the world (Australia, USA, UK, NZ, Canada, Italy, Japan, Singapore, India, Russia, South Africa, and Malaysia); which has been accessed from international directory available, as explained in Chapter 4. Table 5.14 shows details on the number of information producers (government, non-profit and commercial) for each country in the studied sample.

The total sample size of health websites worldwide is 41, of which 15 governments, 19 were commercial and 7 were non-profit organisations with health websites across ten countries around the world: Australia, USA, UK, Canada, Germany, New Zealand, India, Switzerland, Singapore and Malaysia, as in Table 5.15. As explained in Chapter 4, the selected website is based on two conditions: 1) the website must be written in English or given the language option to change to the language that I’m as a researcher is familiar with (Arabic and German); 2) the website must not focus on certain disease or consumers groups.
Table 5.14: The Producers of Information for Online Palliative Care Websites: Government, Non-Profit and Commercial Organisations

<table>
<thead>
<tr>
<th>Country</th>
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<th>Non-profit</th>
<th>Commercial</th>
<th>Total</th>
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Table 5.15: The Producers of Information for Online Health Websites: Government, Non-Profit and Commercial Organisations

<table>
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The list of palliative care websites and health websites assessed in line with the process described above is displayed in Tables 5.16 and 5.17, as are the quantitative results of that assessment. These results are now discussed.
<table>
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<tr>
<th>Health Website Name</th>
<th>Complextiy of Choice (out of 10)</th>
<th>Users' Effort (out of 2)</th>
<th>Responsiveness (out of 5)</th>
<th>Monitoring Information Use (out of 5)</th>
<th>Adding Information (out of 3)</th>
<th>Interpersonal Communication (out of 4)</th>
<th>Total Criteria (out of 6)</th>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Medlineplus</td>
<td>USA:G</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hopkinsmedicine</td>
<td>USA:NP</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rxlist</td>
<td>USA:C</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>health.com</td>
<td>USA:C</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realage</td>
<td>USA:C</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Righthealth</td>
<td>USA:C</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Website</td>
<td>(Country: Type)</td>
<td>Total Criteria</td>
<td></td>
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</tr>
<tr>
<td>----------------------------------------------</td>
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<tr>
<td>health.yahoo (USA: C)</td>
<td>7</td>
<td>1</td>
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</tr>
<tr>
<td>Wrongdignosis (USA: C)</td>
<td>7</td>
<td>1</td>
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</tr>
<tr>
<td>Netdoctor (UK: C)</td>
<td>8</td>
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<tr>
<td>Patient (UK: C)</td>
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<td>2</td>
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<tr>
<td>HC (Canada: G)</td>
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<td></td>
</tr>
<tr>
<td>Canadahealthnetwork (Canada: C)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Heathed (New Zealand: G)</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>everybodycommunities (New Zealand :C)</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HPB (Singapore: G)</td>
<td>7</td>
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<tr>
<td>Myhealth (Malaysia: G)</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctorndtv (India: NP)</td>
<td>7</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Medindia (India :C)</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medknowledge (Germany :C)</td>
<td>7</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Who (Switzerland: NP)</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Criteria:** 41 41 38 9 23 34

Note: G = Government website; NP = Non-Profit website; C = Commercial website
5.4.1 Content Availability and Choice

The availability of contents and wide variety of choices is significantly prevalent in online palliative/hospice care worldwide with 26 occurrences or 86 percent, as presented in Section 5.4 (Table 5.16). All the sites studied provide various types of content. Hypertextuality, which includes internal and external hyperlink, as in Figure 5.1, is found on all palliative care websites. Online palliative care websites are clearly improving in providing news links. Almost 90 percent of all available content and choices are found on only one government website of Australia (caresearch) and one non-profit website from the USA (hospicedirectory). Almost half or fifty percent of the analysed sites were powered with a search engine. Around 23 percent of the sites offer a language option. This researcher found one Australian government site (caresearch) and six non-profit sites around the world: two in USA (hospicedirectory, hopsicecare), one in Canada (chpca), one in Japan (jspm), one in Italy (anteahospice), and, one in Russia (hospice.ru). Almost 83 percent of the websites are taking into consideration the browser speed and connection when downloading from their websites.

Nearly 20 percent offered a print option and multimedia, which consists of audio/video/podcast/photo. Only 17 percent of the online palliative care sites provide a text only option.
Figure 5.1: Content Availability and Choice of Worldwide Online Palliative Care Websites

The availability of contents and a wide variety of choices is significantly prevalent in worldwide health websites, with 41 occurrences or 100 percent, as presented in Section 5.4 (Table 5.17). Among 41 selected health sites, only seven sites have fulfilled 10 elements of content availability and choice dimension, as in Section 5.4 (Table 5.17): one government site in Australia (MHCS.Health), one government (NIH) and two non-profit and non-government sites in the USA (Myoclinic, familydoctor); one government site (HC) in Canada, and, two commercial sites in UK (NHS, Patient).

Every site studied provides various types of content. All health websites were powered with an effective search engine, which either has an in-house search engine or is linked to a major search engine such as Google and Yahoo. Hypertextuality, such as links within the sites and outside is found in all selected health websites. All selected health websites are also clearly provided with the links to the latest news. The whole sample is taking into account the speed of users’ browser and connection when downloading from the web-page. It is interesting to note that some sites are connected to social networks, including Twitter and Facebook, such as Mayoclinic, health.yahoo, healthline and others.
Around 90 percent or 37 sites provide links to the front page, while 4 sites do not have this important link. As a result, users are forced to use the back arrow in the main web browser menu bar, as in Figure 5.2. Nearly 76 percent of the chosen sample offers a print option for users, while 63 percent are enriched with multimedia. Around 37 percent or 15 selected sites offer a language option to suit the users. Among 15 sites that offered a language option, only one site (Medlineplus) offered over 40 different languages in the USA. Only 34 percent or 15 sites give a text option, which is usually placed on the front page to change the size of the text and enable people with vision problems to read the written content.

Figure 5.2: Content Availability and Choice of Worldwide Health Websites

5.4.2 Effort of Users

It was found that this particular dimension is the most significant element of interactive features among palliative care websites worldwide, with 30 occurrences or 100 percent of the websites having perfectly fulfilled this measuring dimension (see Section 5.4, Table 5.16). Most of the information was retrieved only with a single click, as shown in Figure 5.3. Finding different types of information or contents is easier as the sites provide an index on the homepage, or, categorise
contents into pages or categories to enable users to find information quickly and easily.

![Diagram showing effort users must exert on links of Palliative Care websites]

Figure 5.3: Effort Users must exert on Links of Palliative Care websites

Similar to the palliative care case, this particular dimension was also found to be the most significant element of interactive features among worldwide health websites with 41 occurrences or 100 percent of the websites having perfectly fulfilled this measuring dimension (see Section 5.4, Table 5.17). Nearly 85 percent or 35 sites’ information and links were retrieved only with a single click, whereas very few links retrieved 5 sites with 2 clicks, as shown in Figure 5.4. Finding different types of information or contents where the sites provide either an index on the homepage, or, categorise contents into pages or categories to enable users to find information quickly and easily are significant among 39 sites or 95 percent of the online health sample.
Figure 5. 4: Effort Users must exerts on Links of Online Health websites

5.4.3 Responsiveness

In this dimension of interactivity, all palliative care websites proved their responsiveness by providing an ‘about us’ link and ‘contact us’ link as shown in Section 5.4 (Table 5.16). Almost 57 percent provide feedback forms, whereas only a very few (nearly 3 percent) provide help options/messages for the users, as shown in Figure 5.5. Only one non-profit website in the USA (hospicecare) was ahead of the others in providing the help option, ‘about us, ‘contact us’, and feedback form.
In the responsiveness dimension of interactivity, all 41 health websites are also equally proving their responsiveness with 38 incidences or 93 percent of the sample, as is the case of palliative care, as shown in Section 5.4 (Table 5.17). It was found that 95 percent or 39 occurrences provided an ‘about us’ link and ‘contact webmaster’ link, and, a ‘feedback form’, as shown in Figure 5.6. Almost 68 percent provide help options/messages for the users. None of the website has succeeded in providing all elements or measures of the responsiveness dimension.
5.4.4 Monitoring Information/System Use: Customization and Management of Information

This layer of interactivity is less significantly prevalent in online palliative/hospice care worldwide, with 2 occurrences or 7 percent presented. This interactive dimension is found in only one government website of Australia (caresearch) and, one non-profit website in Italy (eapcnet). Online palliative care sites are not rigorous in keeping a record of the number of viewers visiting their sites. None use cookies or counters for this purpose. In general, 70 percent of the analysed sites require visitor registration and/or membership, as seen in Figure 5.7. The dimension of interactivity that proves interactivity utilizing Internet technology is immediate uploading or updating information. Only 7 percent of the analysed sites provide a message of the last update date. This feature is found in only one government website of Australia (caresearch) and, only one non-profit website in Italy (eapcnet).
As is the case of palliative care websites, the dimension of customization and management of information is also less prevalent and less active among health websites worldwide with 22 percent or only nine occurrences, as shown in Section 4.5 (Table 5.16). Online health is not active in holding a record of the number of visitors for their sites, which is similar to online palliative care with only 5 percent or 2 sites, as in Figure 5.8. Counters are only found in one non-profit site in the USA (medhelp) and one government site in Malaysia (myhealth). It was also found that 41 percent or 17 sites require visitor registration, whereas 51 percent or 21 sites provide an updating content message, which is usually found at the bottom of the front page.
5.4.5 Ease of Adding Information

The worldwide online palliative care sites have not been empowered to add their personal web-page, hobby page, announcement or blog. Only one non-profit web-based palliative care in the USA (hospicedirectory) allow users to both post questions and add to the public bulletin boards.

In online health websites sample, almost 56 percent or 23 are empowered with tools that allow users to add their personal questions and discuss issues. Nearly 73 percent, or 30 online health websites, provide a public bulletin board for posting messages, whereas 46 percent, or 19 sites, provide FAQ/FRAQ and any other means for users to add information to the site.

5.4.6 Facilitation of Interpersonal Communication

Online palliative care sites worldwide are not well presented with the interactive feature of interpersonal communication. It only constitutes 7 occurrences or 23 percent as shown in Section 5.4 (Table 5.16). The majority (or 93 percent) of the online palliative care sites provide at least one email address. But in other features –
online forum/discussion group, live chat, and feedback mechanism – they show a very weak indication of their willingness to engage in communication with their audiences. Only one non-profit website in the USA (hospicedirectory) facilitates interpersonal communication via feedback mechanism, online forum/ discussion group or email addresses. None of the analysed sites provides live chat.

Online health websites are enriched with interactive tools and technologies, which are common among 83 percent or 34 sites. The majority or 95 percent of the sample provide at least one email address, which is the case in the palliative care sample. It was found that only one commercial site (webmd) has provided all the elements of the expected communication tools.

Unlike palliative care websites, the interactive features such as a feedback mechanism and discussion group and/or online forum are vigorously common among health websites with 73 percent and 54 percent, respectively, as depicted in Figure 5.9.

Similar to the palliative care case, only 2 percent of the health sample facilitates interpersonal communication through live chat. This is a weak indication for communication opportunity.

Figure 5.9: Communication Tools for Worldwide Health Websites
5.4.7 Other/Unexpected Interactive Options

Apart from the six dimensions of interactivity by Heeter, as discussed above, this category accounts for other or unexpected interactive options or new features that the researcher has not considered.

My study also investigates other advanced and unexpected features. This researcher found that 86 percent of analyzed palliative care sites contain other features such as online forms, posting or sharing your story, and, making a donation. My study also found that only three non-profit websites, two in the USA (Americanhospice, hospicedirectory), and one in South Africa (hospicedirectory) provide a palliative care services search engine. Furthermore, the USA site (Americanhospice) provides an online survey, the option to send an e-card, and, ask specialist services, whereas the USA (hospicedirectory) provides an online store to order and buy books, DVDs and videos. The South Africa site (hospicedirectory) provides an online medical dictionary and request option for specialist services.

Table 5.18 below presents the percentage and occurrence of the unanticipated interactive features among health websites worldwide that the researcher was not aware. The majority of the sample, or 56 percent, provide self-assessment tools that can be used to help review risks and medical conditions, such as a pregnancy calculator, which is used as an interactive tool to calculate the due date or estimate of when the woman is likely to deliver the baby, a weight management tool to estimate the body mass index (BMI), stress test, heart risk assessment to assess the heart risk for people over the next specified period, as well as other health assessment tools. Approximately 37 percent of the sample offers symptom checkers to assess the user and identify their health conditions and enable them to make the suitable decisions on health solutions.

Nearly 51 percent, or 21 incidences, provide a survey to collect feedback on the site or general health related information to test the knowledge of the users on certain medical issue, whereas only 23 percent of the sample provides the users with a poll option to vote on certain issues.
Interactive features such as ‘ask specialist or the expert’ and finding services including finding a doctor in the area, hospital and other health products and services constitute 41 percent or 17 occurrences. Practically 15 percent of the sites provide a ‘pill identifier’ to quickly overcome troubles that patients may have on recognizing the generic pills or drugs and capsules without their original packaging, or from an old prescription. The pill identifier tool is only found in six commercial sites in the USA (webmd, healthline, rxlist, health, health.yahoo and wrongdiagnosis).

My study also found that 12 percent of the sample provides information about the online physician directory to enable patients to contact the healthcare providers and request an appointment by phone. Although the service of ‘request appointment’ can not be completed online through using online forms or emails, it still slightly serves people by listing the doctor’s name, specialty or location. This facility is found in only 5 sites across the sample: two not for profits sites in the USA (Myoclinic, Hopkinsmedicine), two commercial sites in UK (Patient, NHS), and, one government site in Singapore (Hpb).

Another interesting online feature found is ‘Billing & Insurance’, which represent around 7 percent of the sites. This feature helps the users in paying the hospital or medical bills online quickly and easily, and involves the users receiving an invoice and receipt of payment without making an exhaustive trip to the actual physical location. This interesting online billing option is found only among three sites: two not for profits sites in the USA (Myoclinic, Hopkinsmedicine) and one commercial site in the UK (NHS). The latter website (NHS) allows users to apply online for insurance to travel abroad.

To prompt communication and collaboration with patients’ physicians, as being one of the top priorities in the health website sample, a service is provided to refer a patient for assistance in navigating the health systems, where the sites provide several resources available for user convenience, which are common among only 7 percent of the sample. The three sites include two not for profits sites in the USA (Myoclinic, Hopkinsmedicine) and one commercial site in UK (Patient).
Table 5.18: Other unexpected Features in the Health Website Sample

<table>
<thead>
<tr>
<th>Unexpected Features</th>
<th>Percentage</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey</td>
<td>51%</td>
<td>21</td>
</tr>
<tr>
<td>Symptom checkers</td>
<td>37%</td>
<td>15</td>
</tr>
<tr>
<td>Games</td>
<td>7%</td>
<td>3</td>
</tr>
<tr>
<td>Self-assessment tools</td>
<td>56%</td>
<td>23</td>
</tr>
<tr>
<td>Patient health records</td>
<td>10%</td>
<td>4</td>
</tr>
<tr>
<td>Finding services</td>
<td>41%</td>
<td>17</td>
</tr>
<tr>
<td>Pill identifier</td>
<td>15%</td>
<td>6</td>
</tr>
<tr>
<td>Poll</td>
<td>23%</td>
<td>13</td>
</tr>
<tr>
<td>Ask specialists</td>
<td>41%</td>
<td>17</td>
</tr>
<tr>
<td>Request an appointment</td>
<td>12%</td>
<td>5</td>
</tr>
<tr>
<td>Refill prescription</td>
<td>5%</td>
<td>2</td>
</tr>
<tr>
<td>Billing &amp; insurance</td>
<td>7%</td>
<td>3</td>
</tr>
<tr>
<td>Online referral</td>
<td>7%</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>24%</td>
<td>10</td>
</tr>
</tbody>
</table>

In addition, the researcher found that 24 percent of the sites provide unique features such as an online marketplace for medical and health products and medical devices, an online dictionary, and an online bookstore. An online shop or market place is found in three commercial sites in the USA (healthline, qualityhealth, Rxlist, realage), one commercial site in the UK (Patient), and one commercial site in India (Medindia). The latter site (Medindia) also offers a link to health information, as a mobile phone feature. A non-profit site in India (Doctorndtv) offers a link to share your experience as healthcare providers. The online bookstore is found in one commercial site in the USA (wrong diagnosis), one commercial site in the UK (Patient), and one non-profit site in Switzerland (WHO).

5.4.8 Interactivity Continuum Spectrum

The concept of interactivity can also be measured as a continuum, as discussed in previous chapters (Chapter 2 and Chapter 4). Therefore, my study applied Heeter’s six measurable dimensions to further define and measure the degree of interactivity for each website. It is interesting to note that 71 sites in our sample may or may not be in the continuum spectrum, as shown in Table 5.19 and Table 5.20, because some
websites have a very low degree of interactivity and therefore are excluded from being in the spectrum and may not appear on it. This spectrum is only for the sites that fulfill at least three dimensions of Heeter’s (1989) interactivity criteria.

Comparing the palliative care websites throughout the world, my study found that none of the analysed sites have fulfilled all six of Heeter’s criteria (see Table 5.19). However, only one non-profit website in the USA (hospicedirectory) site ranked the highest in the interaction continuum, because it has fulfilled five out of six criteria, and, therefore was the most interactive by this particular measure (See Table 5.19). One Australian Government palliative care (caresearch) and five non-profit sites around the world: one Australian site (pallcarevic), one Canadian (hospicebc), one Italian site (eapcnet), one South African site (hospicepalliativecaresa) and one Indian site (palliativecare.in) fulfilled the four criteria. The rest of the analysed sites (80 percent) have fulfilled three criteria only. Overall, the study found that the average interactivity level for these 30 analysed palliative care websites around the world was low.

Unlike the palliative care sample, the study found that eight of analysed health sites have fulfilled all six criteria of Heeter (see Table 5.20). The highest degree of interactivity found in totally eight websites: three commercial sites (Netdoctor, Patient, and NHS) in UK, one government site (Myhealth) in Malaysia, one commercial site (Medina) in India, two commercial sites (Webmd, Wrongdignosis) and one non-profit site (Medhelp) in USA and therefore, these were the most interactive by this particular measure. There were ten sites that fulfilled five dimensions of Heeter’s criteria (1989). There was a total of six sites in the USA: four commercial sites (Prevention, Medicinenet, Quality, healthline), one government (Medlineplus), and one not-for-profit (Myoclinic); one not-for-profit (Doctorndtv) in India, one commercial (Canadahealthnetwork) in Canada, one commercial in New Zealand (everybodycommunities), and, one government site (Hpb) in Singapore.

The majority of sites (or fourteen sites) fulfilled four criteria, whereas only eight fulfilled three Heeter dimensions. Unlike the palliative sample, this implies that overall interactivity for health samples worldwide is moderate.
Table 5.19: Online Palliative Care Websites Interactivity: Individual Criteria Ranked from least Interactive to Most Interactive

<table>
<thead>
<tr>
<th>Website Name</th>
<th>Low Interactivity</th>
<th>Moderate Interactivity</th>
<th>High Interactivity</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallcare (Australia)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Palliativecarensw (Australia)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Palliativecarewa (Australia)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Palliativecare (Australia)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Pcis (Australia)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Pallcareqld (Australia)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Helpthehospices (UK)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Nepe (UK)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Hospicecare (USA)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
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<td>3</td>
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<tr>
<td>hospice.nz (New Zealand)</td>
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<td>3</td>
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<td>ssl.ebits (New Zealand)</td>
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<td>Aphn (Singapore)</td>
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<td>Victorical hospice (Canada)</td>
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<td>Jspm (Japan)</td>
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<tr>
<td>Anteahospice (Italy)</td>
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<tr>
<td>hospice.ru (Russia)</td>
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<td>Hospicemalaysia (Malaysia)</td>
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<tr>
<td>Caresearch (Australia)</td>
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<td>Pallcarevic (Australia)</td>
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<tr>
<td>Eapcnet (Italy)</td>
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<td>Hospicebc (Canada)</td>
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<td>4</td>
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<tr>
<td>Hospicepalliativecare (South Africa)</td>
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<td></td>
<td>4</td>
</tr>
<tr>
<td>Palliativecare.in (India)</td>
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<td>4</td>
</tr>
<tr>
<td>Hospicedirectory (USA)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
Table 5.20: Online Health Websites Interactivity: Individual Criteria Ranked from Least Interactive to Most Interactive

<table>
<thead>
<tr>
<th>Health Website Name</th>
<th>Low Interactivity</th>
<th>Moderate Interactivity</th>
<th>High Interactivity</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health.Vic (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Familydoctor (USA)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Hopkinsmedicine (USA:NP)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Healthed (New Zealand: G)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>health.yahoo (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>reilage(USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>health.qld (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Medknowledge (Germany: C)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Public.health (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>MHCS.Health (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Health.nsw (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Health.act (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Health.sa (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Healthinsite (Australia: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Everydayhealth (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Nih (USA: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Who (Switzerland: NP)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Righthealth (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Rxlist (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Healthfinder (USA)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>HC (Canada: G)</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Myoclinic (USA: NP)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Medicinenet (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Qualityhealth (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Healthline (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Revolutionhealth (USA: NP)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>health.com (USA)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Medlineplus (USA: G)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Doctorndtv (India: NP)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Prevention (USA: C)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Canadahealthnetwork (Canada: C)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Everybodycommunities (New Zealand: C)</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Website</td>
<td>Country</td>
<td>Type</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>HPB (Singapore: G)</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Netdoctor (UK: C)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Patient (UK: C)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>NHS (UK: C)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Myhealth (Malaysia: G)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Medindia (India: C)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Webmd (USA: C)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Wrongdignosis (USA: C)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Medhelp (USA: NP)</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Note: G= Government website; NP= Non-Profit website; C=Commercial website
5.5 Phase 4: The Final Stage of Q Study Results

This section presents the results and findings of the study conducted using Q Methodology, which is outlined in Chapter 4. Phase 4 is the final stage of my study, in which the concourse was conducted to reveal the views of participants towards health websites. This final Q sort stage was more extensive and involved a larger group of people than the earlier stage of Q Methodology. The earlier Q sort was the preliminary study, which involved only thirty seven participants who were undergraduates, graduates students, academics and the general public in Australia. This final Q sort stage involved seventy participants who were not only undergraduates, graduates students, academics and general public, but also staff in the medical field in Australia. It was assumed that this sample was generally representative of typical users of the Internet.

The majority of participants were male (14 or nearly 59 percent). Their ages ranged from 21 to 48 years old. There were 29 female (or 41 percent) participants and, their ages ranged from 21 to 55 years old. It is interesting to note that there were 15 out of 29 females, who practice nursing or worked in the medical field, such as general practitioners, nurses, pathology collectors, pharmacists and midwives. There were a total of 54 students (11 bachelors, 25 graduates, 18 PhDs): 23 domestic students and 31 international students.

In my study, a three Factor solution was selected for the interpretation. The decision on the number of factors was based upon several attributes from the data, which were used to obtain the proposed solution. The first consideration is that the three-Factor solution explained 36 percent of the variation and accounted for the respondent set with a total of 50 out of 70 sorts loading significantly on the factors. The remaining 20 sorts are either insignificant or had a confounded correlation within the factors. It is apparent from Table (5.21) below that the 3-Factor solution is desirable based not only on the variance, but also on confound and significance among the Q sorts.

Table 5.21 presents not only a 3 to 7 Factor solution, but also demonstrates the validity of the decision to accept the 3-Factor solution to provide a high number of sorts, a low level of confounded sorts and insignificant sorts, 50, 7 and 13,
respectively. In contrast, a 7-Factor solution only provides an additional 2 more sorts being accounted for and increases the number of confounded sorts from 7 to 10. It is observed that 4, 5 and 6 Factor solutions do not provide any additional advantages, as there is a lower number of sorts (40, 49 and 49 respectively), and, increased number of confounded sorts (19,13 and10).

Table 5.21: A Comparison between 3 to 7 Factor Solutions

<table>
<thead>
<tr>
<th>No of Factors</th>
<th>Variance (%)</th>
<th>No. of Confounded</th>
<th>No. of non-significant</th>
<th>No. of Sorts</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>36</td>
<td>7</td>
<td>13</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>19</td>
<td>11</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>43</td>
<td>13</td>
<td>8</td>
<td>49</td>
</tr>
<tr>
<td>6</td>
<td>48</td>
<td>10</td>
<td>11</td>
<td>49</td>
</tr>
<tr>
<td>7</td>
<td>50</td>
<td>10</td>
<td>8</td>
<td>52</td>
</tr>
</tbody>
</table>

5.5.1 The Factor Correlation

The factor correlation is a statistical relationship that exists between the factors and expresses the relationship between factors. It is useful to think of a correlation as a very specific expression of a relationship and connection between sorts (people) as reflected by their presence in the factors. The collection of all of the sorts is presented, as Table 5.22 shows the correlation, which provides the basic statistical relationships from which factors are extracted. Consequently, a high correlation between factors indicates a similarity between the sorts; a low correlation indicates the difference between the sorts, and a perfect correlation of 1.0 is a rare incidence. Table 5.22 displays the various correlations between these factors ranging from -11 between Factor 1 and Factor 2, 17 between Factor 1 and Factor 3; and, -28 between Factor 2 and Factor 3. The reason behind these variations in the correlation becomes clearer as I re-evaluate each factor and contrast them.

Table 5.22: Correlations between Factors 1 to Factor 3

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>0</td>
<td>-11</td>
<td>17</td>
</tr>
<tr>
<td>Factor 2</td>
<td>-11</td>
<td>0</td>
<td>-28</td>
</tr>
<tr>
<td>Factor 3</td>
<td>17</td>
<td>-28</td>
<td>0</td>
</tr>
</tbody>
</table>
5.5.2 The 3 Factor Solution Data

In my study, three interpretable factors were extracted. Table 5.23 provides the four consensus items and their factor scores. Obviously, these statements emerged for all three factors and were not strongly positioned either positively or negatively. Tables 5.24-5.26 include the statements that distinguished each factor from the remaining factors.

Table 5.23: Consensus Statements in 3 Factors (Varimax)

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>I prefer to use printed sources such as health magazines rather than online health sources</td>
<td>-1</td>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>22</td>
<td>I trust the online health information that provides the medical credentials/qualifications of the content providers and developers of the website</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>I prefer Websites that offer me customization options (email, text option, language option…etc.) to suit my needs.</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>I believe that health websites can improve the quality of healthcare</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5.24: 7 Items distinguish Factor 1 from all other Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I prefer immediate (fast) access when I am using a website</td>
<td>5</td>
<td>-5</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>I want to be able to print the information needed</td>
<td>3</td>
<td>-4</td>
<td>-1</td>
</tr>
<tr>
<td>21</td>
<td>I would like to be highly involved in online discussions and feel like I am part of the community</td>
<td>0</td>
<td>5</td>
<td>-4</td>
</tr>
<tr>
<td>30</td>
<td>I would like the opportunity to participate by using facilities such as surveys, polls, and games</td>
<td>-4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>33</td>
<td>I think the public should be able to make online donations to support healthcare and research</td>
<td>-4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>35</td>
<td>I would like to see practical features such as ‘Request an appointment’ and Refill prescriptions</td>
<td>-3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>50</td>
<td>Fully interactive media can create a situation in which the roles of senders and receivers are interchangeable</td>
<td>-3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 5.25: 10 Items that distinguish Factor 2 from all other Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I prefer immediate (fast) access when I am using a website</td>
<td>5</td>
<td>-5</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>I would want to be able to get extensive information through links and related links of that specific information</td>
<td>1</td>
<td>-4</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>I expect health websites to provide me with useful features such as a search engine, help page and site map</td>
<td>3</td>
<td>-2</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>I would like to be involved in online discussions such as chat rooms, forums, and bulletin boards</td>
<td>0</td>
<td>4</td>
<td>-3</td>
</tr>
<tr>
<td>21</td>
<td>I would like to be highly involved in online discussions and feel like I am part of the community</td>
<td>0</td>
<td>5</td>
<td>-4</td>
</tr>
<tr>
<td>27</td>
<td>I find it easy to access online health information provided on this website is scientifically correct</td>
<td>1</td>
<td>-3</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>I would like the opportunity to participate by using facilities such as surveys, polls and games</td>
<td>2</td>
<td>-5</td>
<td>5</td>
</tr>
<tr>
<td>30</td>
<td>I would like to be able to share my story on a health website</td>
<td>-4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>31</td>
<td>Even with a password, a website cannot be trusted to keep information confidential</td>
<td>-1</td>
<td>5</td>
<td>-4</td>
</tr>
</tbody>
</table>

Table 5.26: 8 Items that distinguish Factor 3 from all other Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Statements</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>I would like to be able to download audio, video and podcast from health websites</td>
<td>3</td>
<td>2</td>
<td>-2</td>
</tr>
<tr>
<td>4</td>
<td>I prefer immediate (fast) access when I am using a website</td>
<td>5</td>
<td>-5</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>I feel empowered because I can add and contribute my ideas through useful features such as a public bulletin board</td>
<td>1</td>
<td>3</td>
<td>-3</td>
</tr>
<tr>
<td>21</td>
<td>I would like to be highly involved in online discussions and feel like I am part of the community</td>
<td>0</td>
<td>5</td>
<td>-4</td>
</tr>
<tr>
<td>30</td>
<td>I would like the opportunity to participate by using facilities such as surveys, polls and games</td>
<td>-4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>36</td>
<td>Website should enable the public to ask more questions so that they are informed and can make better health decisions</td>
<td>-2</td>
<td>-3</td>
<td>4</td>
</tr>
<tr>
<td>44</td>
<td>Health websites should target a variety of users (patients, healthcare providers, community…etc.)</td>
<td>-2</td>
<td>-1</td>
<td>4</td>
</tr>
<tr>
<td>49</td>
<td>The healthcare profession should make more use of the Internet to improve services</td>
<td>-2</td>
<td>-2</td>
<td>3</td>
</tr>
</tbody>
</table>
5.5.3 Normalized Factor Scores

5.5.4 Factor 1: Service-Oriented Users

Factor 1 consists of a total of 22 participants, as illustrated in Table 5.27. There were 16 males (73%) and 6 females (27%) in Factor 1. Among the 16 males, there were 2 domestic students: one an undergraduate and one a graduate (age 25 and below); 3 international graduate students (age 25 and below); among the 3 domestic graduate students (age 26-30), there were two part-time tutors, out of 16 males, there were also 2 international postgraduate students (age 26-30), 2 international graduate students (age 31-35), one domestic student (age 36-40), 2 international postgraduate students (age 36-40), and one international postgraduate students (age 41 and over). Among the 6 females, three participants were 25 years old and below: one was a pathology collector, one a domestic undergraduate student, and one an international graduate student; one was a domestic undergraduate student (age 26-30), one an international graduate student (age 36-40), and one a registered nurse (age 36-40).

Table 5.27: The Demographic Information for Factor 1

<table>
<thead>
<tr>
<th>Participants</th>
<th>Age ≤ 25</th>
<th>Age 26-30</th>
<th>Age 31-35</th>
<th>Age 36-40</th>
<th>Age ≥41</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Domestic Student</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>International Student</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Domestic Student</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>International Student</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td>1 (Registered Nurse)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 5.28 contains the statements with a high agree (positive) and high disagree (negative) for each of the three Factors. Presenting the statements in this way allows a better visual view of the results and the ability to compare among each factor. This could allow for a more rigorous assessment of the factors. Table 5.28 also include the
factor scores that indicate the relative importance level of each statement. For Factor 1, Table 5.28 shows eleven (11) statements were given the highest weighting (the strongest agreement statements).

It is important to understand what this factor means in the terms of social and collaborative activity, as indicated by the shared statements. It is clear that from the strongly positive statements that Factor 1 presents collaboration as a high-level purposeful activity, which is carried out by individuals. The very positive statements such as when one is having ‘…immediate access when using the website’ (statement 4), could result in improvement of ‘…quality of healthcare’ and ‘…delivery of healthcare’ (statements 1 and 18), and, having interactive features could also result in the improvement of the ‘… relationship between patients and healthcare providers’ (statement 20). This Factor prefers reliable websites in terms of unbroken links, useful features (effective search engine), information-intensive, downloading, printing and language options as shown in statements (No. 2,11,16,10,3,26,15). This factor sees the benefit that online health may bring to all stakeholders, including both patients and healthcare providers.

The 12 negative statements expand this view further by explaining what the participants strongly disagree with. Their concern around trust was not an issue among Factor 1 as reflected in statement 43. This factor looks at having interactive features as not risky for both parties: users and professionals (statement 41). It is also worth noting that this factor does not see online health as a shortcoming opportunity (statement 12). This factor also does not like to be empowered and be a fully interactive member of society (statements 30, 33, 35). It is also worth noting that this factor dislikes having extensive information that could target everyone in the society (statement 46).
<table>
<thead>
<tr>
<th>No.</th>
<th>Statement</th>
<th>Z-Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I prefer immediate (fast) access when I am using a website</td>
<td>2.288</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>1</td>
<td>I believe that health websites can improve the overall quality of healthcare</td>
<td>1.959</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>20</td>
<td>I think interactive health features (emails, chat rooms, forums and bulletin boards) can improve relationships between patients and healthcare providers</td>
<td>1.682</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>2</td>
<td>I find health websites reliable. I rarely encounter any broken links when I navigate through the website</td>
<td>1.582</td>
<td>User Efforts</td>
</tr>
<tr>
<td>18</td>
<td>I believe that interactive health features (emails, chat rooms, forums and bulletin boards) do improve the delivery of healthcare</td>
<td>1.224</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>11</td>
<td>I expect health websites to provide me with useful features such as a search engine, help page and site map</td>
<td>1.215</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>16</td>
<td>I believe that I can get the depth of information that I need from health websites</td>
<td>1.138</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>10</td>
<td>I would want to be able to print the information needed from an online health website</td>
<td>1.119</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>3</td>
<td>I would like to be able to download audio, video and podcast from health websites</td>
<td>1.105</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>26</td>
<td>I feel that the language used must be easy to understand, i.e. medical terms simplified to non-technical language and if not, provide a glossary or online medical dictionary</td>
<td>1.062</td>
<td>User Knowledge &amp; Effort</td>
</tr>
<tr>
<td>15</td>
<td>I would want health websites to offer me a choice of language</td>
<td>1.043</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>43</td>
<td>Even with a password, a website cannot be trusted to keep information confidential</td>
<td>-1.462</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>41</td>
<td>Interactive features such as online diagnosis and &quot;ask a doctor&quot; are risky for the user and the professional</td>
<td>-1.366</td>
<td>Customization &amp;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>I would like the opportunity to participate by using facilities such as surveys, polls and games</td>
<td>-1.252</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I do not believe that health websites improve the delivery of healthcare</td>
<td>-1.214</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>I think the public should be able to make online donations to support healthcare and research</td>
<td>-1.176</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Fully interactive media can create a situation in which the roles of senders and receivers are interchangeable</td>
<td>-1.171</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>I would like to see practical features such as the ability to request an appointment and refill prescriptions</td>
<td>-1.147</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Health websites are responsive because of the availability of 'about us' and 'contact us' sections and the help options they contain</td>
<td>-1.13</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>I would like to see a variety of topics covered within one single health website (one-stop-shop and health portal)</td>
<td>-1.104</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Interactive health websites are time consuming</td>
<td>-1.047</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Public forums on websites can be abused by malicious contributors and so cannot be used in healthcare</td>
<td>-1.013</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>The healthcare profession should make more use of the Internet to improve services</td>
<td>-0.975</td>
<td></td>
</tr>
</tbody>
</table>
5.5.5 Factor 2: Interactive Users

Factor 2 consists of 22 participants. There are 22 participants on Factor 2, as shown in Table 5.29. This factor is comprised of 16 females (73%) and 6 males (27%). The Females were 7 medical nurses, 1 general practitioner (age 36-40), 2 pharmacists (one age 36-40 and the other over 40), 1 engineer (age 36-40), and 5 students (4 international and one domestic). The males were one domestic undergraduate student who was below 25 years of age, 2 domestic students (age 26-30), and 3 postgraduate international students (age 26-30).

Table 5.29: The Demographic Information for Factor 2

<table>
<thead>
<tr>
<th>Participants</th>
<th>≤ 25</th>
<th>26-30</th>
<th>31-35</th>
<th>36-40</th>
<th>≥ 41</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Domestic Student</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>International Student</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Others/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Domestic Student</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>International Student</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>1RN</td>
<td>1 CNE</td>
<td>1 GP</td>
<td>1 Pharmacist</td>
<td>1 DDON</td>
<td>1 EN</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>22</td>
</tr>
</tbody>
</table>

Note: RN= Registered Nurse; GP= General Practitioner; DDON= Director of Nursing, EN= Enrolled Nurse; CNE= Clinical Nurse Educator

The eight (8) statements shown in Table 5.30 are the strongest agreement statements for Factor 2 and were given the highest weighting. For Factor 2, there are ten (10) statements, as shown in Table 5.30, which were given the lowest weighting (the strongest disagreement statements).
Apparently, the selected strongest positive statements reflect the communication view of work practices and roles. These participants have collaborative work practices, which allow them to share information and knowledge as reflected in statement 31. There is an increased sense of community belonging and involvement, as in statements 21 and 14, and, an increased self-empowerment through participation roles and being active members of the society, as in statement 30. The participants prefer ease of adding information such as sharing stories, bulletin boards and weblog as in statements 31, 17 and 23. So this factor values collaborative and interactive working, which requires a great deal of communication. Consequently, this factor shows communication, collaboration and interaction activities as valuable and challenging for healthcare workers as it is time-consuming, as seen in statement 47.

The strong disagreement statements on factor 2 support this view further by explaining what it is not. For instance, it does not support the argument for the need of reliable health informatics, nor does the website need to be ‘accessible’ or have an ‘extensive informatics’.
Table 5.30: Factor 2: Array of Z-Scores (±1), Statements and Categories

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Z Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>I would like to be able to share my story on a health website</td>
<td>1.994</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>21</td>
<td>I would like to be highly involved in online discussions and feel like I am part of the community</td>
<td>1.484</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>14</td>
<td>I would like to be involved in online discussions such as chat rooms, forums and bulletin boards</td>
<td>1.354</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>30</td>
<td>I would like the opportunity to participate by using facilities such as surveys, polls, and games</td>
<td>1.309</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>15</td>
<td>I would want health websites to offer me a choice of language</td>
<td>1.212</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>17</td>
<td>I feel empowered because I can add and contribute my ideas through useful features such as a public bulletin board</td>
<td>1.183</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>47</td>
<td>An interactive website would make more work for healthcare workers</td>
<td>1.038</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>23</td>
<td>I would like to see a Weblog/blog in a health website so that I can read and add my comments</td>
<td>0.989</td>
<td>Easiness of Adding Information</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Z Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>I feel that it is important that the quality of information provided on this website is scientifically correct</td>
<td>-2.361</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>4</td>
<td>I prefer immediate (fast) access when I am using a website</td>
<td>-2.117</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>5</td>
<td>I would want to be able to get extensive information through links and related links of that specific information</td>
<td>-1.641</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>10</td>
<td>I would want to be able to print the information needed from online health</td>
<td>-1.541</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>8</td>
<td>I focus on the health information</td>
<td>-1.138</td>
<td>Content Availability &amp;</td>
</tr>
<tr>
<td>32</td>
<td>I would want to see the date when the website was created and the date of the last update</td>
<td>-0.983</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>I find it easy to access online health information from home and anywhere else</td>
<td>-0.965</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Website should enable the public to ask more questions so that they are informed and can make better health decisions</td>
<td>-0.96</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>I prefer a health website that is fully open to public scrutiny and evaluation, i.e. no registration, logins, passwords or closed sections requiring fees to access additional features and information</td>
<td>-0.886</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Interactive features such as online diagnosis and ‘ask a doctor’ are risky for the user and the professional</td>
<td>-0.803</td>
<td></td>
</tr>
</tbody>
</table>

### 5.5.6 Factor 3: Health Information Seekers

Table 5.31 shows that among the 6 participants on this factor there were 2 females (33%), one a domestic student (age 26-30) and one international student (age 25 and below). The four males (67%). were: 2 domestic postgraduate students and part time lecturers (age 26-30 and 36-40, respectively), and 2 international postgraduate students and part time tutors (age 26-30 and 31-35, respectively).
Table 5.31: The Demographic Information for Factor 3

<table>
<thead>
<tr>
<th>Participants</th>
<th>Age ≤ 25</th>
<th>Age 26-30</th>
<th>Age 31-35</th>
<th>Age 36-40</th>
<th>Age ≥41</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Domestic Student</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>International Student</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Domestic Student</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>International Student</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 5.32 includes the statements that are the strongest statements and strongest disagreement statements for Factor 3. Clearly, the selected positive statements show that the participants are from the general public, who see online health as an opportunity to improve healthcare delivery, quality and services, as demonstrated in statements 28, 1 and 49. They strongly agree with the content of information such as language simplicity and language options as in statements 26 and 15. It is interesting to note that one of the attributes of the growing number of ‘Health Information Seekers’ is the continuity of using the search engine to search and browse for usable health information sources, as demonstrated in statement 11. This fact also is in line with the existing studies, e.g. Fox and Rainie 2002, and Crespo 2004. More interestingly, this factor sees health websites as information-intensive portals that should target a variety of users to make better health choices and decisions, as demonstrated in statements 36, 44 and 46. They also view health websites as practical opportunity for filling prescriptions and requesting doctor’s appointments as in statement 35.

The negative statements in Table 5.32 expand this view by further explaining what the participants strongly disagree with. They do not see any disadvantage to having
health websites (statement 12). The concern around trust was not an issue among Factor 3 participants, as shown in statement 43. Health websites were not disliked because of the many graphics and visuals it may contain (statement 6). It is also worth noting that this factor does not only see online health as interactive, involved sharing, and, downloading tools and techniques (statements 21, 31, 17, 14, 3).

Table 5.32: Factor 3: Array of Z-Scores (±1), Statements and Categories

<table>
<thead>
<tr>
<th>No.</th>
<th>Statement</th>
<th>Z Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>I feel that the language used must be easy to understand, i.e. medical terms simplified to non-technical language, and if not, there needs to be a glossary or online medical dictionary</td>
<td>0.275</td>
<td>User Knowledge &amp; Effort</td>
</tr>
<tr>
<td>28</td>
<td>I feel that it is important that the quality of information provided on this website be scientifically correct</td>
<td>0.256</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>1</td>
<td>I believe that health websites can improve the quality of healthcare</td>
<td>0.206</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>36</td>
<td>The website should enable the public to ask more questions so that they are informed and can make better health decisions</td>
<td>0.201</td>
<td>Easiness of Adding information</td>
</tr>
<tr>
<td>44</td>
<td>Health websites should target a variety of users (patients, healthcare providers, community...etc)</td>
<td>0.198</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>15</td>
<td>I would want health websites to offer me a choice of language</td>
<td>0.167</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>46</td>
<td>I would like to see a variety of topics covered within one single health website (one-stop- and-shop health portal)</td>
<td>0.167</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>11</td>
<td>I expect health websites to provide me with useful features such as a search engine, help page and site map</td>
<td>0.162</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>49</td>
<td>The health care profession should make more use of the Internet to improve services</td>
<td>0.157</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>35</td>
<td>I would like to see practical features, such as the ability to request an appointment and refill prescriptions</td>
<td>0.125</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Statement</th>
<th>Z Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>I do not believe that health websites improve the delivery of healthcare</td>
<td>-0.308</td>
<td>Customization &amp; Management of Information</td>
</tr>
</tbody>
</table>
Even with a password, a website cannot be trusted to keep information confidential -0.219
I dislike too many graphics/visual, as they slow down my access to the health website -0.214
I would like to be highly involved in online discussions and feel like I am part of the community 0.206
I would like to be able to share my story on a health website -0.175
Public forums on websites can be abused by malicious contributors and so cannot be used in healthcare -0.169
I would want to see the date when the website was created and the date of the last update -0.167
I feel empowered because I can add and contribute my ideas through useful features such as a public bulletin board -0.164
I would like to be involved in online discussions such as chat rooms, forums and bulletin boards -0.135
I would like to be able to download audio, video and pod-casts from health websites -0.132

<table>
<thead>
<tr>
<th></th>
<th>Even with a password, a website cannot be trusted to keep information confidential</th>
<th>-0.219</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I dislike too many graphics/visual, as they slow down my access to the health website</td>
<td>-0.214</td>
</tr>
<tr>
<td>21</td>
<td>I would like to be highly involved in online discussions and feel like I am part of the community</td>
<td>0.206</td>
</tr>
<tr>
<td>31</td>
<td>I would like to be able to share my story on a health website</td>
<td>-0.175</td>
</tr>
<tr>
<td>45</td>
<td>Public forums on websites can be abused by malicious contributors and so cannot be used in healthcare</td>
<td>-0.169</td>
</tr>
<tr>
<td>32</td>
<td>I would want to see the date when the website was created and the date of the last update</td>
<td>-0.167</td>
</tr>
<tr>
<td>17</td>
<td>I feel empowered because I can add and contribute my ideas through useful features such as a public bulletin board</td>
<td>-0.164</td>
</tr>
<tr>
<td>14</td>
<td>I would like to be involved in online discussions such as chat rooms, forums and bulletin boards</td>
<td>-0.135</td>
</tr>
<tr>
<td>3</td>
<td>I would like to be able to download audio, video and pod-casts from health websites</td>
<td>-0.132</td>
</tr>
</tbody>
</table>

5.6 Chapter Summary

This chapter revealed the results of the 4 Phases of the research. While Phase 1 and Phase 2 were necessary to reveal some basic understanding of the perception towards online palliative care, an important incidence of health context, Phase 3 was essential to provide the study with an understanding of the nature of the content and layout of palliative care as well as the health context. Phase 4 was more extensive and involved not only a larger sample, but also various stakeholders.

Phase 1 was conducted using usability testing of online palliative care. The results revealed both strengths and weaknesses in the existing site, as perceived by university medical students.

Phase 2 was the preliminary Q study, which involved thirty-seven participants from the university who participated in the Q study to reveal their attitudes toward online palliative care in the context of the Australian health environment. The results explained the reasons for selecting a four factor solution. In Phase 2, the results
revealed the significance of the views of four types of groups; ‘Interactive’, ‘Superficial’, ‘Traditional Medical’ and ‘Service-Oriented’.

In Phase 3, the content analysis phase was necessarily to deepen the researcher’s understanding of the content nature and layout on three types of information producers, government, non-profit and commercial organisations from both health and palliative care centres worldwide. The study undertook 30 different types of palliative/hospice care websites across developed as well as developing countries of the world. This step was essential to undertake to provide my study with a comprehensive and comparable picture of the current context of healthcare worldwide.

Phase 4 revealed the results of the Q Methodology that involved seventy participants, students, and academic personnel at University of Wollongong, ordinary people and medical workforce in a genuine healthcare setting inside Australia. The results also disclosed the importance of three types of stakeholder groups; ‘Service-Oriented’, ‘Interactive Users’, and, ‘Health Information Seekers’.

The next chapter (Chapter 6) will provide a detailed discussion on the interpretation of the results and the findings of this chapter for each necessary phase of my study.
CHAPTER 6

INTERPRETATION OF THE RESULTS

6.1 Introduction

This chapter presents a detailed explanation and interpretation of the results and findings from all the data analyses from Phase 1 to Phase 4. The results of these four studies were presented in Chapter 5. Overall, the four sets of data collections were undertaken in this study as follows:

- Phase 1: Scenario-based usability testing method used to explore users’ attitudes towards online palliative care websites.
- Phase 2: First Q study of thirty-seven participants from University of Wollongong and ordinary people to evaluate their views and attitudes towards palliative care websites.
- Phase 3: Content analysis of 30 online palliative care websites around twelve countries of the world and, 41 health websites across ten countries of the world.
- Phase 4: Final Q study on seventy participants from University of Wollongong and actual healthcare personnel to assess diverse views on healthcare websites.

This chapter also presents a discussion on the association between the Q results with content analysis findings to reveal the importance of meeting the universal needs and requirements of the Q sample towards the online palliative and online health websites. The discussion of the results is necessary to form the basis of the application of the Activity Theory that will be presented in the next chapter (Chapter 7).
6.2 Interpretation of Phase 1 Results
The first Phase of my research involved six medical students from University of Wollongong to evaluate the effectiveness of online palliative care as an example of healthcare websites. There were an equal number of females and males (50 percent). As explained in Chapter 4 and 5, the first step to conduct usability testing is setting up ATUL and scenarios, which also included pre- and post-questionnaires (see Appendixes 1, 2 and 3).

In Phase 1, the usability test that was conducted aimed to provide feedback and suggestions to improve the delivery of palliative care services in regard to what they found in the website, which is considered as a second important resource of information in the field.

The findings revealed two distinct views regarding online palliative care. The first prevailing view is that the palliative care website is an intensive, innovative and quick source of information portal and access, as there were links, content and simplicity in the design and navigation tools. On the other hand, the participants evaluated the website in terms of its difficulty in locating information, as there is confusion in the arrangement of menus and sub-menus, and, also they stressed the importance of using simple language when designing a heavy content site.

It was significant that the findings of Phase 1 relate only to users views of existing health websites which emphasise the delivery of information from health professionals. There is little opportunity for feedback or interaction.

6.3 Interpretation of Phase 2 Results
In Phase 2, Q Methodology was introduced and used to capture public users’ subjectivity and perceptions on online palliative care not only as it is now but how it may be in the future. My research in this phase explored and analysed perceptions of medical practitioners and students as well as some members of the general public towards online palliative care in the context of the Australian health environment. The four-factor solution was chosen, with 33 percent of the variance identifying and
signifying perceptions of online palliative care, categorized as the, ‘Interactive’, ‘Superficial’, ‘Traditional Medical’, And ‘Service-Oriented’ users. As revealed in Chapter 5, the results showed that there were 10 participants (27 percent) in the ‘Interactive’ group, five (14 percent) in ‘superficial’ group, seven (19 percent) in the ‘Traditional Medical’ group, and, only four (10 percent) in the ‘Service-Oriented’ group.

The most obvious finding from this subjective study is the recognition of a least four significant groups, identified from this four-factor analysis, which used online palliative care as a regular medium to seek health information. The first group of people is ‘Interactive’ users who used online palliative care as a communication and interactive medium. To achieve this objective, as illustrated in Table 6.1, online palliative should provide an ‘ask an expert or professional’, a ‘FAQ’, discussion forums, and, other interactive facilities, while other groups totally opposed this view. In addition, ‘Interactive’ users strongly agreed on the issue of simplicity and clarity of the language usage and the content, while ‘Traditional Medical’ and ‘Service-Oriented’ groups strongly disagreed with this. The importance of providing a more comprehensive service or one-stop shop government website was ignored by the Factor A group, whereas other factors slightly agreed with it.

Meanwhile, 'Superficial’ users strongly emphasised the presence and colourful design of the website rather than the importance of the currency of information, whereas ‘Interactive’ and ‘Traditional Medical’ groups opposed the superficial enhancement of online palliative care. The ‘Traditional Medical’ group of online palliative care strongly acknowledged the importance of having ‘stories on what it is like to be a “healthcare worker” in a palliative care environment. On the other hand, this group do not favour having the public access to the information, i.e. within information booths in hospitals waiting rooms, and, this might be due to their time constraint. In addition, this group clearly supports the activity of non-English speakers by having an option for changing languages on the website.
The ‘Service-Oriented’ users were attracted to the client service features offered by one of the online government health websites—jobs for workers and service information for the public. They were not enthusiastic about contributing ideas using a section of ‘Frequently and Recently Asked Question’ (or FRAQ). They saw that the public website is not just for information, but it is also a service for the public and practitioners. Clearly, these service features will attract the attention of users and entice their participation during a visit to the online palliative care websites.

Evidently, differences between participants are reflected in their priorities, expectations, views and perceptions of online palliative care, which are largely based on their own purpose or intention. Therefore, designing and maintaining a website can be a challenge. The website needs to balance the needs of different users, have simplicity versus completeness and hence complexity, utility versus attractiveness, and, service providers versus service users. Clearly, designers would benefit from this awareness and understanding of the variety of users and their needs, as identified in my study.
<table>
<thead>
<tr>
<th>Interactivity Dimension</th>
<th>Interactive</th>
<th>Superficial</th>
<th>Traditional</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content Availability and Choice</strong></td>
<td>1. Provide effective and fast search engine</td>
<td>1. Like to be able to download and print simple fact sheets</td>
<td>1. Like to be able to download and print simple fact sheets</td>
<td>1. Job Links are needed</td>
</tr>
<tr>
<td></td>
<td>2. Give language option for non-English speakers.</td>
<td>2. The site should cover more information and a wide variety of topics</td>
<td>2. The site should contain stories on what it's like to be as a 'healthcare worker'.</td>
<td>2. Provide sections on services for relatives</td>
</tr>
<tr>
<td></td>
<td>3. Provide sections to support services for relatives</td>
<td>3. Like to see links to updated events</td>
<td>3. Provide networks for other regional general practitioners, nurse, and allied healthcare providers.</td>
<td>3. Provide stories on what it's like to be as a &quot;patient&quot;.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Provide links to recent research articles for evidence based medicine</td>
<td>4. Provide links to recent research articles for evidence-based medicine</td>
<td></td>
</tr>
<tr>
<td><strong>Effort &amp; Knowledge of Users</strong></td>
<td>1. Clear and simple language must be used.</td>
<td>Avoid the &quot;pop-ups&quot; advertisements.</td>
<td>Avoid the &quot;pop-ups&quot; advertisements.</td>
<td>Provide scenarios of different users on how to use the health website</td>
</tr>
<tr>
<td></td>
<td>2. Provide explanations of roles of different specialists so patients/families know where to go</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Responsiveness</strong></td>
<td>Make the layout simple, clear, and attractive.</td>
<td>1. A 'contact us' section should be available.</td>
<td>A 'contact us’ section should be available</td>
<td>None</td>
</tr>
</tbody>
</table>
2. The site should be more colourful and jazzy.

3. The website design should be pleasant, attractive, and visually appealing

<table>
<thead>
<tr>
<th>Customization &amp; Management of Information</th>
<th>Like to see a statement about encryption or any security protection used</th>
<th>None</th>
<th>The organization or content provider should be recognizable to user</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easiness of Adding Information</td>
<td>A ‘FRAQ’ section should be available.</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Facilitation of Interpersonal Communication</td>
<td>1. An 'ask a healthcare professional' facility should be available for patients</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2. Provide discussion forums, chat windows and interactive tools.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.4 Interpretation of Phase 3 Results

In Phase 3, my study used the content analysis method of palliative care and health websites worldwide. The results and findings presented in Chapter 5 were basically an exploration of the nature of the content and the layout of thirty online palliative care and forty-one health websites worldwide. I used a website content analysis approach to map out Heeter’s six interactivity dimensions, namely: content availability and choice, effort users must exert, responsiveness to the users, monitoring information and system use, ease of adding information, and, facilitation of interpersonal communication.

In Phase 3, the most prevailing dimension of interactivity in online palliative care websites was users’ knowledge and effort. As expected, the findings of my study show that palliative care websites worldwide are well designed to reduce users’ effort in finding information and content. This is in line with findings of McMillan (1998), Heeter (1989, 2000), Dholakia et al. (2000), and Deuze (2003). These researchers stressed the importance of easy navigational structures, especially at the front page of the websites, as demonstrated in my study. The next most commonly found dimension of interactivity is content availability and choice. The results show that there is an obvious increase in the number of choices and content through category/index/page links to enable users to exert less effort in locating information, apparent improvement in the presentation of the content, and, their ability to communicate a large amount of information.

The interactivity dimensions – interpersonal communication and easiness of adding information are almost absent amongst palliative care websites worldwide. Live chat rooms, feedback mechanism and discussion forums are significantly absent. One of the great challenges of online palliative care sites are to utilize and incorporate certain interactive technological facilities effectively and take full advantage of the Internet's benefits. No single site manages from those studied take advantage of the whole range of opportunities the Internet offers in terms of feedback, customization/personalisation, immediacy of content, multimedia, etc.
In health websites, the most prevailing dimension of interactivity found is not only the effort of users, as is the case of palliative websites, but also the content availability and choice. The next commonly found interactivity dimension among online health websites is responsiveness of the system to users, which is similar to the online palliative case. My study found that healthcare websites worldwide are enriched with interactive tools and features. Like palliative websites, health websites provide at least one email address. Unlike palliative care websites, the interactive features such as feedback mechanism and discussion group and/or online forum are vigorously common among health websites.

Similar to the palliative care case, my study found slight and weak evidence of interactivity dimension of interpersonal communication through live chat. My study also found that health websites are less likely to be empowered with tools that allow users to add their personal questions and discuss issues. Similarly, I found that customization and management of information is less prevalent and less active among health websites worldwide.

My study also applied the interactivity continuum spectrum, as explained in Chapter 5. The result showed that only one non-profit website of the USA (hospicedirectory) site fulfilled five out of six criteria in the interactivity continuum. It ranked the highest on the criteria of: effort users must exert, content availability and choice, ease of adding information, facilitation of the interpersonal communication, and, also had some advanced features. One Australian Government Palliative Care website (caresearch) has fulfilled four criteria. All the websites analysed contain hyperlinks and some interactive features, and, some of them use multimedia more or less, but few of them do it extensively. Our findings clearly indicate that non-profit sites are ahead of the curve using interactive tools, while governmental websites may be viewed as having the greatest source of information and content, though the sites provides few or no interactive capabilities. Therefore, the results clearly showed that the overall interactivity of online palliative care is low.
In online health websites worldwide, the results showed that eight of the sites have fulfilled all six criteria of Heeter’s interactivity dimensions: 6 commercial sites, 1 government, and, 1 non-profit website. There were ten sites that have fulfilled 5 criteria: 6 commercial, 2 government, and, 2 non-profit. Unlike this study’s sample of online palliative websites, the results clearly indicated that commercial health websites are ahead of the curve using interactive tools, while government and non-profit have less interactive tools. Therefore, the overall interactivity of online health is moderate.

6.5 The Link between Phase 2 and Phase 3
My research has found meaningful association on the results between Phase 2 and Phase 3 of my study. The most prevalent dimensions of interactivity in online palliative care worldwide assessed in Phase 3 were knowledge and effort of users and, content availability and choice. It does not only represent the four distinct groups, but strongly signified the importance of an ‘Interactive’ group extracted from Q results from Chapter 5. Table 6.2, which displayed the results of Phase 2 and Phase 3 showed significant content availability and choice, which featured online palliative care websites, especially in providing internal links to the first page, links to news (health and non-health related), and a search engine. Evidently, ‘Interactive’ group strongly also suggested the importance of providing a language option, as in statement 19, providing a service facility as well as providing not an unusable search engine, but an effective and fast navigation tool on the site; this is also essential on online palliative care websites.

Interestingly, the content analysis results also revealed the importance of easiness of adding information and communication opportunities, especially in discussion, bulletin boards and Web blogs (refer to Chapter 5, Sections 5.4.5 and 5.4.6). These findings coincided with Statements No. 50, which has the highest rank: “A section of "Frequently and Recently Asked Questions" (FRAQ) should be available”. The next highly ranked statement is No. 45: ‘An 'ask a healthcare professional' facility should be available for patients’ (Chapter 5, Section 5.3.3.1). Although the chosen sites provided at least one email address as a means of communication, palliative websites
are still deficient in communication opportunity. Therefore, the ‘Interactive’ group acknowledged the importance of having interactive online palliative care, not only an information-intensive source that transmits a one-way message, which allows users to communicate through interactive tools such as chat windows, discussion forums and others, as reflected in Statement No. 4: ‘Provide discussion forums, chat windows and interactive tools’.
### Table 6.2: Interpretation of Phase 2 and Phase 3 of the Results

<table>
<thead>
<tr>
<th>Web Content Analysis Results</th>
<th>Q Methodology of Four Factors Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content Availability and Choice</strong></td>
<td><strong>Interactive</strong></td>
</tr>
<tr>
<td>1. Online palliative care enriched with hypertexts, links to the first page, links to news and search engine</td>
<td>1. Give language option for non-English speakers.</td>
</tr>
<tr>
<td>2. Online palliative care were found to be less in terms of the language option, multimedia, text option, and, print option</td>
<td>2. Provide sections to support services for relatives</td>
</tr>
<tr>
<td></td>
<td>3. Provide an effective and fast search engine</td>
</tr>
<tr>
<td><strong>Effort and Knowledge of Users</strong></td>
<td><strong>Interactive</strong></td>
</tr>
<tr>
<td>1. Most links retrieved with single click</td>
<td>1. Clear and simple language must be used</td>
</tr>
<tr>
<td>2. All online palliative care provides an index on the homepage and are enriched with links to other sites</td>
<td>2. Provide explanations of the roles of</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Responsiveness | different specialists so patients/families know where to go | Make the layout simple, clear, and attractive | 1. A 'contact us' section should be available  
2. The site should be more colourful and jazzy  
3. The website design should be pleasant, attractive and visually appealing | A 'contact us' section should be available | None |
|---|---|---|---|---|---|
| 1. All the sites provide a means to contact the webmaster  
2. Most sites provide feedback forms  
3. 9 online palliative care sites provide a help link | | | | | |
| Customization and Management of Information | | | | | |
| 1. Visitor registration and membership are more prevalent | I would like to see a statement about encryption or any | None | | | |

The organization or content provider should be recognizable to the user | None |
2. 2 sites provide an updating message
3. None uses cookies or counters

<table>
<thead>
<tr>
<th>Easiness of Adding Information</th>
<th>security protection used</th>
<th>None</th>
<th>None</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only 1 site allows visitors to add questions and visit public boards</td>
<td>A ‘FRAQ’ section should be made available</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facilitation of Interpersonal Communication</th>
<th>None</th>
<th>None</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. None on live chat rooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Most provide at least one email address to contact the webmaster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 1 site provides an online forum and discussion area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. An 'ask a healthcare professional' facility should be available for patients</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>2. Provide discussion forums, chat windows and interactive tools</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
6.6 Interpretation of Phase 4 Results

Phase 4 of my research, entailed Q Methodology, and was used to capture the subjectivity and perceptions of diverse users towards online health. This Q study involved seventy participants from the university, the general public, and medical personnel to relatively represent the larger characteristics of Internet users worldwide, as this is a global phenomenon.

A three-factor solution was chosen, which explained 36 percent of variance, with fifty participants or seventy one percent of participants loaded into the factors, as explained in Chapter 5. The factors represent three subjective perspectives of online health use, and, were labelled as ‘Service-Oriented’, ‘Interactive’, and ‘Health Information’ users. As revealed in Chapter 5, the results showed 22 participants (31 percent) in the ‘Service-Oriented’ group, 22 (31 percent) in the ‘Interactive’ group, and, only six (9 percent) as ‘Health Information Seekers’ group.

Accessibility is particularly important in Factor 1, as specified in statement 4 and among ‘Service-Oriented’ users, because they view online health as a potential way to extend the healthcare system to meet the information needs of its end-users, as in statement 18. The benefits of ICTs are to empower consumers to access pertinent health information directly by cutting out the intermediary levels such as health professionals and making consumer health information more accessible (Eysenbach 2008). More importantly, by facilitating and enhancing accessibility, these individuals are able to make informed healthcare decisions and thus improve the quality, the value of services, and, users’ satisfactions, while reducing health care costs as specified in statement 1. This finding is in-line with previous studies, including Heeter (1989, 2000), Nazi (2003), Brailer (2008), Hill and Powell (2009), and others. However, despite the ever-increasing spread of Internet access over the last years, several studies report the existence of a persistent digital divide both in Internet access and its use (Renahy, Parizot & Chauvin 2008).

The differences in preferences among individuals accessing health related information cannot be solely attributed to lack of Internet access, but may be caused by other factors, including lack of interest in health information, as well as education
level, income status, and content barriers such as literacy (Bansil et al. 2006; Renahy, Parizot & Chauvin 2008). The concept of online health literacy implies that the individuals having difficulties understanding the content related to health informatics could find this to be a barrier to Internet use, as indicated in statement 26. The existing literature reports other barriers to online health such as computer literacy, cultural diversity, level of education and income (Gilmour 2007; Renahy, Parizot & Chauvin 2008).

It is interesting to note that most of participants in this Factor are academic individuals who are highly in accord with the readability level of health information. They feel that health informatics should be simple, clear and easy to understand using the non-technical terms rather than scientific language. This finding points out the importance of assessing other segments of society with low online health literacy. Because limited online health literacy has been shown to be associated with less knowledge of health conditions and hence lower self-management, and higher health care costs, it may adversely affect health care outcomes (McCray 2005). As a result of limited online health literacy, consumers who need it the most may be the least able to take advantage of new health technologies. It is interesting to note that Renahy, Parizot & Chauvin (2008) find that people who would need the Internet the most to compensate for a lack of health information – due to their economic circumstances, social problems and health issues – are also those who use it the least. This particular finding suggests that government authorities should be aware of the existence of this problem. One way to tackle this dilemma is by promoting educational programs to elevate the level of health literacy among the general public (Hernandez 2009).

The ‘Service-Oriented’ users in Factor (1) use health-related sites because of several favourable features: smooth and simple direct navigation for health information at any time, as well as language and print options, as indicated by their choice of statements (2, 11, 10 and 15). The availability of such ease of use and friendly features is central to users to avoid user’s exhaustion in retrieving and reading online health information. This finding is in line with the research of Bansil et al. (2006). The ‘Service-Oriented’ users also expect to access the health websites with no
delays. As technology advances, multimedia may become faster to load with fewer broken links they encountered, as shown in statement 3.

Despite the fact that many studies find that patients regard their physicians as the most reliable source of information compared to the Internet. Over the past years, the roles have changed significantly from a more authoritarian model to a more mutual partnership, which still ranked as the most important relationship after the family (Henwood et al. 2003; Ishii and Ullmer 1997; and, Hillgren and Linde 2006). Online health may enhance the traditional model of the physician-patient relationship and the communication among healthcare providers where users would move beyond simple information collection to integrated interactive health care systems (carers, family, relative, physicians, etc.), as indicated in statements 20 and 18. The existing literature suggests that there should some kind of cautionary measures that need to be undertaken, including the potential malpractice liability for email and other electronic interactions, hence, there has been a need for greater informatics interventions that must mainly focus on patients not only the providers or institutions, and, support them as partners in the health care system (Nutbeam 2000). This finding confirms with Nazi’s (2003) findings. Consequently, online health’s potentials may maximize healthcare providers’ limited time and contact with patients (Gibbons 2005). This fact may sound too pessimistic because physicians may find it significantly difficult to adopt and embrace these technologies due to the disruption of workflow, financial costs and lack of interaction with their patients. These issues should be resolved, or otherwise, the adoption of online health solutions by physicians will be impacted negatively (Gibbons 2005).

For the ‘Interactive’ group, the basic tenet behind online health is to access not only quantities of health information, but also to access quality of electronic health informatics that empower the public by increasing their knowledge and improving decision-making, as anticipated by participants in Factor 2 in statements 31, 17 and 23. Perceived usefulness and benefits of using emerging interactive health information technologies, often referred to as online health, not only include improvement in wellbeing and quality of life and reduced distress, but also in
developing communication and information sharing among patients with similar conditions, and, this tendency also supports the notion of ‘knowledgeable patients’. Hence, this can enhance patient empowerment, autonomy and satisfaction with health care. Not only can patients enjoy the benefits of health ICTs, but also health care providers can discuss health issues and share their experience with others in the community of practice.

The ‘Interactive’ participants in Factor 2 also anticipate that online health can increase the capacity to provide tailoring and customization for consumers (Ahern, Kreslake and Phalen 2006). Online health is rising in significance. Factor 2’s emphasis is more on collaboration and sharing, as specified in statements 21, 14 and 30. Online health should include more than content and images. It should have consumer directed electronic tools to facilitate the participation, such Web 2.0 technologies including blogs, wikis and other communication tools that allow people to post information online, collaborate, and, share among users. It allows community to participate in social networking and openness within and between user groups, rather than closed technology which is controlled by an expert (Hernandez 2009). Hence, community members will be able to create, assemble, organize, locate and share information to meet their own needs and their community. In online communities, consumers can access and share stories of fellow consumers’ experience to help them understand and manage their conditions and maintain hope. They also seek self-care information and answers to questions that assist in decision-making. This signifies that the amount of health information is available at a faster rate and from various diverse sources than before (Hernandez 2009). This finding is in-line with Bath (2008), Akesson, Saveman and Nilsson (2007), Harland and Bath (2008), and, Lau and Kwok (2009). As shown in Factor 2, which is composed of international students and academics, the language option is one of the main concerns, as indicated in statement 15. The availability of such an option may overcome the anxiety of searching and retrieving health informatics among non-English speakers and individuals whose first language is not English.
Interestingly, I found that Factor 2 is different from other factors as it includes more practitioners in the healthcare field. Therefore, the desire to improve the mutual collaboration and communication among health care providers in order to enable them to acquire sufficient information and possess a high degree of skill and expertise has become one of the biggest challenges for the knowledge-based economy. Improving knowledge intensive health settings by enhancing knowledge works among practitioners in the medical field is essential for success in emerging health ICTs. In practice, improvement of knowledge work through assisting practitioners to conduct their activities and facilitate the collaboration may increase the overall quality and lower the cost of health care. Since the purpose of the ICTs is to facilitate work activities, it becomes necessary to investigate how Cultural-Historical Activity Theory, or simply Activity Theory, can be applied. The main reason for the use of Activity Theory in ICTs is to research to analyse the complex dynamic settings like health care that typically involve interaction between human (subject) and technical elements (objects) (Hasan and Crawford 2006), and, this may leave room for further research.

Contradictory, we also find that participants in this Factor strongly believe that interactive technologies would make more work for healthcare workers, as revealed in statement 47. As a result of this, physicians may find it significantly difficult to adopt and embrace these technologies due to the disruption of workflow, financial costs and lack of interaction with their patients. These issues should be resolved, or otherwise, the adoption of online health solutions by physicians will be impacted negatively (Gibbons 2005). This particular point of view discovery contradicts our earlier finding regarding Factor 1, which considers online health as a way to maximize healthcare providers’ limited time and contact with patients. Therefore, this interesting finding needs further investigation to additionally explore the perception of practitioners on this issue.

Health literacy is one of the most common barriers in achieving better health outcomes. It is not just an objective assessment of whether or not individuals are classified as literate (Hernandez 2009). It is the process of learning that keeps
changing as technology changes. Apparently, Factor 3, or the ‘Health Information seeker’ group, has distinct characteristics. This group consists of only educated individuals who seem to possess little willingness to process and understand the basic health information and services that are needed to make appropriate health decisions. Their emphasis is more on basic health information via the usage of non-technical language and readable formats, as shown in statements 26 and 28. Therefore, it is significant to improve the health literacy levels amongst individuals. To overcome this issue designing an online health system that incorporates online communities for social networking, as in Web2.0, as implied in statement 36. This group are more likely to find it easy to seek other people with the same personal experiences.

The popularity of the Web as a source of information raises concerns about the issues related to the perceived credibility and the quality of health informatics (Impicciatore et al. 1997). The quality of health informatics is an essential component to improve the overall healthcare delivery as specified in statement 28. It is one of the huge challenges of this free-market mentality that stakeholders are faced with. Judging the quality of health information is not always straightforward. This poses the risk that inaccurate, out-dated, or low quality of health information will be disseminated. Due to the existence of such a problem, organizations having developed and considered some criteria, such as website content, form, accessibility and credibility should consider these criteria when evaluating health information (Eysenbach et al. 2000). Until now, the impact of these criteria on the design, form, usefulness and the use of health information has been relatively weak and users are unaware of them (Benigeri and Pluye 2003). This implies that although healthcare professionals are recognized as the most reliable source of health information, consumers have a responsibility to critically question the information source posted on the health website when using the Internet as a secondary source of health issues (Nsuangani & Perez 2006). The critical thinking skill is another essential element of health literacy. It is composed of the ability to analyze and judge value-based choices when presented with alternative possibilities. This skill will be increasingly important as people move into home-based self-care management and community-based care (Hernandez 2009). This
implies that promoting quality control concerning online health via a rating system to test, rank and distinguish legitimate online sites from the ones that are merely attractive becomes necessary to implement (Bomba 2005; Ahern, Kreslake, and Phalen 2006). Moreover, one way for controlling quality of health information on the Internet is evaluating information by third parties (Eysenbach et al. 2000).

Locating health information is one of the most common activities on the Web. The ‘Health Information Seekers’ who ascribed to Factor 3 seek information from a variety of Health topics offered by online health, as implied by statement 46. This is not surprising, as research indicates that most people want to have detailed health information (Charles, Gafni & Whelan 1997). The finding here also stresses the importance of locating one health website as a ‘one-stop-and-shop’, because their information seeking behaviour may reduce their anxiety and, facilitates their decision-making process (Sillence et al. 2007). ‘Health Information Seekers’ also stress the importance of targeting all users and stakeholders, as indicated in statement 44. With widespread computer use, the knowledge, skills and experiences of computers users have become very broad. Therefore, a universal online health services central to accommodate users with different skills, knowledge, age, gender, disabilities, etc. In the health context, this paves the way for future developments such as improved healthcare systems and expanded government services. It also may bridge the gap between what users know and what they need to know, user diversity and technology diversity (Lazar 2007). This indicates the importance of including the universal utility design that target different users in Web-based health services (or Web 2.0).

With the continuous evolution of the Web, health information becomes more available on the Internet as a secondary source of information (Pereira, Bruera, & Kavanagh 2000). ‘Health Information Seekers’, as depicted in Factor 3, perceive the benefits of online health as in statement 1. The availability of Web-based health saves more time and effort in retrieving health informatics than paper-based sources, avoids users’ exhaustion, and hence, reduces the costs of healthcare and improves the quality of healthcare. People who seek health information may have a desire to seek
a second opinion or verify information already obtained from healthcare professionals about their illnesses and available treatments, and, participate in decision-making processes (McGrath et al. 2007). Similar to previous factors, the ‘Health Information Seekers’ group prefer having a choice of language as a utility in online health, as in statement 15. The availability of such an option may assist this group in achieving a simple and smooth retrieval of health informatics to match their needs with different culture and language backgrounds.

While a ‘Service-Oriented’ group are intense on service providing facilities such as print, language and fast navigation, this group has not suggested any facility to add valuable information (easiness of adding information). Contrastingly, the ‘Interactive’ group has not suggested any features for users’ knowledge and effort as well as the responsiveness dimension of interactivity. Similarly, the ‘Health-Seeking’ group has not suggested any features, not only for communication opportunity, but also responsiveness dimensions. Table 6.3 illustrated the evidence of my study.
Table 6.3: Interpretation of Q Methodology for the Three Factors Results

<table>
<thead>
<tr>
<th>Interactivity Dimension</th>
<th>Service</th>
<th>Interactive</th>
<th>Health Information Seekers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interactivity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dimension</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Service Interactive</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Health Information Seekers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Expect to provide useful features such as search engine, help page, and site map.</td>
<td>1. I would like the opportunity to participate by using facilities such as surveys, polls, and games.</td>
<td>1. I would like to offer me a choice of language</td>
<td></td>
</tr>
<tr>
<td>2. Get the depth of information that I need from health websites</td>
<td></td>
<td>2. Provide me with useful features such as search engine, help page, and site map</td>
<td></td>
</tr>
<tr>
<td>3. I would like to be able to download and print the information needed from online health</td>
<td></td>
<td>3. should target a variety of users</td>
<td></td>
</tr>
<tr>
<td>4. I would like to download Audio, Video, and Podcast from health websites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. To offer me a choice of language</td>
<td>2. To offer me a choice of language</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Content Availability and Choice</strong></td>
<td>1. Rarely encounter any broken links when I navigate through the website</td>
<td>1. Language used must be easy to understand</td>
<td></td>
</tr>
<tr>
<td><strong>Effort and Knowledge of Users</strong></td>
<td>2. language used must be easy to understand</td>
<td>2. Quality of information provided on this website should be scientifically correct</td>
<td></td>
</tr>
<tr>
<td><strong>Responsiveness</strong></td>
<td>Prefer immediate (fast) access when using a website.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Customization &amp; Management of Information</strong></td>
<td>Health websites can improve the overall quality of healthcare</td>
<td>None</td>
<td>1. Health websites can improve the quality of healthcare</td>
</tr>
<tr>
<td>Easiness of Adding Information</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. I would like to be able to share my story on a health website.
2. I would like to feel empowered because I can add and contribute my idea through useful features such as a public bulletin board.
3. I would like to see a Weblog/Blog in a health website because I can read and add my comments.

| Facilitation Interpersonal Communication | 1. Interactive health features can improve relationships between patients and healthcare providers.
2. Interactive health features do improve the delivery of healthcare |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|                                          | 1. I would like to be involved in online discussions and feel like part of community.
2. I would like to be highly involved in online discussions and feel like I am part of the community.
3. An interactive website would make more work for healthcare workers. |
|                                          | Enable the public to ask more questions so that they are informed and can make better health decisions.

<table>
<thead>
<tr>
<th>2. The healthcare profession should make more use of the Internet to improve services</th>
</tr>
</thead>
</table>
6.7 The Link between Phase 3 and Phase 4

This section presents the agreement between the results from Phase 3 of content analysis and Phase 4 of the results from the Q study that marked the importance of three distinct groups. As explained in Chapter 5, Phase 4 provides meaningful results of the perception of diverse users (seventy participants) towards online health websites worldwide, whereas Phase 3 presented the results of content analysis of forty-one health websites worldwide. The Q study of Phase 4 produced a three-Factor solution named as ‘Service-Oriented’, ‘Interactive Users’ and ‘Health Information Seekers’, while Phase 3 revealed the complexity and dynamic nature of online health.

The dimensions of content availability and choice and users’ efforts are well presented in the sample of health websites as pinpointed in Chapter 5. The element of content availability and choice presented the enrichment of online health websites of links, hypertext, navigation tools, print option and multimedia. This finding is in accord with the views from the three groups. Table 6.4 below presents the agreement between the results of the content analysis and the three-factor perceptions on the online health websites. The findings from the content analysis showed the lack of a language option among the study sample. Consequently, the results from the Q study also confirm this particular finding as a need among the three distinct groups. Decisively, this finding indicated a strong and ultimate need for the presence of such a facility on online health websites.

On the other hand, there was not as much of a harmonizing between the responsiveness dimension and the needs of the ‘Service-Oriented’ group as there was a need for immediate and fast access to the website. Similarly, the revealed results from content analysis indicated that the dimension of users’ efforts and knowledge aspect was not fully met, as there was a universal need for simplicity and easiness of language used on health websites. The results from content analysis also indicated that the dimension of customization and management of information was not yet fully implemented among the study sample of health websites, as there was an
ultimate requirement on the quality of health information provided as strongly obvious among ‘Service-Oriented’ and ‘Health Information Seekers’ groups. Even though the results of content analysis showed a slight presence of interactive features of online health websites, there was a collective need for communication opportunity among the three groups for an online discussion forum and live chatting window in order to improve the overall quality and delivery of the healthcare system.
<table>
<thead>
<tr>
<th>Web Content Analysis Results</th>
<th>Q Methodology of Four Factors Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content Availability and Choice</strong></td>
<td><strong>Service</strong></td>
</tr>
<tr>
<td>1. Online health websites empowered with effective search engine, hypertextuality, and links to latest news.</td>
<td>1. Expect to provide useful features such as search engine, help page, and site map.</td>
</tr>
<tr>
<td>2. Most websites have links to the first page, print option, and multimedia</td>
<td>2. Get the depth of information that I need from health websites</td>
</tr>
<tr>
<td>3. very few offer language option and text option</td>
<td>3. I would like to be able to download and print the information needed from online health</td>
</tr>
<tr>
<td>4. I would like to download Audio, Video, and Podcast from health websites</td>
<td>5. To offer me a choice of language</td>
</tr>
<tr>
<td><strong>Effort &amp; Knowledge of Users</strong></td>
<td></td>
</tr>
<tr>
<td>1. A single click, index on homepage, and outside links are available</td>
<td></td>
</tr>
<tr>
<td>2. language used must be easy to understand</td>
<td>None</td>
</tr>
<tr>
<td><strong>Responsiveness</strong></td>
<td>Prefer immediate (fast) access when using a website.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1. Most sites enriched with either link to contact webmaster, feedback form, or help option</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Customization &amp; Management of Information</strong></th>
<th>Health websites can improve the overall quality of healthcare</th>
<th>1. Feel the importance of the quality of information provided on this website is scientifically correct</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 2 sites used cookies or counters for personalisation purpose</td>
<td></td>
<td>2. Health websites can improve the quality of healthcare</td>
<td></td>
</tr>
<tr>
<td>2. 17 sites require visitor registration</td>
<td></td>
<td>3. The healthcare profession should make more use of the Internet to improve services</td>
<td></td>
</tr>
<tr>
<td>3. 21 sites provide updating content message</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Easiness of Adding Information</strong></th>
<th>None</th>
<th>1. I would like to be able to share my story on a health website</th>
<th>Enable the public to ask more questions so that they are informed and can make better health decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Most sites provide a public bulletin board</td>
<td></td>
<td>2. I would like to feel empowered because I can add and contribute my idea through useful features such as a public bulletin board</td>
<td></td>
</tr>
</tbody>
</table>
2. few sites provide FAQ

<table>
<thead>
<tr>
<th>Facilitation of Interpersonal Communication</th>
<th>I would like to see a Weblog/Blog in a health website because I can read and add my comments.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interactive health features can improve relationships between patients and healthcare providers</td>
<td>1. Like to be involved in online discussions and feel like part of community</td>
</tr>
<tr>
<td>2. Interactive health features do improve the delivery of healthcare</td>
<td>I would like to see practical features such as request an appointment and refill prescriptions</td>
</tr>
<tr>
<td>2. 1 site provide all expected communication tools</td>
<td></td>
</tr>
</tbody>
</table>

1. Most sites provide at least one email address, feedback mechanism, and discussion forum

2. An interactive website would make more work for healthcare workers
6.8 Chapter Summary

This chapter explained the results and findings collected from Phase 1 to Phase 4 of this research, which presented in Chapter 5. The explanations of the results and findings using the application of three qualitative research methods - scenario-based usability testing, Q Methodology and content analysis aimed to answer the main research questions expressed in Chapter 2 of my thesis. The main objectives of my research are to explore the subjective perception of diverse users of the health information systems and the nature of the content and layout of health and palliative care websites worldwide. This chapter has also explained associations between the results from both the Q study (Phase 2 and Phase 4) with the results revealed from the content analysis approach.

The interpretation from Phase 4 of my research will be underpinned by Activity Theory to enhance the overall understanding of online health websites and users’ subjective views and perceptions towards the online health website. The analysis of Activity Theory is significantly suitable for describing the pattern of users’ activities where activity is considered as the ideal ‘holistic’ unit of analysis for explaining and clarifying the dynamic relationship between people and the system with assistance of tools in complex and dynamic environments. Therefore, the next chapter, Chapter 7, will provide a discussion and analysis of the application of Activity Theory based on users’ activities extracted from Q Methodology.
CHAPTER 7

THEORETICAL INTERPRETATION OF THIS RESEARCH

7.1 Introduction
This chapter applies theoretical framework to interpret the results of the data analysis. Earlier Chapter 3 introduces the theory that will be used as the basis for the research. Chapter 3 (Section 3.5) also provides an overview of Activity Theory including its historical background along with its principles and its development through three generations.

The main purpose of this chapter is to describe and apply the philosophical framework of Activity Theory to answer the research questions. This theoretical framework allows the researcher to investigate the different aspects of individual reactions to dynamic complex Web-based health information systems within their activities of use. Activity Theory is a powerful, descriptive tool that provides a holistic approach to explain tool-mediated human activity and the context in which it occurs.

7.2 Activity Theory: Application

7.2.1 Systems with Activity as the Unit of Analysis
Using Activity Theory to underpin my research takes an activity, as previously shown in Chapter 3, Figure 3.4 (Section 3.5.2.2), as the unit of analysis. In any situation there are normally many interconnected activities and any one person or group are often engaged in multiple activities over time. Thus, it makes sense to talk about systems of activities. Following the work of Engeström (1987), Kuutti and Virkunnen (1995), an analysis of an activity system normally begins with the identification of one central activity, which is the focal point of holistic investigation surrounded by other interrelated activities that support the central activity (Hasan 2003b), as shown previously in Chapter 3, Figure 3.6 (Section 3.5.2.3). Each activity is identified through the dialectic relationship between subject and object where the
object has the dimensions of being focused and has a purpose while the subject is a person or group engaged in the activity, incorporates the various motives involved.

In my study the phenomenon of interest included the design, implementation and the use of an online health website. This could be construed as an example of the interaction between the design and use activities in the manner previously shown in Chapter 3, Figure 3.7 (Section 3.5.2.3). In addition to the activities, there are studies; the conduct of the research was also identified as an activity of interest to which the Activity Theory framework could be applied. The initial stage of my study focused on the activity of end-users of online health for which the website would be a tool of this central activity, as seen in Figure 7.1 below. The owners and designers of the palliative care website that was the object of the initial usability tests assumed that there was a common activity of use. This assumption was conveyed to the researcher and influenced the development of the set of scenarios applied in the usability tests. However, group discussions with potential and current users revealed that there may be several different activities to satisfy different needs of users of online health websites. A selection of these was subsequently identified through the use of Q Methodology in Phases 2 and 4.

Figure 7.1: The Common Activity of obtaining Online Health Information (in the initial Phase of the Research it was assumed that there is a common Activity of use)
Table 7.1 below clearly depicts an explanation for the activity of general online health-related information at the initial stage of my research, applying the framework of Activity Theory.

Table 7.1: Activity Theory Elements for the Activity of General Online Health-Related Information (Initial Stage)

<table>
<thead>
<tr>
<th>Activity Theory Element</th>
<th>As Used in Activity of General Online Health-Related Information (Initial Stage) (Figure 7.8)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>To obtain general online health-related information</td>
<td>To discover, access and obtain various online health information</td>
</tr>
<tr>
<td>Subject</td>
<td>General online health users</td>
<td>Prospective and current online health users</td>
</tr>
<tr>
<td>Tools</td>
<td>Health websites</td>
<td>Physical tool: website Psychological tool: Web information and knowledge</td>
</tr>
<tr>
<td>Community</td>
<td>Medical and public</td>
<td>Medical community: medical staff, general practitioners, etc. Public community: family, relatives, friends, carers, etc.</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Improve healthcare delivery Improve knowledge</td>
<td>Cost reduction, enhance product and service quality, and, improve decision making process</td>
</tr>
</tbody>
</table>

The development of research activity will be described in the next section.

7.2.2 Developing the Research Activity for my study

Because there is no activity without a subject, the concept of the ‘always active’ subjects is crucial in Activity Theory (Leontiev 1978). Any decision and changes to the conduct of the activity must be initiated and nurtured by real and identifiable people, individuals and groups.
As the subject of the research activity, I am a crucial element of the research activity and my choices are made in the context of the object of the research, namely, the activities of online health users, and, the research community of my supervisors. According to Engeström and Kerosuo (2007), an interventionist researcher must find a flesh-blood dialogue between partners who share their emotions, concerns and agendas within the activity system. For this reason, Q Methodology, as a research method, is selected as a discovery mediated tool for my research, as it allowed me to open up and dig into the subjective views of the participants. Its use places the participants at the centre of analysis and enables my research to explore ways to engage and motivate people. In addition to Q Methodology, usability testing was also used as a discovery tool to assess me as a researcher and uncover potential users and their views. Content analysis research is also used as a research method tool to explore the content and the nature of websites. Figure 7.2 depicted the framework for the data collection activity as used in my study.

![Figure 7.2: The Data Collection and Analysis Activity Covering the 4 Phases of the Research](image)

The activity of the data collection and analysis is performed by researchers, or information brokers, including myself. I used various research tools for data collection and analysis such as Q Methodology, scenario-based usability testing, and, content analysis to assist designers of online health websites to make more structured
decisions. In addition to these data collection and analysis tools, information brokers may use surveys, interviews, observations, action research, etc. The use of participatory design methods where end-users are invited in the development of the online health information system is currently widespread in the healthcare sector (Pilemalm & Timpka 2008). As the healthcare sector becomes increasingly bigger in size and more complex, it has also become necessary to extend the scope of the online health information systems that are to be used for management, analysis of data, information and knowledge to response to the diversity of the problems encountered in the design processes for online health information system development (ibid). Table 7.2 presents a better description of the element for the data collection activity.

Table 7.2: Activity Theory Elements for the Activity of Data Collection and Analysis

<table>
<thead>
<tr>
<th>Activity Theory Element</th>
<th>As Used in Activity of Data Collection and Analysis (Figure 7.9)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>To collect and analyse data</td>
<td>Data collection and analysis to explore various perceptions of online health and investigate the content of online health</td>
</tr>
<tr>
<td>Subject</td>
<td>The Researcher</td>
<td>Myself as the researcher undertaking data collection and analysis</td>
</tr>
<tr>
<td>Tools</td>
<td>Research methods</td>
<td>Q Methodology, scenario-based usability testing and content analysis as research methods</td>
</tr>
<tr>
<td>Community</td>
<td>Researchers and Designers</td>
<td>Myself, supervisors, data providers, designers of online health information system</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Effective evaluation of online health systems</td>
<td>Effective assessment of online health information system to improve healthcare outcomes</td>
</tr>
</tbody>
</table>

Furthermore, the research itself was considered an activity of the researcher, as illustrated in Figure 7.3. The author of this thesis is involved in the research
methodology design and implementation. Therefore, I consider myself as the subject and the object of my research. Here, the subject and the object are forming the principal part of my research activity. Throughout the research activity, especially when I carry out the interpretations of my research, it is bounded and shaped by my cultural norms and personal beliefs, views, experience and sense-making ‘cognitive’ function. Moreover, this activity of interpretation is mediated by the use of Activity Theory as a secondary tool to assess me getting a deeper understanding and explanations of the activities of the users.

![Diagram](image)

Figure 7.3: The Interpretation Activity of the Researcher using Activity Theory to obtain a deeper understanding of the Results of the Data Analysis Activity

Table 7.3 below provides a description for the elements for my interpretation activity.
Table 7.3: Activity Theory Elements for the Activity of Interpretation

<table>
<thead>
<tr>
<th>Activity Theory Element</th>
<th>As Used in Activity of Data Collection (Figure 7.10)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>To interpret the activities of diverse online health users</td>
<td>Explanations of diverse online health users to better understand their activities and assist the development of online health information systems</td>
</tr>
<tr>
<td>Subject</td>
<td>Researcher</td>
<td>Myself as a researcher and an author of this thesis</td>
</tr>
<tr>
<td>Tools</td>
<td>Activity Theory</td>
<td>The use of Activity Theory as descriptive and analytical tools, as it places the interaction of users and online health system in a socio-cultural context of activities</td>
</tr>
<tr>
<td>Community</td>
<td>Researchers</td>
<td>Myself, supervisors, information system developers and designers</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Deep understanding of online health diverse users’ activities</td>
<td>Building holistic and deep understanding of online health users and improving healthcare outcomes</td>
</tr>
</tbody>
</table>

After the data collection and interpretation activities, the design activity of online health Web-based information systems involves various types of researchers and information system developers as depicted in Figure 7.4. Also, Table 7.4 further clarifies the elements of design activity.
Table 7.4: Activity Theory Elements for the Activity of Design

<table>
<thead>
<tr>
<th>Activity Theory Element</th>
<th>As Used in Activity of design (Figure 7.11)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>To design</td>
<td>Knowing the general diverse users of online health assists in the development and design of online health information systems that meet the needs of diverse users</td>
</tr>
<tr>
<td>Subject</td>
<td>Researcher and developers</td>
<td>Such as information system developers, IT teams, programmers, etc.</td>
</tr>
<tr>
<td>Tools</td>
<td>Online health information system and IT tools</td>
<td>The technical tools such as online health websites and IT tools (softwares and hardware)</td>
</tr>
<tr>
<td>Community</td>
<td>Research and design</td>
<td>Various types of information system developers, designers, and researchers</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Advanced online health information system and improve healthcare</td>
<td>Cost reduction, healthcare quality improvement and better knowledge and decision making</td>
</tr>
</tbody>
</table>
Figure 7.5 clearly shows the sequences of the activities discussed earlier. Initially, my research activity started with the identification of general online health-related information to improve the researchers’ knowledge on the current situation of online health and therefore improve the outcomes of healthcare. Data collection activity is needed in order to explore the perceptions of diverse users of online health and investigate the nature of the content of this medium. Then, the Activity Theory framework is used as a tool to provide a context in which the system can be evaluated and hence, assists and enables designers to develop an in-depth understanding of user’s activities. Without understanding the user’s activities, it becomes impossible to design and evaluate the system effectively. Activity Theory places the system in the context of an activity as a mediating tool. This implies that the system, as a tool, facilitates the activity and should be evaluated on how well it facilitates the activity, rather than just on how well it performs.
7.2.3 The Activities of the Users

In my study, various activities of users from a health website were conducted by students with different majors and degrees, other members of the general public, medical students and medical practitioners. Identifying the central activity of each group of users reveals what they actually do. This is the most fundamental matter because it represents the use-situation, or the context in which the system being evaluated resides. According to Activity Theory, all activities are object-oriented and the object of an activity is the shared and unifying purpose that users are striving towards. To carry out this core activity, there may be several alternative tools that can be used to carry out the same activity and a single activity may require the use of a number of tools. The following are a brief overview of descriptions of the 3 types
of Factors and depictions, and, descriptions of the 3 user activities that correspond to the Factors that emerged from the Q study.

7.2.4 A Snapshot of the 3 Types of Factors

7.2.4.1 Factor 1 – Service-Oriented Users

Factor 1 consists of 22 participants. Factor 1 is named as ‘Service-Oriented’. This group views accessibility to services as being the most important capability that online health can deliver and will give individuals better access to healthcare. The participants see benefits of online health such as improving the overall quality of healthcare delivery, the value of health services, and, users’ satisfaction, while reducing healthcare costs. This group views online health as a way to broaden the healthcare system by meeting the information needs of a greater variety of end-users with the health-related information it covers. This group also prefers using health-related sites that have usable features including smooth direct navigation as well as simple language and printout options. As technology advances, current usability problems may decrease, e.g. multimedia may become faster to load and no broken links may be encountered.

7.2.4.2 Factor 2 Interactive Users

Factor 2 consists of 22 participants. The ‘Interactive Users’ believe that the basic tenet of online health is to access not only quantities of health information, but also to improve the quality of online health by empowering the public through leveraging their knowledge to support decision-making processes. This group places more emphasis on collaboration and sharing, claiming that online health should include more than static content and images. It should have consumer-directed electronic tools to facilitate communication that allows people to post information on-line, collaborate and share knowledge among users. Because most of the participants in Factor 2 were international students and academics, having information in a variety of languages was one of their main concerns. Participants in this factor also strongly believe that interactive technologies would make more work for healthcare workers.
7.2.4.3 Factor 3: Health Information Seekers

Factor 3 consists of 6 participants. The ‘Health Information Seekers’ place more emphasis on the simplicity of online health information provided through the use of non-technical language and readable formats. Therefore, according to them, it is important to improve the health literacy levels among individuals. This group believe that the quality of online health is an essential component in improving the overall healthcare delivery. Obviously, locating health information is one of the most common activities among ‘Health Information Seekers’. The ‘Health Information Seekers’ in Factor 3 seek information on a variety of health topics offered by online health. The findings here also stress the importance of designing a health website as a ‘one-stop-shop’ to reduce their anxiety and facilitate their decision-making process (Sillence et al. 2007). ‘Health Information Seekers’ also stress the importance of having a health website that targets all users and stakeholders. ‘Health Information Seekers’ acknowledge the benefits of online health. The availability of web-based health has the potential to save the time and effort of online health users than paper-based sources, avoiding users’ exhaustion, and hence, reducing the costs of health and improving the quality of healthcare. ‘Health Information Seekers’ prefer to have a choice of language as a utility in online health. The availability of such an option will assist this group in simple and smooth access to online health and better match their needs due to different culture and language backgrounds.

7.2.5 The Activity of Service-Oriented Users Corresponding to Factor 1

Figure 7.6 below depicted the ‘Service-Oriented’ users in a collective activity, which is primarily bound to an object or a goal which is related to getting services-related information. Students with different majors and degrees (international and domestic students) and medical staff are the subjects of this activity; obtaining health-related services is the object that defines the activity. Making better self-care decisions is the most common outcome of this activity. Obtaining health services is mediated by the community, which includes internal and external stakeholders in healthcare system, such as the healthcare industry, government, local, national and international academia. An activity is also mediated by tools, which in this case include the online
health information system. See Table 7.5 for a better representation of the elements of this activity.

Figure 7.6: Activity of getting Health-Related Information Services corresponding to Factor 1 of the Q Study
Table 7.5: Activity Theory Elements for the Activity of getting Health-Related Information Services

<table>
<thead>
<tr>
<th>Activity Theory Element</th>
<th>As Used in the Activity of Getting Information Services (Figure 7.13)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object</strong></td>
<td>To obtain health-related information services</td>
<td>Service users’ main activity is to get information related to health services using online resources</td>
</tr>
<tr>
<td><strong>Subject</strong></td>
<td>Service Users</td>
<td>This group related to Factor 1, who seemed to be interested in getting health-related services</td>
</tr>
<tr>
<td><strong>Tools</strong></td>
<td>Online health information system</td>
<td>Online health website (physical tool) and information services as a psychological tool</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Medical and public</td>
<td>Public community: international and domestic students, carers, family, patients Medical community: medical staff, healthcare providers, etc.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Self-care decision and improved healthcare quality</td>
<td>The outcomes: Cost reduction, healthcare quality improvement and better informed decision making</td>
</tr>
</tbody>
</table>

7.2.6 The Activity of Interactive Users Corresponding to Factor 2
Factor 2 was tagged as ‘Interactive Users’, as in Figure 7.7, because the subjects are not passive recipients, but active participants. ‘Interactive Users’ are actively access media to fulfil their needs and motives. Accordingly, their active mode of the uses the Internet focuses on the subjects’ purposive and intentional nature of communication. Hence, the core activity of the ‘Interactive Users’ is communication, which describes individuals as becoming active members with those experts to mutually determine what is best for themselves as well as others and to have opportunities in decision making with regards to tasks, access to information and resources for making proper decisions, having a range of options to enable them to
make choices, the ability to exercise assertiveness in collective decisions and learn skills to improve the ability to make decisions. The subjects include local and international academia, healthcare workers, palliative care staff and the general public. It is interesting to note that healthcare workers and palliative care staff make up almost 50 percent of this group. The outcomes of the communication activity allow ‘Interactive Users’ to create, share and manage knowledge, skill-sets needed to cope with the dynamic nature of healthcare settings and circumstances. Each participant, as a subject, will bring different personal characteristics that may change over time, including innovative tools and services, individual motivations, goals and self-perceptions. The transformation of goals is affected by the users’ self-perceived identities and the role of participation. The goal of participating in online health focused on information gathering, i.e. gathering specific knowledge that is work related or maintaining the overall quality of the online health environment. The outcomes of the communication activity also offers ‘Interactive Users’ autonomous roles, self-regulation and sense making, as they are in the best position to sense the dynamic changes in their immediate environment. The elements of this activity are organized briefly in Table 7.6 below.

![Diagram](image-url)

Figure 7.7: The Interactive Communication Activity Corresponding to Factor 2 of the Q Study
Table 7.6: Activity Theory Elements for Communication Activity

<table>
<thead>
<tr>
<th>Activity Theory Element</th>
<th>As Used in the Activity of Communication (Figure 7.14)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>To communicate</td>
<td>‘Interactive Users’ main activity is to communicate, share experience, and collaborate among themselves and with others</td>
</tr>
<tr>
<td>Subject</td>
<td>‘Interactive Users’</td>
<td>This group includes local and international academia, healthcare workers, palliative care staff and the general public</td>
</tr>
<tr>
<td>Tools</td>
<td>Online health information</td>
<td>Physical tool: online health websites Psychological tools: ideas, language, information</td>
</tr>
<tr>
<td>Community</td>
<td>Online engaged</td>
<td>Any user with interactive mode</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Knowledge, decision, empowerment and autonomy</td>
<td>Communication activity allows ‘Interactive Users’ to create, share and manage knowledge, skill-sets and the attitude needed to cope with the dynamic nature of healthcare settings and circumstances. This activity also offers ‘Interactive Users’ autonomous roles and self-regulation and sense making</td>
</tr>
</tbody>
</table>

7.2.7 The Activity of Information Seeking Users corresponding to Factor 3

Figure 7.8 below illustrates the activity of the ‘Health Information Seekers’, as described in Factor 3. Their core activity is to explore the Internet to find desirable information they are hunting. They tend to use the same mediated tools as previous users, which is the website, because they see health websites as information-intensive portals that should target a variety of users to make better health choices and decisions. The subjects of locating activity are local and international students and lecturers at the university. Table 7.7 explains the elements of this activity.
Figure 7.8: The Activity of Seeking Health Information Corresponding to Factor 3 of the Q Study

Table 7.7: Activity Theory Elements for the Seeking Activity

<table>
<thead>
<tr>
<th>Activity Theory Element</th>
<th>As Used in the Activity of Seeking Health Information (Figure 7.15)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>To Search for online health information</td>
<td>‘Health Information Seekers’ main activity is to explore and locate health information using online resources</td>
</tr>
<tr>
<td>Subject</td>
<td>‘Health Information Seekers’</td>
<td>This group includes local and international students and lecturers at the university</td>
</tr>
<tr>
<td>Tools</td>
<td>Online health information</td>
<td>Physical tool: online health websites Psychological tools: information</td>
</tr>
<tr>
<td>Community</td>
<td>General public</td>
<td>Any user with health information needs from the general public</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Decision, improved quality of healthcare</td>
<td>The outcomes of this activity assist ‘Health Information Seekers’ in better decision making in particular, and, improves the quality of healthcare delivery in general</td>
</tr>
</tbody>
</table>
7.2.8 The Design and Use Activities

The central challenge for third generation Activity Theory is to ‘acquire new ways of working collaboratively’ (Engeström 2001, p. 139). As a result, there was a need to develop a third generation of Activity Theory, as proposed by Engeström, as shown earlier in Chapter 3, Figure 3.7 (Section 3.5.2.3) which intends to develop conceptual tools to understand dialogue, multiple perspectives and voices and networks of interacting activity systems. Figure 3.7 showed the minimal activity systems presentation. Multi-voicedness is one of the Activity Theory principles and the key concept regarding multiple and interrelated activity systems (Engeström 1987). It is the key factor in design processes, a source of difficulty and a source of innovation, demanding actions of translation and negotiation (Engeström 2001).

In this mode of research, the basic model is expanded to include two minimally interacting activity systems. According to Bodker (1991a & b) and Bodker and Gronboek (1996), there are two interlinked activities: design activity and use activity. The design activity is constrained by the computer in various ways, through the actual, available materials as much as through the past experiences of designers and users (Bødker et al. 1987). In earlier Figure 7.4 (Section 7.2.2), the health IS was depicted as the outcome of technical design activity. Designers must have primary data about real activities that various users’ engage in, rather than relying solely on their own prior knowledge and experience, and, the system functions to define user’s tasks. To reach and achieve the ultimate outcomes (or the goals of the designers), their core activity of design is mediated by the same online health information system tools that are carried out by the users, as shown in Figure 7.9 below.

In order to make a better design and ultimately to create a better online health information system based on artifacts, designers and users are in a number of interrelated and somewhat overlapping activities. The experiences, resources, tools, etc. of designers meet, and sometimes clash, with those of the users, and with others involved. In our concern for the Web of activities involving a particular IT-based artifact, the design activities are essential, and, should emphasize how our understanding needs to reach beyond the immediate use (Bødker 1999).
The online health information system is the outcomes of both technical online health information system design activity and the data collection activity performed by the information brokers. A link between the objects of online health information system design and data collection represents the communication and cooperation that is needed if the online health information system is both technically sound and provides the right kind of information. Figure 7.16 below represents a holistic, contextual and dynamic model of how computer technologies and tools can be used effectively to provide the information needed. A feedback loop has been added from the outcomes of the use activity to the previous link between the design activity and the data collection activity. This feedback loop is particularly important to ensure that the goals of multi-voicedness or multiple perspectives are met.

Figure 7.9: The Holistic Interaction Activity Systems of Design and the Use Model expanding Figure 7.5 in response to the Research Findings of three different Activities of Use in Online Health (Figures 7.6-7.8)
7.2.9 Identifying the Mediating Tools for my Research

As explained earlier in Chapter 3 (Section 3.5.4.3), one Activity Theory principle infers mediation by tool use activity. Three types of tools are also explained in the same section: primary tools, which are the physical and tangible tools, whereas secondary and tertiary tools are psychological tools. Primary tools produce changes in the material object, while psychological tools influence the psychological aspect and the behaviours of the subjects (Hasan and Gould 2001). In Activity Theory, the power to identify the concept of having a physical health website, the information, knowledge and sense-making it provides, should be viewed as tertiary tools.

From the Activity Theory perspective, as a communication channel and technology, a health website involves two types of tools. A physical tool, in a way, delivers rich information media by using many artefacts such as HTML, JAVA, GIF, etc. The physical tool also determines the quality of the psychological tools, i.e. audio, text, graphic, etc., on the online health website, which can be considered as psychological systems for representing symbolic information and other artefacts including images, audio, video and animations. These psychological tools are necessary for generating social interaction through a rich representation of information. Ultimately, health websites, as both physical and psychological tools, may have the opportunity to enhance the degree of social interactions and make communication more effective between healthcare workers themselves on the one hand and patients on the other hand.

My research is particularly interested in the primary, secondary and tertiary tools that mediate the various activities carried out by diverse users concerning health-related information.

Primary tools for various users’ activities concerning health information include face-to-face meetings with their primary general practitioners and the health websites.

The online communication tools using computer-based information systems are of particular importance for the outcomes of my research and can be used by both
medical staff and general public, or ordinary people, as a primary tool to seek health information, as well as to communicate and exchange information, and, obtain health-related services.

The primary tools among ‘Service-Oriented’ users are search engines and other navigation tools as well as multimedia such as audio, video, podcast… etc.

To fulfil their online involvement and interactions motives, ‘Interactive Users’ in particular are more likely to use social technologies such as email, discussion forums, chat rooms, Weblogs, and online community services. These are the tools to support work units and the individual knowledge worker. The so-called ‘social’ and/or ‘conversational’ technologies should provide unprecedented opportunities for everyday user activities. The term Web 2.0 reflects the on-going transition of the World Wide Web (WWW.) from a simple collection of websites to a full-fledged computing platform serving these social web applications to end users. The lure of these social technologies is their low cost and connectivity functionality. They also support the new forms of informal network interaction and activity between people to create and enhance informal access to create and disseminate information.

The primary tools of interest for ‘Health Information Seekers’ are search engines. The search engines as well as other navigation tools therefore have to be efficient and effective in information retrieval.

**Secondary tools** include medical and health knowledge, communication skills, previous or past experiences and the language preference, which may be different for each group of subjects. Healthcare staff uses their own medical and professional language, while general users use non-medical or common language. As a result of having multicultural identities and backgrounds this makes communication and interaction with their primary physicians even more difficult, especially when it is face-to-face. Hence, this also makes the design activity more difficult as developers of the system need to design for all (healthcare and general) uses rather than focus on one side of the coin.
For ‘Interactive Users’ as well as other users, the new social technologies empower ordinary people to have a global presence for various purposes, i.e. economic, political and social. They give users a new flexibility and independence to support collective actions, share knowledge and decision-making by self-directed groups.

Tertiary Tools include the social context where stressed users are in the need of finding and communicating the needed health information due to their medical conditions. Therefore, it is important for the ordinary users to understand the health and medical information users are receiving from the medical staff to help to reduce their stress level and improve decisions and well-being.

It is important to look closer at the communication activity of the ‘Interactive Users’, in which healthcare providers constitutes more than 50 percent of the group. In order to achieve the intended outcome, it is important that the individual actions are coordinated towards the shared goal. Various means of coordination and communication are used to achieve this objective (Korpela, Soriyan & Olufokunbi 2004). It is also important for healthcare providers to create virtual communities to disseminate the required health information and circulate their ideas and knowledge among themselves. This assists in better decision making and knowledge managing and improving healthcare outcomes.

7.2.10 Internalization, Externalization and the Internal Plan of Action (IPA)
IPA is one of the most important principles as explained in the earlier Chapter 3 (Section 3.5.4.5), as it differentiates between internal and external activities. Activities have a dual nature because they have an internal and external side (Kuutti 1996).

In my research, three sets of activities were recognized: obtaining a health-related service, communicating, and, seeking health information, as explained earlier in Sections 7.2.5-7.2.7 of this chapter. Whilst communication activity requires social interactions, activities of obtaining health-services and seeking information can be
conducted on an individual basis. For example, information seeking activity is a purposive process of sense-making in which an individual is forming a personal point of view in response to a need or gap in knowledge (Dervin 1983). It is the process where an individual encounters a problem for which her/his current knowledge is insufficient and thereby, may purposefully engage in information-seeking in order to change the current state of knowledge (Marchionini 1995). In this manner, an individual is actively putting an effort in acquiring meaning, which fits in with what he/she already knows, which may include sense-making within a personal frame of reference.

The new Internet technology influences information seeking by providing a new set of alternative models that may accurately describe the dynamic activities that carried out by individuals to satisfy an information need. Ellis (1989), Ingwersen (1996) and Kuhlthau (1993) are among the others who developed theoretical foundations for the information seeking process.

**Ellis’ Model of Information Seeking**

Ellis’s (1989) model of information seeking is a behavioural approach where he focused more on the users of information systems rather than the system itself. He modelled his behavioural approach into six discrete features (not stages as he claimed), as follows (see Figure 7.10):

- **Starting**: Identifying and selecting the initial and starting sources of interest to search through.
- **Chaining**: Back searching for the initial source or forward searching for new sources of information.
- **Browsing**: Casual searching for information in areas of potential interest, such as tables of contents, lists of titles, topic headings and so on.
- **Differentiating**: Organizing and selecting among the known sources by noting the differences between the nature and the value of the information.
- **Monitoring**: Keeping up-to-date on a relevant topic by regularly checking the ‘core’ sources.
- **Extracting**: Systematically analysing sources in order to identify materials of interest.

![Diagram of Ellis's Behavioural Framework]

Figure 7.10: A Process Version of Ellis's Behavioural Framework (Wilson 1999)

In Ellis, Cox & Hall (1993)'s framework, Ellis added two more features to his behavioural model:

- **Verifying**: Checking the accuracy of information.
- **Ending**: Actual dissemination of information or drawing the conclusion for a publication through a final search.

It is also worth noting that the boundaries, which represent the relationship between features of his model, are very soft (Ellis 1996). In a follow up study, Ellis (1997) modified two features of his model by changing the feature starting to surveying, because surveying reflects the key activity of an overview of the research and improvement of differentiating to distinguishing, where information sources are ranked by noting the channel (formal and informal) where the information comes from. A new feature has also been added which is filtering where personal criteria or mechanisms increase information precision and relevancy.

While Ellis’s model focuses more on the behaviour portion, there is an ongoing need to structure a model that defines the cognitive aspects of information retrieval. Ingwersen (1996) has therefore developed a general interpretation cognitive model,
which concentrates more on identifying processes of cognitions where a number of complex interactive communication activities are revealed. This is the strength aspect of the model. Moreover, the main two elements of his model are user’s cognitive space and the social/organizational environment, which are similar to the person in context and environmental factors, as specified in Willson’s models (1981, 1996 and 1999). His model suggests that information-seeking behaviour must include a system that points to information objects that may be the points of interest to the researcher. In his model, he also shows that various cognitive model transformations may take place in moving from one’s real life-world in which the user encounters a problem to a situation where objects are identified. These cognitive models and their transformations must communicate effectively throughout the system, as in Figure 7.11 below.
He also moved from the traditional role of information seeking research in which he resembled much like the development of library services to the current need for the development of diverse information systems (Ingwersen and Jarvelin 2004). In Ingwersen’s model, he explicitly demonstrates the need for attention towards tasks and technology and thereby comes very close to an Activity Theory approach to study information seeking. However, this model weakness is that it does not provide room for usability testing.

Kuhlthau’s conceptual framework is built on Kelly’s (1963) personal construct theory to develop a model named the Information Search Process, which describes a process from a user’s perspective. The original hypothesis of Kelly (1963) depicts a process, which includes a series of phases, beginning with confusion, that describe individuals’ experiences as they construct meanings of the world by assimilating new
information. The phases of construction lead to the examination of the affective dimension as well as the cognitive aspects of the information seeking process (Kuhlthau 1991). Kelly’s (1963) theory extended from Dewey’s (1933) model of reflective thinking where individuals solve problems with uncertainty. Kelly emphasises the disruption caused by acquainting new information to a person’s system of constructs and therefore boosting the uncertainty in early phases of the construction process. This level of uncertainty is believed to be an essential element in order for reflective thinking to occur. When individuals are tackled by vague new experiences or situations, which cannot be assimilated into their existing system of constructing reality, they become puzzled and confused. At this phase, Kelly (1963) proposes that individuals may form a tentative hypothesis to include a new construct into their existing system of construction.

The personal construct theory also provides a way to understand the user’s experience within an evolving problem state. This indicates that throughout our search for information, we tend to construct and reconstruct the matter under investigation. As we become more informed by the information, our construct of the matter changes and evolves accordingly.

Kelly’s (1963) construct theory offers a new stream in the development and modelling of the cognitive perspective. However, other researchers may use the cognitive approach of information to elucidate an individual’s experience and behaviour. Therefore, Kelly’s (1963) theory presents a view of what may determine the behaviour of the researchers.

So Kuhlthau (1991) expanded on the way information seeking may be examined by giving more attention to feeling as the ‘affective’ dimension of information seeking. It is hard to see the association between personal motivations, discussed by Kuhlthau (1991), and, the desired information as expressed by Ingwersen. Kuhlthau (1991) also formed her ideas into a conceptual framework with six stages, whereas Ellis formed six features by stressing the emotional or affective dimension as a driving force of the information seeking process.
Kuhlthau's Phenomenological Stages Model of the Information Search Process:

- **Initiation**: Beginning the process, characterized by feelings of uncertainty and apprehension and more general ideas with a need to recognize or connect new ideas to existing knowledge and experience.
- **Selection**: Choosing the initial general topic with general feelings of optimism by using a selection to identify the most useful areas of inquiry.
- **Exploration**: Investigating to extend personal understanding and reduce the feelings of uncertainty and confusion about the topic and the process.
- **Formulation**: Focusing the process with the information encountered, accompanied by feelings of increased confidence.
- **Collection**: Interacting smoothly with the information system with feelings of increased confidence as the topic is defined.
- **Presentation**: Completing the process with a feeling of confidence or failure, depending on how useful the findings are (Kuhlthau 1991).

Kuhlthau (1991) adheres to understand the information seeking process from a user’s perspective. For each stage, she expected certain actions to take place that did not require much more than a thought. She focuses on the users of the system to explain their physical actions at each; therefore, they generally are describing themselves. So Kuhlthau (1991) acknowledges that the ‘study of users’ perception of task in relation to the actual experience in the search process is needed’ (Kuhlthau 1991, p. 369). We thereby can conclude from her model that learning, creativity and enhanced intellectual access are ways to deepen our understanding of Information Seeking.

Dervin’s (1998) sense-making metaphor has provided the most widely adopted model in information seeking; her ‘sense making model’ describes users as moving along time and space until they reach a cognitive gap, where an information need is mostly perceived. It is the bridging of the ‘gap’ metaphor caused by discontinuity through acquisitions of new information that she acknowledges as the driver for the information seeker.
The sense-making activity consists of three significant levels: individual, group and organization (Linger and Warne 2001; Cecez-Kecmanovic and Jerram 2002).

In information seeking activity, the concept of internalization is established when the individual is engaging with the sense-making activity processes (Warne, Ali & Hasan 2005). The activity of information seeking provides an opportunity for individual work to develop cognitively as the individual use psychological tools are internalized.

Computer-based artefacts have become ubiquitous and capable of accomplishing more routine tasks, which used to facilitate the higher level of cognitive work, and, support creative thinking by allowing reorganization of objects and subjects (ibid). The following Figure 7.12 demonstrates the involvement of ICT tools across the personal space into IPA and the rest of external world.

![Figure 7.12: Individual Sense-Making Activity (Warne, Ali & Hasan 2005)](image)

Furthermore, when external mediating artefacts, such as the case of health websites, are integrated into functional organ and goal-oriented configurations, they are perceived as an attribute of the individual, implying that they naturally extend the individual’s abilities, thus shaping the boundary between the internal tool (based
inside the human mind) and external tool (the outer world). This particular fact distinguishes between expert users and novice users of the Web-based health information system. The merging of internal and external tools is an important piece of evidence among expert users, who use the online health information system clearly as a seamless extension of their abilities, whereas for novice users, who are still in the learning process on how to use the online health information system, the boundary between the internal and external tool is the most apparent. The boundary between internal (human mind) and external (machine) becomes less clear and distinguished when tools are repetitively used by users to carry out an activity. In other words, expert users are deemed to have internalised more of the central activity as well as the health IS system itself. Users of the online health information system should make decisions based on the information from external sources, including primary care providers, health websites, etc. which is internalised and manipulated in the IPA using mental models or maps.

In a communication activity, groups are engaging collectively in sharing activity and thereby making sense of the information perceived. Therefore, health ICT artefacts play the role not as an external computerised system, but as an internalized plan of cognitive action. Figure 7.13 shows that the ICT tools link to a common group space emerges over time, which is align to IPA.
Furthermore, Warne, Ali and Hasan (2005) emphasised a network centric way of sense-making activity, which consisted of many activity systems to carry out sense-making as demonstrated in Figure 7.14.
As a result of internalization/externalization, this principle can shape the future designs of the systems, and hence, it creates a challenge for contemporary developers to design a system that meet the abilities of multi-voiceness and multi-perspectives of users (novice and expert).

Design activity encompasses internal and external activities. Internal activities include cerebral activities including thinking, imagining and sense-making and decision making, whereas external perceptible activities include information gathering, drawing and model making. Designers rarely consider how the tools they design will mediate activities, change work practices, and, social and cultural norms (Hasan 1999). The external activity includes the situation or the context where the expert (or more mature person) teaches the learner how to use the mediating tools, then internally as the learner begins to use the tools in performing other activities. Mediator tools modify and transform the learner’s thinking processes as they begin to use new tools to express their thinking (Cole and Wertsch 2001). When the notion...
of internalisation of external activity (IPA) is reached and mastered towards the using of the old mediating online health information system tools, the users then tend to have a new state of need for new mediating online health information system tools, because of the existing phenomena of an activity system that is unstable and dynamic, and, the dynamic complexity of healthcare settings.

7.2.11 The Zone of Proximal Development (ZPD)

Whilst some researchers concentrate on applying Activity Theory and the concept of ZPD to traditional learning and educational contexts, this concept has been also applied in more dynamic evolving and complex life settings (Engeström 1999a, 2000a, 2005c; Hasan 1998; Nardi, Whittaker and Schwarz 2002; Verenikina 2003; Warmington et al. 2005). However, the application of ZPD to computer environments and information systems is still in its infancy state (Verenikina 2003).

Wells (1999) claimed that the application of ZPD, which has proven useful in a learning context, could be equally applied to any learning situation and use and the development of an information system. ZPD could be applied to any situation that requires individuals who are in the development stage while participating in an activity, and hence, there is the potential to increase their future actions and participations, and improve the tools and artefacts that mediate an activity. This concept of ZPD is not an attribute of the individual, but also requires social interaction (Verenikina 2003).

In my research, three distinctive activities were identified, namely, obtaining a health-related service, communicating, and, seeking health information, as discussed earlier in Chapter 3, Section (3.5.4.6). Vygotsky (1978) has distinguished between higher and lower mental functions. The lower mental functions are those pertained to natural and genetic abilities while the higher mental function is developed through social interaction and cultural mediation (Wertsch 1991). Vygotsky (1977c, p. 106) claimed that ‘social relations, real relations of people’ is the notion behind all the higher functions and their relations. ‘Every function in the cultural development of the child appears on the stage twice, in two planes, first, the social, then the
psychological, first between people as an intermental category, then within the child as an intramental category’ (Vygotsky 1977c, p. 106).

In this regard, whilst the communication activity is a higher mental function, the activities of obtaining health-related services and seeking health information are in the lower mental functions. The nature of the communication activity requires not only social interactions, but also the use of social artefacts to mediate such an activity. The developmental nature of the communication activity that flowed from a constantly changing healthcare setting imposes new demands on designers, developers and owners of health websites to reinterpret the objects of users’ activities and thereby reinvent the artefacts and emergence of new ones for this communication activity.

The ZPD is closely related to the concept of ‘scaffolding’, which emphasizes that learning occurs best when an expert (either an adult or a more competent peer; a more Knowledgeable person) guides a novice from the current level of knowledge to the level of knowledge to solving problems with assistance. The zone of proximal development of a communication activity is the range of potential a person has for learning, with that learning being shaped by the social environment in which it takes place; ideas and knowledge are reached and thereby cannot be mastered in non-communication settings. For example, from the patient’s perspective, a person with a certain health problem or question comes to the Internet and interacts with people who may have the same state of need, same experience, and/or seek medical advice. His learning is eventually shaped by the amount of information perceived from this interaction and communication activity. In this regard, his potential ability when learning is facilitated by mediated artefacts and someone with greater expertise than current and actual ability (Wertsch 1991). This concept is also related to inter-mental abilities, where learning is achieved and mastered through social interactions and the use of the psychological tools available (ibid). From this standpoint, the communication activity simulates the cognitive growth of the high mental function for the users.
In use activities and the design activity of online health information systems, as previously discussed in Section 7.2.8, everyone is either a user or a designer and can thus act as a novice in one context and step into the expert role in another context. From this standpoint, the bridge between where the learners are and where they are going is determined through their personal knowledge network or social interaction, rather than in the hands of a trainer or a more competent peer. Consequently, the learning of new tools is embedded in a particular context and expressed through practice rather than individual cognitive process.

This principle assists in shaping the process of design of the information system. Over the recent years, there has been a shift from passive users of the system where users are only a passive recipient of information to knowledge learners, where learning is an active recipient of information. This new approach in learning design provides benefits as it helps to develop the needed skills for the workplace including problem solving, critical thinking, and, independent learning for both users and designers.

The healthcare sector is one of the knowledge-intensive industries. It is evident that knowledge in healthcare sector is highly dynamic and complex when dealing with knowledge in a way where knowledge is definitely not reducible to any sequence of actions. The actions of Engeström’s expansive learning cycle, which is shown earlier in Chapter 3, Figure 3.9 (Section 3.5.4.6) are not the only kinds of actions that must be mastered and performed in a highly complex knowledge system. Web-based health information system does not propose a predetermined sequence of actions; rather it enables a wide range of learner-driven actions that are neither predetermined nor predictable.

The developer of Web-based health information systems needs to be aware of the boundaries between the closed virtual environment and the open physical system or life (Engeström 2001). The virtual environment in its own right is similar to a world, where you can have any identity, any role and share any information you wish. But the virtual worlds cannot exist alone; the physical world with real people and real responsibilities and actions need to co-exist as well (Engeström 2001).
To sum up, the conceptualizations of scaffolding in information system are needed in order to gain greater insights into the use and design processes. Our work has revealed that those traditional forms of scaffolding, based on the ‘isolated expert designer’ view of how the problem of design should be solved needs to be modified in order to accommodate the needs of various users’ perspectives.

7.2.12 The Principle of Contradictions and Conflicts

The notion of contradictions and conflicts, as described briefly in Chapter 3 (Section 3.5.4.7), started when the participants or the user of the system began to question and deviate from the norms of the fixed static mode of Web-based system and escalate into collaborative visions and a deliberate collective change effort. Engeström (1993) observed that there has been no specific attention given to the principle of contradictions as a research tool. Therefore, my study fills this gap by analyzing how this principle is applied in the context of use and design activity to bring sense and meaning to the complexities of changes about the use of ICTs in healthcare. Because of the dynamic nature of activity systems, the health information system must be designed for change. Therefore, the development of online health information system projects must include processes for user participation and feedback and implementation of new requirements. Within an activity system, there are different people with different backgrounds, motives and perspectives. The notion of multi-voicedness, as described earlier, can be a source of conflict in the design activity, but it can also lead to positive action if there is a room or forum for voicing users’ different views. It is important to expose multi-voicedness to negotiation and change when understanding and improving an activity system.

Despite the potential of contradictions to change and transform the activity system, this transformation does not always happen. In fact, it can either enable the change or disable it. This only depends on whether they are identified, acknowledged and resolved (Nelson 2002). Hidden, invisible, or un-discussible contradictions are the most difficult to identify, and, these issues tend to be taken for granted among design teams. From this perspective, to enable innovations, the resolution of contradictions cannot happen at the individual level, it requires social interactions. From the design
perspective, there has to be a close collaboration and cooperation between the use activity and the design activity. This implies that Activity Theory emphasizes that the use and design activity are in a continuous cycle of change where computer applications as well as other parts of work activities are constantly reconstructed using more or less design tools. A clear knowledge of the changes paves a way of doing a better design (Floyd 1987).

When analyzing tensions, Engestrom (1987) proposed four levels of inner contradictions, which must be focused on when analyzing the work setting and assist participants in changing the nature of the activity to overcome tensions and conflicts. Level 1 is the primary contradiction, which is found within a single node of an activity. It emerges from the tension between use value and exchange value. It is the breakdowns within and between the elements of action that make up the activity and is affected by other related activities. This means that the same action can be executed by different people for different reasons or by the same person conducting two separate activities.

Secondary inner contradictions are those that occur when users of the system encounter a new element of an activity. The process for incorporating the new element into the activity brings conflicts. For example, designers face difficulties assimilating and coordinating both the users’ requirements and the new rules of government and division of labor (health organization).

Tertiary inner contradiction related to the existing activity and what is described as a more advanced form of activity. This may be found when the design activity is reconstructed to take into account new motives (multi-voicedness), or ways of reworking.

Quaternary inner contradictions are tensions between the central activity and the related activities, for instance, instrument producing, subject-producing, and, rule producing activities of the activity systems.
7.3 Chapter Summary

This chapter revealed not only the historical background and the principles of Activity Theory, but more importantly, its second and third generation of Activity Theory application in my research. This chapter explained the importance of applying Activity Theory, due to its well-developed framework, for analysing complex dynamic settings such as the healthcare context. The combination of Activity Theory and Q Methodology are appropriate techniques for conducting the research and interpreting its results in an integrated holistic approach and its contributions to an overall understanding of users’ perceptions towards online health websites. This theory of activity shows the effects of tools and the environment on human actions, reactions and behaviour in the work settings and in their relations with technology.

A theoretical framework is required in order to form a basis by placing the user’s needs and the user’s activities in a context to enable the researcher to recognize diverse users’ perceptions and requirements when engaging in online health activities, and hence, designing for the diverse use activities.

The notion of a useful online health information system implies that system should be designed to serve a purpose, in which it supports different stakeholders’ activities. In the next section, Chapter 8 will provide the conclusions and discussions of the research.
CHAPTER 8

CONCLUSIONS & IMPLICATIONS

8.1 Introduction
This final chapter of my thesis explains how the outcomes of this study help to fill the gap in the understanding of online health identified in the literature review of Chapter 2. This gap concerns the changing nature of the socio-technical systems that support the diverse activities of users of online health websites. This chapter addresses the implications of the findings of the study for both academics and practitioners. The chapter starts with a summary of the main findings of the thesis related to the research questions, as mentioned in Chapter 1. It then describes how the findings answer the research questions and highlights the significance of the research in terms of the theory and practice of the online health environment. The chapter also addresses the limitations of the study. Finally, the chapter puts forward suggestions and recommendations for future research related to the study.

8.2 Findings related to the Research Questions
This research aims to contribute to the knowledge about the online health context. This will be achieved by addressing the broader questions relating to the online health system and its users. From this perspective, this study adopts an interpretive theoretical approach that acknowledges the importance of human social interactions in the area of online health (Page and Sharp 1994). Therefore, three phases (Phases 1, 2 and 4) of the study focus on user perceptions of health websites and one phase (Phase 3) focus on understanding the nature of the content and layout of online health websites. For this reason, this study adopts a mix of innovative qualitative methods including usability testing, content analysis and Q Methodology. Whilst content analysis deals with the Web-based information system itself, usability and Q Methodology deal with the users of the systems. This mixed methods approach was appropriate to both gather objective data on online features and to unveil subjective data of users’ perceptions of the evolving Internet technology. Studying the users of
Web-based information system together with the content of Web-based information system is an approach commonly applied in the fields of Human-Computer interaction (HCI), Information Systems (IS) and new media research.

8.2.1 Research Question 1:

What are the perceived information and interaction needs that are currently being accommodated or envisaged within public Web-based information systems in a dynamic environment like healthcare?

This research recognizes the importance of the users of health Web-based information systems. For this reason, this question was answered through the use of Q Methodology in Phases 2 and 4, which apply Q Methodology and usability testing in Phase 1.

As discussed in Chapter 6 (Section 6.2), Phase 1 of this study was essential in giving the impression that there may be different users of online health. The usability testing of a particular health Website, which was conducted in 2008, assessed the impressions of the users and their feedback and suggestions to improve the delivery of palliative care services. The finding of this phase was concerned with the benefits of online health and also revealed the challenges to improving the health information system within the technological capacity of the Internet. Health websites can be utilised as a quick, easy and information-intensive portal. However, the systems fail to take full advantage of the capacity of the Internet in terms of interactivity and navigability.

Chapter 6 (Section 6.3) describes Phases 2 and 4 of the study where Q Methodology was used to capture general users’ subjective perceptions in the context of the Australian online palliative care environment and online health information systems, respectively. The Q Methodology research (see Chapters 4, 5 and 6) technique was applied in this research as a systematic way of exploring and interpreting the subjective views of participants. The analysed data illustrate that my online study
revealed something important about Internet technology. It shows and proves that Internet technology can be used as a powerful mediated tool that can facilitate communication and act as a social connection channel to connect people at any time and any place and allow networking and virtual communities; provide rigorous information on health-related and other specific issues, and, also offer and supply health-related services. Therefore, the findings from the Q Methodology studies helped me address the first research question on how people as users of Web-based information systems perceive the dynamic media of health online.

The first Q study of Phase 2, which was conducted in the year 2008, identified different users of the online palliative care by exploring their subjective perceptions. As presented in Chapter 5 (Section 5.4), the findings revealed four significant groups: ‘Interactive’, ‘Superficial’, ‘Traditional Medical’, and, ‘Service’ Users. These were further analysed in Chapter 6 (Section 6.3). This analysis highlighted that Internet users can be differentiated by their needs and intentions. The ‘interactive’ group is differentiated primarily by their communication and interaction needs as well as their desire for simplicity and clarity of features. Whilst a ‘Superficial’ group was concerned primarily with the presentation and look of the site rather than its contents, the ‘Traditional’ group recognized the importance of the content and its usefulness to this group as decision makers, i.e. healthcare workers. The ‘Service’ users acknowledged the importance of providing palliative care information related to services.

The final Phase of the Q study, which was conducted in 2009, also aimed to capture the perceptions of diverse users, including healthcare workers, towards online health, as this is a global phenomenon. As discussed in Chapter 5 (Section 5.5), the findings revealed more dynamic and advanced attributes of users. The first distinctive users were the ‘Service-Oriented’ ones who acknowledged the importance of online health as a potential way to extend the healthcare system and meet the information needs of its end-users by providing an open 24/7 access to the public and cutting out the intermediary. For this reason, this group were interested more in user friendly features of this media. In addition, these users were also enthused by the potential
online health environment, which may result in significantly improving not only the relationship between physicians and patients, but also the communication among healthcare providers. Another group that emerged from this phase was an ‘Interactive’ group primarily concerned with accessing not only quantity of health information, but also quality of information that could empower the public and result in better decision-makers. This group supported the notion of the ‘knowledgeable patient’ and the importance of medical-based community of practices. Consequently, this may significantly reduce the issue of medical errors and hence improve the quality of the healthcare system. Another major prevalent characteristic among this group is the emphasis on collaboration with other users of the system and sharing of health information. As this group was primarily composed of international students and academics, the language option is one of the main concerns. Interestingly, this group was composed of not only internal students and academics, but also some real practitioners in the healthcare field. Therefore, the desire to improve the mutual collaboration and communication among healthcare providers was an essential aspect among this group to acquire sufficient information and possess sufficient level of skill and expertise has become one of the biggest challenges for the knowledge-based economy.

The third group that emerged from this phase is the ‘Health Information seeker’ group consists of only educated individuals who emphasised more the use of simple health information through the usage of non-technical language and readable formats. This group also are more likely to find it easy to seek other people with the same personal experiences. The quality of health informatics and locating health information are the focus of this group activity. The finding stressed the importance of the ‘one-stop-and-shop’, which targets all variety of users to reduce anxiety and facilitate a decision-making process among users. This group also acknowledged the importance of the availability of online health in saving time and effort in retrieving health informatics than paper-based sources, avoid users’ exhaustion, and hence, reducing the costs of the healthcare sector and improving the quality of healthcare.
8.2.2 Research Question 2:

*What is the level of interactivity features of health websites that are utilizing the interactive capacity of the online health Web-based systems?*

To answer this question, Phase 3 of the research was set out to include content analysis of the health website and was conducted in 2009 (see the results in Chapter 6: Section 6.4). This Phase was an exploratory investigation into the extent to which interactive features of Internet technology have been integrated into the practice of Web-based information systems related to the online health context. More specifically, through the use of content analysis, my research explored and analysed the nature and levels of interactivity in online health as well as the online palliative care environment worldwide with the aim of determining to what extent and in what ways the interactive quality of the Internet is incorporated into these types of websites. As described in Chapter 5 and Chapter 6, the findings showed that among the three types of information producers, government, non-profit and commercial, only government organizations, especially the USA ones, scored relatively highly in terms of complexity of choice and monitoring information and management measures in both the palliative care and general health contexts. They scored relatively low on the interpersonal communication dimensions. This suggests that government websites utilize the traditional model of one-way communication that allows for a great deal of information flow from the experts to the public, but very little communication and interaction between the public on the one side, and, government healthcare experts on the other side, confirming the findings of Grunig and Grunig (1989). Whilst non-profit websites are enriched with content availability and choices, responsiveness, management of information, ease of adding information and facilitation of communication, only one commercial site was found to utilize communication and interactive measures. In other words, government and non profit organizations are more likely to utilize the interactive capacity of the medium, while commercial or made for profit sites are less likely to use the interactive capacity of the Internet. This is so because the main objective of government or non profit organizations is to help consumers improve their wellbeing rather than making profits. This interesting finding is in line with McMillan (2009).
As discussed in Chapter 6 (Section 6.4), Heeter’s (1998) dimensions of content availability and choices, users’ knowledge and effort, and, responsiveness of the system were found to be the most popular interactivity attributes of online palliative care and health websites. Generally, health websites were found to be more enriched with interactive features than palliative care websites. I found that dimensions of interactivity related to customization and management of information and ease of adding information were less prevalent and less active among health and palliative care websites worldwide than other prescribed aspects of Heeter’s interactivity dimensions.

To sum up, in terms of content analysis of websites in health organizations, this study attempted to measure the degree of interactivity of a website by counting the presence of the interactive features and tools. This qualitative descriptive method of content analysis is appropriate for measuring the potential of interactivity a website can offer. As discussed in Chapter 6 (Section 6.4), the findings of this study revealed low levels of interactivity identified among the selected sample of online palliative care websites worldwide. This suggests that online palliative care, as it is a new and contemporary field, is not yet as interactive as it should be. The findings also revealed that non-profit and government organizations are more flexible and more motivated to build up community through interactive devices by offering more options for interactive communication to attract user’s attentions of online palliative care. On the other hand, as opposed to palliative care websites, a moderate level of interactivity is identified among the selected sample of health websites worldwide, especially among commercial websites. It is interesting to note that the analysed sample consisted of the list of the most visited health websites. The result also suggests that commercial health websites have more utilising capacity and technological potential of the Web in a way to provide more interactive tools to the people or users of the Web than any other types of websites. This discovery does not confirm with the suggestions and the findings of McMillan (2009), in terms of the apparent relationship between the government and non-profit organization and the level of interactivity in organizational websites. This result highlighted the fact that
consumers of the Internet are no longer passive recipients of online health communication, and thus, it is important to listen and pay close attention to audiences in order to satisfy their needs, and, this is basically a ‘consumer-oriented’ approach.

8.2.3 Research Question 3:

*How are the findings of this research being applied theoretically using the framework of Activity Theory to develop a holistic, contextual and dynamic tool and, providing an understanding of the problem?*

To answer this research question, Chapter 7 illustrated the theoretical application of Activity Theory framework along with its principles to this research study. This study illustrated the power of using activity as a unit of analysis. Activities of design and use of IT artefacts has been the object of study in HCI and IS. In my research, the basic activity model is expanded to include two minimally interacting activity systems. The design activity (see Chapter 7: Section 7.3.8) is constrained by the computer in various ways, through the actual, available materials as much as through the past experiences of the designers and users (Bødker et al. 1987). In order to make a better design and ultimately to create better Health IT-based artifacts, designers must have primary data about real activities that various users’ engage in rather than relying solely on their own prior knowledge and experience, and, the system functions to define user’s tasks. The health IS can be viewed not only as the outcome of technical design activity, but as a tool for the use activity. The use of participatory design methods is essential because end-users are invited to participate in the development of the health IS system, which is currently widespread in the healthcare sector (Pilemalm & Timpka 2008).

As illustrated in Figure 7.12 (Chapter 7, Section 7.3.2), I began my investigation of health-related information systems with a perception that there was one general activity of users. As a result of the Q-methodology data collection and analysis, I identified three different activities of use and there may now be more. I then applied
the Activity Theory framework to deepen the understanding of these diverse online health users’ activities. This is illustrated in Figure 7.16 (Chapter 7, Section 7.3.8), which is the culmination of my research, giving a holistic view of systems of activities based primarily on three different factors extracted from the Q study in Phase 4 of this research (Service-Oriented, Interactive Users, and Health Information Seekers) together with my research activities and their impact on the future design activity of an online health system.

### 8.3 Theoretical Implications of the Research

This research is theoretically and methodologically significant to the field of Human Computer Interactions (HCI), Information System (IS), and, other media studies that are associated with the Internet role in disseminating information and users’ perceptions regarding technology. Theoretical concepts of interactivity and Activity Theory and Q Methodology and usability testing methods were applied in my study to give a better and richer understanding of the complex and the dynamic phenomena of the online health context.

As explained in Chapter 7, Activity Theory was applied to this research as a holistic and comprehensive conceptual framework to facilitate the descriptive analysis of this investigation and increase the understanding of the relationships in terms of objects, subject, and the use of tools. This research proposed that ‘activity’ should also be considered as a suitable unit of analysis for theory in IS since the purpose of any information systems is to facilitate activities of use. To support this proposition, this research described tenets of Activity Theory and how they can be used to underpin IS research. My study illustrated these with the interpretation, through the application of Activity Theory, of a study of health information systems development that aimed to identify and meet the needs of various users’ activities.

Activity Theory has inspired a number of theoretical researches on information systems (IS) studies and specifically the development of information systems, e.g., Bertelsen 2000; Bødker 1991; Bødker 1997; Bødker & Petersen 2000; Hasan 1998; Kuutti 1991; Nardi 1996. There is a claim for activity as an appropriate unit of
analysis in the use of existing theory in IS research and when building new theory for IS. In the field of IS, researchers regularly use existing theories from more established disciplines to interpret or make sense of their data. They also adapt or combine these theories to create new theoretical frameworks in order to make them more appropriate to the particular requirements of IS research. In addition, IS researchers also build upon new theories of various types (Gregor 2006) from their research findings.

The way theory is used, adapted or created usually assumes a certain unit of analysis, which could be the artefact, the system, the organisation, the user, the developer, the team or something else. This does not suggest there is anything wrong with having theories that are built around these different units of analysis. Indeed it is believed that it is appropriate for a multidisciplinary field such as IS to have multiple theories addressing a range of units of analysis. ‘Activity’ is proposed here and should be considered as one of the suitable units of analysis for theory in IS since the purpose of any information systems is to facilitate activities of use. To explicate this proposition, this study draws on the tenets of Activity Theory, an established and respected theory of human activity that has been around for nearly a century, i.e. long before the advent of computers. The foundational work of Activity Theory was published in Russian at the time and only translated into English many decades later (Vygotsky 1978; Leontiev 1981). As with any theory, it has its own concepts and language, with English words (particularly: subject, object, action, activity), only approximations of their Russian counterparts.

The applied framework of Activity Theory proved useful in describing a multifaceted Web-based information system, its users’ activities and their unmet needs. The proposition that activity is considered as the unit of analysis; IS research and practice can be described in a systematic way, which holistically represents purpose, dynamic context, mediation by tools, contractions within and between activities as they interconnect.

In the context of my study, the concept of interactivity from Heeter (1989) was applied using the specific dimensions to explore the dynamic nature (not static) and
the layout of online health. Therefore, my study significantly added values to understanding of the evolving and interactive environment of the Web and hence fills a gap in the literature, because there is very limited research in this area (Adam & Deans 1999; Palmer & Griffith 1998; Sheehan & Doherty 2001). Interactivity becomes a standard dimension to measure performance of the Web and its design (Chen & Yen 2004; Retzinger 2009). Moreover, the interactivity concept can be seen as a continuum, which is measured by Heeter’s six dimensions in this study. This concept measures how interaction works in a specific purpose and context (Retzinger 2009).

In this study, usability testing using a scenario approach was applied, as discussed in Chapters 3, 4 and 5, to develop a flexible and practical user-centred method that assesses the usability and usefulness of the systems as it is an important tool in human-computer interaction studies to collect data from the end-users that can result in more effective decisions to develop and improve Web-based information services.

This study, by adopting the Q Methodology approach to explore users’ perceptions, also explicitly supports the significant contribution to this research in which the subjectivity of participants’ views is examined, rather than more rigid methodologies that only explores items or statements. Q Methodology is a feasible and effective research method for turning subjectivity into objective outcomes due to its hybrid qualitative and quantitative techniques embedded within it. The use of Q Methodology as a discovery mediating tool for this research allows me as a researcher to view various subjective views, because its uses place the participants at the centre of analysis and enables me to explore ways to engage and motivate people.

The combination of Activity Theory and Q Methodology has proven to be an appropriate technique for conducting IS research and interpreting its results in an integrated and holistic approach. The distinct factors that come out of the Q study were invariably related to specific activities of the people on those factors, who hold similar views on a topic. This combination has also enabled me to examine these activities of users by applying the rich concepts of Activity Theory. This has contributed to enhance the overall understanding of users’ perceptions and the
purposes of their different activities of use in terms of online health. Indeed, this leads to the more general observation that humans use diverse information systems on a daily basis to achieve their personal and/or work objectives, with an expectation that these information systems will facilitate the activities in which they are engaged, as they perceive them. Therefore, the activities represent a basic element of the context in which systems must exist and operate. Indeed, I contend that attempting to understand information systems is meaningless without also attempting to understand the activities in which they are involved; information systems only become meaningful in the context of use. In order to successfully undertake the design activity, the use activity must be taken into account.

8.3.1 Practical Implications of the Research

In addition to the health consumers (the patient’s side and doctor’s side, as demonstrated in Chapter 2: Section 2.4, Figure 2.1), the findings reported in my thesis have practical implications for online health industries, health-related information producers, i.e. government, health organizations and Web designers. These segments of the economy need to reassess the opportunity by taking full advantage of the Web potential as a channel for disseminating information and communication to online health consumers and providing other functionalities to users.

While innovations in the healthcare sector are extremely needed to overcome the rise of healthcare expenses without compromising quality, equity and access, one emerging approach is to make greater use of information and communication technologies (ICT) in the delivery of health services. Since the use of ICT is relatively new in healthcare industries, the present study provided an understanding of its impact on the healthcare sector. Another effective approach is the acknowledgment of changing population profiles and the recognition of the diversifying population that may play a role in understanding consumers’ health needs in the area of healthcare. The implication of my research may help practitioners in healthcare organizations understand the relationships between users...
of the system and their activities. Therefore, for future purposes, health industries need to carefully meet the challenges resulting from the evolving nature of the Web and changing demands and activities of the health users. To meet this purpose, health industries and organizations must be well-equipped with specialised skill sets, resources and knowledge to promote and facilitate communication and interactions between various users and stakeholders in online health.

Another practical contribution of my research is the importance of online health as a source of information and communication for various stakeholders, as it plays a significant role in improving the relationship between healthcare providers and their clients. The intended outcome of the research is to enhance the development of online health.

This research identifies and recognizes the potential benefits of online health tools for all segments of society. To achieve the maximum public benefits, it may require decision makers (government) not only to shift their thinking and strategies, but also reliable management is needed to harmonize policy and decision-making for the public benefit. In other words, decision makers need to make public benefits a top priority when making decisions. Disparities in access to health information, healthcare and technology make it hard for diverse consumers’ efforts to achieve desired public health goals. Consistent with other government initiatives, public sector engagement is crucial to harness current consumer trends and align the multiple interests of stakeholders. The suggested crucial technique sets for online health consumers is to use public interests to create and sustain a diverse user-centric strategy that results in online health tools being available on a much wider scale than is currently being offered.

The online health industry must be structured in a way that meets the needs of different and all end users in terms of its friendly features for those with low health literacy and/or culture needs. To successfully develop online health with ‘Web 2.0’ features, it is critical to recognize the importance needs of diverse individuals brought to the table, because this system is not just a package of technological or system tools. The online health system is one of the most important keys to
meaningfully addressing issues in the healthcare sector, including sky-scraping expenditures, poor disease management and prevention, and, reduced quality of life and public health.

8.4 Limitations

Whilst this research has benefited greatly from the combination of theories, concepts and methods used, namely, Activity Theory, interactivity, Web content analysis, usability and Q Methodology, there are, however, several limitations of this research, as follows:

First, the task of managing huge data collection using the Web-based content analysis method from cross-sectional online health and palliative care websites worldwide was very challenging and exhaustive to me as a researcher due to the dynamic nature of technology, because some content, layout and functionality of health websites continued to change whilst data was collected during the same period of my study.

Second, as discussed in Chapter 4 (Section 4.8.2), the task of drawing a meaningful sample of online health and online palliative care is surrounded with difficulties because of the lack of standards and guidelines. The method of selecting a sample is left to the subjectivity and creativity of the researcher to decide by establishing a reliable list. The researcher faced enormous obstacles in the sampling process, as it consumed considerable time and effort to obtain enough information and to draw an overall description and understanding of health websites.

Third, the dynamic and evolving nature of the Internet has created a challenge regarding the measurement of the interactivity concept for such a medium. In this regard, interactivity becomes a very complex issue as it not only involves multi-perspectives with people interactions within the system and its content, but also constantly changes this phenomenon. While some of the advanced features of online health Web-based information systems appeared, some have been altered. Therefore,
it becomes difficult to have one solid fixed measurement to accurately measure the interactivity of websites features over a period of time.

Finally, the increased desire to improve the mutual collaboration and communication among healthcare providers and enable them to acquire sufficient information and possess a high degree of skill and expertise has become one of the biggest challenges for the knowledge-based economy. Improving the knowledge intensive health setting by enhancing knowledge works among practitioners in the medical field is essential for the success of the emerging health ICTs. In practice, improvement of knowledge work through assisting practitioners to conduct their activities and facilitate the collaboration may increase the overall quality and lower the cost of healthcare. Since the purpose of the ICTs is to facilitate work activities, it becomes necessary to investigate how Activity Theory can be applied. The main reason for the use of Activity Theory in ICT research is to analyse the complex dynamic settings like healthcare that typically involve interaction between human (subject) and technical elements (objects) (Hasan & Crawford 2006), and, this may leave room for further research.

Despite these limitations, the present study provides valuable insights into the study of the online health’s dynamic and complex environment. My research also acknowledges that limitations of this study have led to suggestions for further research.

8.5 Opportunity for Future Research

The present study used a Web content analysis method of palliative care as well as online health sites as a representative of the content and features. Further work has been suggested and is warranted to examine the user’s interactivity behaviour and the perceptions of interactivity occurring between and among various online users employing more extensive survey or experimental techniques.

The examined subjectivity of healthcare practitioners has been explored in this study, as discussed in Chapter 6 (Section 6.6). More specifically, “Interactive Users’ are
more likely to believe that interactive technologies make more work for healthcare workers, because one would expect that online health tools should minimize their work loads and save time, which is the common found views among factors ‘Service-Oriented’ users and ‘Information Seekers’. This significant finding is essential to investigate and further explore the perceptions of practitioners on this issue.

Although online health tools are embedded in a broad shift toward a digital culture, healthcare as a sector has been slow to adapt a user-centric strategy of the Internet that cuts across socioeconomic lines. The present study recommends further research that aims to explore the significance of cultural influences on interactive health communication for diverse population groups.

In this study, the application of Q Methodology aimed to explore the multiple stakeholders and multiple types of users of online health. The results may enable healthcare organizations and practitioners to use the full range of online health tools available to engage and support diverse consumers in their own health management. The outcomes of Q Methodology on different types of users re-interpreted them as user activities using the framework of Activity Theory. However, due to the dynamic evolving nature of the Internet, these users may not be the only user types that must be considered for system design purposes. One direction for future research should be expanded to continue to include other types of future potential users.

Within the framework of Activity Theory, tools are what people think they are and this can vary depending on experiences, culture and purpose. In this study, I tend to interpret what people intend to do with the technical system. Over time, there appeared to be changes in perceived function not only on different types of tools, i.e. primary, secondary, and tertiary being utilised, but also in terms of the object of activity of online health sites. Therefore, continuous future work is still needed to improve ways that Activity Theory can be effectively utilised as a robust method for Web-research.
8.6 Achievement of the Research Objectives

In summary, this concluding chapter of the thesis reflects on the findings of the following research objectives, as stated in Chapter 1. These objectives were to:

- To evaluate the usability of online health websites using a scenario-based evaluation method. This main objective was achieved by conducting usability tests of a palliative care website using the ATUL scenario-based approach (Phase 1 of this research). By doing so, the expectations and impressions of the Web-based information system was uncovered here. The achievement of this research objective has given me the impression that there might be a great deal of diversity among user’s points of view and, has led to the subsequent use of Q Methodology (Phases 2 and 4) to identify different groups of online health users and their perceptions and needs.

- To explore the content and the features of online health websites as well as online palliative care websites worldwide, especially in developed countries, e.g., Australia, UK, USA, etc. This objective was achieved by using the content analysis approach (Phase 3) to investigate the nature of the content and the layout of online health as well as online palliative care websites globally. The findings revealed that governmental health and palliative websites worldwide were the main producer of great sources of information and services more than any other types of organizations. The achievement of this research objective led to building an understanding of the current reality and situation of websites in the healthcare context.

- To identify and analyse the dimensions of interactivity that influence online health and online palliative care. To achieve this objective, Heeter’s (1989) dimensions were used to categorize and measure the degree of interactivity of health and palliative care websites (Phase 3). It was found that health websites worldwide, particularly commercial websites were more interactive than online palliative care websites. This research objective assesses the current interactivity level and degrees among websites in the healthcare context.
To investigate, evaluate and analyse users’ perceptions and their perceived information and interaction needs that are currently being accommodated or envisaged within public Web-based Information Systems in a dynamic environment, i.e. healthcare. This was achieved through the use of a Q Methodology research technique, which was applied into two separate Phases (2 and 4). While Q study in Phase 2 explored perceptions of users in online palliative care, the Q study in Phase 4 explore diverse users’ perceptions (including healthcare workers) towards online health websites. The results revealed a great deal of users’ views and needs towards Web-based information systems.

To gauge and interpret perceptions and activities of online health using the holistic and dynamic Theory of Activity. This research objective was achieved through the applications of the Activity Theory framework of distinct views of users resulting from the Q Methodology, in order to explain users’ perceptions of online health, using ‘activity’ as the unit of analysis. The emphasis was given to the importance of understanding user activities in relation to online health, not just their interaction with the system, and, building knowledge about the diversity of users’ activities, particularly in the complex dynamic area of healthcare in order to assess the evolving usefulness of the system and the appropriateness of its design besides the continuous changing user needs and requirements in rapidly changing environmental context.

8.7 Chapter Summary
The present chapter has reviewed the major key findings of this study related to three significant research questions, as explained throughout my thesis. The emphasis has been geared towards users’ perceptions and their uses of online health and the content and the features of the Web that have an impact on people’s perceptions as users of the systems. In this regard, when analysing interactivity dimensions of the
online health context, it is also important to align users’ perceptions and views towards the complex dynamic online health phenomena.

In this study, the choice of a theoretical framework, interactivity theory and Activity Theory, and, the methodology have been also addressed. Recommendations for future research regarding interactivity concept, Activity Theory and Q Methodology were also proposed to give holistic interpretations and richer meaning to the complex and dynamic online health environment. This chapter also provides evidence of the theoretical and practical contributions of my research.
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APPENDIX 1: USABILITY TEST PRE-QUESTION

Activity Theory Usability Laboratory (ATUL)

Name:  
Date:  
Pre-test Questionnaire-Test #  Scenario #

**Personal Information:** the following questions ask for your background and this will be used for statistical purposes only. Please answer each question by ticking ☑ in front of the appropriate box. This information is anonymous and will be kept strictly confidential.

What is your age?  Your highest level of education is:
- ☐ Under 25 years  - ☐ higher school certificate
- ☐ 25-45 year’s  - ☐ University Bachelor degree
- ☐ Over 45  - ☐ Postgraduate degree

How would you describe your computer literacy?  Your gender:  ☐ Female  ☐ Male
- ☐ Poor  ☐ fair-good  ☐ Expert

Your first language:
- ☐ English  -
- ☐ Other language

Do you ever research for medical information for patients in palliative medical conditions?
- ☐ Yes  -
- ☐ No
APPENDIX 2: USABILITY TEST SCENARIO1- CARESEARCH

Maree is a nurse who has been working with cancer patients in Palliative Care in a Sydney hospital close to where she lives. She would like to extend her skills and knowledge in this area but, due to family commitments, is not able to travel interstate or overseas. Consult the care-search web-site on her behalf and answer the following:

Questions:

**Question 1:** Are there any courses promoted on the website that would suit her?

**Question 2:** Which conference promoted on the website would be suitable her to attend?

**Question 3:** Is there any information on service specific for cancer patients?

**Question 4:** Is there any other information on the site that would interest her?
APPENDIX 2.2: USABILITY TEST SCENARIO 2- CARESEARCH

Jane is a 64 year-old Sydney woman who has been diagnosed with 4th stage Breast cancer. Her only close relative, a son, lives and works inter-state and cannot give her much support.

While she was really shocked after the initial diagnose, she has always been a strong independent person who as a teacher always loved her work, her school and her students. But now after the surgery and the chemotherapy her long term prognosis is not good and she feels extremely sick and anxious.

Currently she requires assistance with her activities of daily living and for her medical needs. She realises that her ability to function is decreasing and she need someone to really listen to her hopes and fears.

She has decided to look for a professional palliative care service that can provide the medical care she needs at her home and encourage her to cope with this new phase of her life.

Questions:

Question 1: What can you find out about suitable palliative care within NSW?

Question 2: What can you find out about local or online groups to provide social support?

Question 3: What information is there about symptoms management?
Jamie’s father is 70 years old; he was diagnosed at the age of 65 with Alzheimer’s disease.

Jamie’s mother had always taken full care of him because Jamie is a full time worker and has 3 children. But now his mother is getting too old to cope.

Both parents now seem to be filled with tension, anxiety and fear and are not able to deal with important issues. Jamie feels circumstances have changed significantly and would like to take more responsibility but is not really qualified to cope with two Alzheimer patients.

Doctors said they need help from family and community resources to deal with their behavioural problems as their need for the medication. A friend told him that there is state support that provides palliative care. Jamie wants to know about this, to improve his knowledge on how to deal effectively with his parents. See what information would help Jamie in the Families’ section of the Care Search website.

**Questions:**

**Question 1:** Does the website help families to understand this disease and help them professionally?

**Question 2:** Is there a way for Jamie to be trained to be the main caregiver for his parents?

**Question 3:** Is there information to help such families emotionally, physically and medically?

**Question 4:** Is there information to help such families cope with the stress and sadness times of their situation?
Evelyn’s husband Adam is 55 years and was involved in a road traffic accident which has left him suffering from severe brain injury from which there is no chance of recovery.

Evelyn is now responsible for the family which consists of five children (three of which are school age). The cost of Adam’s medication alone is just slightly less than his social security income. With him to look after at their Wollongong home she cannot work.

They really needs financial and social support, so Evelyn has decided to look for a live-in palliative care service nearby that the Australian government provides for patients with chronic or advanced illness. See what help you can find for Evelyn on the carer’s section of the Care Search Website.

Questions:

**Question 1:** How can Evelyn get the best palliative care service for her husband within the government palliative service in NSW?

**Question 2:** What is the financial support available to pay for the private palliative care services?

**Question 3:** If there is any support group information on the web-site?

**Question 4:** Can you find more information about the Australian governmental palliative care policy?

**Question 5:** What are procedures if you want to complain about government help for palliative care services?
APPENDIX 2.5: USABILITY TEST SCENARIO 5

Antonio has primary pulmonary hypertension, a rare condition of the blood vessels in his lungs. There are no treatments that can cure his illness, and he needs multiple medicines.

He is admitted to the hospital almost every month because he has hard time breathing. Episodes can be brought on by a mere cold or changes in the weather. During these hospitalizations he receives extra doses of medication, but it takes a few days for him to feel better.

Each time he is hospitalized, the palliative care team works with his heart and lung doctors to treat his breathlessness. The medications they prescribe allow Antonio to feel calm and comfortable.

You are the doctor for this patient. He has recently expressed concern over medications he is taking, and he would like to explore alternative medicine.

Questions:

Question 1: What information is there available on the Caresearch website about alternative or complementary medicine?

Question 2: Name several databases you could refer to for obtaining such information.
APPENDIX 2.6: USABILITY TEST SCENARIO 6- CARESEARCH

You have just graduated from the University of Wollongong with a degree in Medicine. Recently you have begun work in a NSW palliative care unit and find that you need more specific skills in some aspects of palliative care.

Questions:
Question 1: What sort of further training could you undertake?
Question 2: If you wanted to specialise in a specific area of palliative care what kind of certifications are available?
APPENDIX 3: USABILITY TEST POST QUESTIONS (POST-TEST QUESTIONNAIRE)

Please answer each question about CareSearch Web site to indicate your opinion:

1. What is your overall impression to current web site?
2. Is there anything that you feel is missing on this site?
3. Do you agree that web is important and useful?
4. How the current web site affect your understanding about what is the Palliative care
5. What did you like best about the site?
6. What did you like least about the site?
7. Do you think that this site is linked to by other useful and credible sites?
8. Does this web site offer information about support groups or offer virtual or chat support groups?
9. Does this web site allow for interaction and communicate with the provider of the site, with professional, or with other visitors?
10. Is there a section on this web site that is devoted to new information regarding Palliative care services?
11. What are your suggestions to improve the contents of the web?
12. If you were the website developer, what would be the important things you would do to improve the website?
13. Do you have any other final comments or questions about this current web site?
14. The homepage is attractive?
15. The site has a good balance of graphics versus text?
16. Can you get to the information quickly?
17. Is the language used understandable and if there a glossary (medical terms)?
18. Is there a Frequently Asked Questions (FAQs) section?
### APPENDIX 4: PHASE 2-Q SORT STATEMENTS AND CATEGORIES

<table>
<thead>
<tr>
<th>Item No</th>
<th>Statement</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Choose a more appropriate name for the website (i.e. Palliative care of New South Wales instead of Care search).</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>2</td>
<td>Make the layout simple, clear, and attractive.</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>3</td>
<td>The language used is easy to understand (i.e. medical terms simplified to layman’s terms and if not there is a glossary).</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>4</td>
<td>Provide discussion forums, chat windows and interactive tools.</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>5</td>
<td>The site should contain unbiased information.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>6</td>
<td>The user can easily find the link to the home page.</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>7</td>
<td>The website offers information that is helpful to me.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>8</td>
<td>The website design should be pleasant, attractive, and visually appealing.</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>9</td>
<td>The site should contain various levels of information delivery (i.e. text, graphics, voice recognition, discussion boards, online chat forums, online health tests, patients tool…etc.)</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>10</td>
<td>The home page in the main menu should be located at the top rather than the bottom.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>11</td>
<td>External links to other medical journals.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>12</td>
<td>The site should cover more information and a wide variety of topics.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>13</td>
<td>There is a statement about how information is evaluated or someone named as responsible for overview of all content.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>14</td>
<td>The site is fully open to public scrutiny and evaluation (i.e. no registration, logins, passwords, or closed section requiring fees to access additional feature and information).</td>
<td>Customization and Management Information</td>
</tr>
<tr>
<td>15</td>
<td>More work is needed on the arrangements of icons and wordings at the home page is needed to give it a more orderly look</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>16</td>
<td>The organization or content provider should be recognizable to user (i.e. AMA, or national academic or professional institutions).</td>
<td>Customization and Management Information</td>
</tr>
<tr>
<td></td>
<td>The site should contain sections on services for relatives (i.e. emotional counselling, financial services, etc.).</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>18</td>
<td>Access should be provided within information booths in hospitals waiting rooms</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>19</td>
<td>Give language option for non-English speakers</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>20</td>
<td>It should provide links to recent research articles for evidence based medicine.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>21</td>
<td>It should have networks with or links for other regional general practitioners, nurse, and allied healthcare providers.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>22</td>
<td>Provide more links to overcome the intensively information.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>23</td>
<td>The website described intended audience or stated the purpose of the site.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>24</td>
<td>The user can get on-line help from the site (e.g. email the webmaster).</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>25</td>
<td>I believe the information provided on this website is scientifically correct.</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>26</td>
<td>It should provide effective and fast search engine.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>27</td>
<td>There should be a date of when the website was created and a date for the last update.</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>28</td>
<td>The site should contain stories on what it's like to be as a &quot;patient&quot;.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>29</td>
<td>Provide scenarios of different users, i.e. patients, and healthcare providers on how to use the health website</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>30</td>
<td>Job links are needed.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>31</td>
<td>Provide links to student health organizations/universities.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>32</td>
<td>The information is easy to access and does not depend on location.</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>33</td>
<td>Clear and simple language must be used.</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>34</td>
<td>Provide explanations of roles of different specialists so patients/ families know where to go.</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>35</td>
<td>It is possible for patients to email specific doctors if they are concerned about a health issue.</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>36</td>
<td>Internal links should be working</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>37</td>
<td>Option to change font, size, and PDF should be</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
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<tr>
<td><strong>available.</strong></td>
<td><strong>Choice</strong></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>The doctors can find the information useful and can quickly look up guidelines</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>39</td>
<td>I would like to be able to download and print simple fact sheets (printer-friendly).</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>40</td>
<td>Links to updated events should be available.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>41</td>
<td>Fast introduction to the site and purpose of site should be available</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>42</td>
<td>The site should be designed attractively and more attention should be paid in the use of colours</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>43</td>
<td>Avoid the &quot;pop-ups&quot; advertisements.</td>
<td>Effort of Users</td>
</tr>
<tr>
<td>44</td>
<td>A 'contact us 'section should be available.</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>45</td>
<td>An 'ask a healthcare professional' facility should be available for patients.</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>46</td>
<td>It should provide a forum for healthcare workers to post their “opinions”.</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>47</td>
<td>The site should be more colourful and jazzy.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>48</td>
<td>The site should contain stories on what it's like to be as a ‘healthcare worker’.</td>
<td>Content Availability and Choice</td>
</tr>
<tr>
<td>49</td>
<td>There should be a statement about encryption or any security protection used.</td>
<td>Customization and Management of Information</td>
</tr>
<tr>
<td>50</td>
<td>A section of &quot;Frequently and Recently Asked Questions&quot; (FRAQ) should be available.</td>
<td>Easiness of Adding Information</td>
</tr>
</tbody>
</table>
### APPENDIX 5: PHASE 4 Q SORT STATEMENTS AND CATEGORIES

<table>
<thead>
<tr>
<th>Item No</th>
<th>Statement</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I believe that health websites can improve the overall quality of healthcare</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>2</td>
<td>I find Health Websites reliable - I rarely encounter any broken links when I navigate through the website.</td>
<td>User Efforts</td>
</tr>
<tr>
<td>3</td>
<td>I would like to be able to download Audio, Video, and Podcast from health websites</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>4</td>
<td>I prefer immediate (fast) access when I am using a website.</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>5</td>
<td>I would want to be able to get extensive information through links and related links of that specific information</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>6</td>
<td>I dislike too much graphics/visual as it slows down my access to the health website</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>7</td>
<td>I favour health website as my source of getting health information</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>8</td>
<td>I focus on the health information posted, rather than the website design</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>9</td>
<td>I would like to see entertainment features such as online games in health website</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>10</td>
<td>I would want to be able to print the information needed from online health</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>11</td>
<td>I expect Health websites to provide me with useful features such as search engine, help page, and site map.</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>12</td>
<td>I do not believe that health websites improve the delivery of healthcare</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>13</td>
<td>I prefer to use printed sources such as health magazine rather than online health.</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>14</td>
<td>I would like to be involved in online discussions such as chat rooms, forums, and bulletin boards.</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>15</td>
<td>I would want Health websites to offer me a choice of language.</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>16</td>
<td>I believe that I can get the depth of information that I need from health websites</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>17</td>
<td>I feel empowered because I can add and contribute my idea through useful features such</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>Number</td>
<td>Statement</td>
<td>Category</td>
</tr>
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<td>--------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>18</td>
<td>I believe that interactive health features (emails, chat rooms, forums, and bulletin boards) do improve the delivery of health care</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>19</td>
<td>When seeking information I like to start with the Frequently Asked Questions (FAQ).</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>20</td>
<td>I think interactive health features (emails, chat rooms, forums, and bulletin boards) can improve relationships between patients and health care providers</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>21</td>
<td>I would like to be highly involved in online discussions and feel like I am part of the community</td>
<td>Facilitation of Interpersonal Communication</td>
</tr>
<tr>
<td>22</td>
<td>I prefer using the health website rather than printed sources because the design is more pleasant, attractive, and visually appealing.</td>
<td>User Effort</td>
</tr>
<tr>
<td>23</td>
<td>I would like to see a Weblog/Blog in a health website because I can read and add my comments.</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>24</td>
<td>I prefer a health website that is fully open to public scrutiny and evaluation (i.e. no registration, logins, passwords, or closed section requiring fees to access additional feature and information).</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>25</td>
<td>I prefer Websites that offer me customization options (email, text option, language option...etc.) to suit my needs.</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>26</td>
<td>I feel that the language used must be easy to understand (i.e. medical terms simplified to non-technical language and if not, there is a glossary or online medical dictionary)</td>
<td>User Knowledge &amp; Effort</td>
</tr>
<tr>
<td>27</td>
<td>I find it easy to access online health information from home and anywhere else.</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>28</td>
<td>I feel that it is important that the quality of information provided on this website is scientifically correct</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>29</td>
<td>I trust the online health that provides the medical credentials/qualifications of the content providers and developers of the website.</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>30</td>
<td>I would like the opportunity to participate by using facilities such as surveys, polls, and games.</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>31</td>
<td>I would like to be able to share my story on a health website</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td></td>
<td>I would want to see the date when the website was created and the date of the last updated</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>33</td>
<td>I think the public should be able to make online donations to support healthcare and research</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>34</td>
<td>I would like to have anonymous medical features available as well as ask specialist, symptoms checkers, and pill identifier.</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>35</td>
<td>I would like to see practical features such as request an appointment and refill prescriptions</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>36</td>
<td>Website should enable the public to ask more questions so that they are informed and can make better health decisions</td>
<td>Easiness of Adding Information</td>
</tr>
<tr>
<td>37</td>
<td>I would like to see sites that provide personal medical features such as access to my patient health record, online referrals and so on</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>38</td>
<td>Health websites are responsive because of the availability of 'about us' and 'contact us' sections and help options they contain</td>
<td>Responsiveness to Users</td>
</tr>
<tr>
<td>39</td>
<td>I would like health websites because they contain basic information (i.e. definitions, consequences, preventions, and treatments) in simple language</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>40</td>
<td>Health websites can be used to improve the work and communication between healthcare professionals</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>41</td>
<td>Interactive features such as online diagnosis and &quot;ask a doctor&quot; are risky for the user and the professional</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>42</td>
<td>I believe that health websites should provide comprehensive services</td>
<td>Content Availability &amp; Choice</td>
</tr>
<tr>
<td>43</td>
<td>Even with a password, a website cannot be trusted to keep information confidential</td>
<td>Customization &amp; Management of Information</td>
</tr>
<tr>
<td>44</td>
<td>Health websites should target a variety of users (patients, healthcare providers, community…etc.)</td>
<td>Customization &amp; Management of Information</td>
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<tr>
<td>45</td>
<td>Public forums on websites can be abused by malicious contributors and so cannot be used in healthcare</td>
<td>Customization &amp; Management of Information</td>
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<tr>
<td>46</td>
<td>I would like to see variety of topics covered within one single health website (one-stop-</td>
<td>Content Availability &amp; Choice</td>
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<td>47</td>
<td>An interactive website would make more work for healthcare workers</td>
<td>Customization &amp; Management of Information</td>
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<tr>
<td>48</td>
<td>Interactive health websites are time consuming</td>
<td>Customization &amp; Management of Information</td>
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<td>49</td>
<td>The healthcare profession should make more use of the Internet to improve services.</td>
<td>Customization &amp; Management of Information</td>
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<td>50</td>
<td>Fully interactive media can create a situation in which the roles of senders and receivers are interchangeable</td>
<td>Facilitation of Interpersonal Communication</td>
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APPENDIX 6: Q SORTING INSTRUCTIONS

The followings are enclosed:

1. Participant’s Consent Form
2. List of Q statement sample (one page contain 50 statements).
3. Q-Sort Grid Answer Sheet (scale from -5 to +5)

Here are the steps to sort the supplied statements:

1. The statements are about your reactions/perception towards online health that you have explored and experienced. Please read through the list of Q statement sample to develop an understanding and feel for the range of meanings.
2. In the same process, you can begin to divide the statements into three main groups: “agree”, “neutral”, and “disagree”.
3. Then, divide further group into subgroups. For example: in “agree” statements will be spread scale from +1 to +5. Concurrently, this process should also develop subgroup downwards from each scale (+1, +2, +3, +4, and +5).
4. The same process applies for “disagree” group of statements, which will be divide into most “disagree” by placing the statements into each scale.
5. All neutral statements will be spread downwards.
6. Once all has been determined and finalised, place in the statements number into Q-Sort Grid Answer Sheet.

~Thank You~
APPENDIX 7: Q Grid Answer Sheet

Most Disagree

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<tr>
<td>-5</td>
<td>-4</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
<td>0</td>
<td>+1</td>
<td>+2</td>
<td>+3</td>
<td>+4</td>
<td>+5</td>
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(2)   (3)   (4)   (6)   (6)   (6)   (8)

Most Agree

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(2)   (3)   (4)

Name: _________________________________    Gender: **Male / Female**
Age: __________    Email: _________________________
Contact no.: ___________________    Job/Study/Position:
__________________________________________________________________________
__________________________________________________________________________
Please state the reason why you place the two statements in +5 and -5.
__________________________________________________________________________
__________________________________________________________________________
(Your sort and comments will be treated confidentially)