

**A STUDY ON SOCIABILITY ASPECT IN E-HEALTH
COMMUNITY : A CASE ON CANCER COMMUNITY**

by

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**Thesis submitted in partial fulfilment of the requirements
for the Degree of
Master of Science**

FEBRUARY 2011

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ACKNOWLEDGEMENT

First of all, I would like to express my thanks to my supervisor, Dr. Nasriah Zakaria for all her thoughtful guidance and support. She was a good supervisor who helps me to think critically to complete this research. Thanks to Dr. Shahida Sulaiman for being part of my panel. Her guidance and advice had made this research more supportive. My thanks also go to all my research participant for their valuable time and willing to participate for the testing of this research. Besides that, I dedicated this research to my strongest supporter who is my beloved father, Abdullah bin Hassan and my beloved mother, Norma binti Md. Rejab and my family for their encouragement and support during my bad and good times in my Master life. Finally, I wish to acknowledge all my friends for their support throughout my studies. My deep and sincere appreciation goes to Nursakirah Ab. Rahman Muton for spending time for me in throughout the research and Lim Seow Hua, Khor Aik Howe and Siew Han Ping for their final year project prototype. Thank you very much.

KAJIAN MENGENAI ASPEK SOSIAL DALAM JARINGAN KOMUNITI

KESIHATAN:

KAJIAN KES PADA KOMUNITI PESAKIT KANSER

ABSTRAK

Jaringan komuniti kesihatan atas talian merupakan medium komunikasi untuk pesakit memberi sokongan antara satu sama lain kerana kebanyakan pesakit memerlukan sokongan moral dan emosi untuk melawan penyakit. Untuk menjadikan komuniti atas talian ini berjaya mencapai matlamat, aspek sosial harus dititikberatkan selain aspek teknikal semata. Tujuan kajian ini dijalankan adalah untuk menyiasat keperluan sosial pesakit kanser berdasarkan garis panduan oleh Preece (2000) iaitu manusia, tujuan dan polisi pada komuniti pesakit kanser di Pulau Pinang. Kajian awal dilaksanakan menggunakan teknik pemerhatian semasa aktiviti komuniti berlangsung dan teknik temu duga (n=7) untuk mendapatkan keperluan sosial komuniti terbabit. Kajian awal mendapati komuniti terlibat berinteraksi melalui aktiviti. Oleh sebab itu, modul pengurusan aktiviti merupakan modul yang dicadangkan sebagai penyelesaian secara teknikal untuk komuniti tersebut. Modul ini akan ditambah pada web pesakit kanser yang sedia ada. Seterusnya, ujian kebolegunaan (n=15) menggunakan teknik kognitif, pemikiran terbuka dan temu duga dilakukan untuk menilai kebolegunaan modul pengurusan aktiviti kerana tiada cara yang tepat untuk menilai aspek sosial pada jaringan komuniti. Berdasarkan keputusan yang diperoleh, modul pengurusan aktiviti yang dicadangkan boleh menggalakkan penglibatan peserta dalam program yang

dianjurkan sekaligus menggalakkan interaksi sosial di kalangan pesakit dalam jaringan komuniti. Secara keseluruhan, kajian ini dilakukan pada komuniti pesakit kanser sebenar untuk menyiasat keperluan sosial pada sebuah komuniti menggunakan garis panduan oleh Preece (2000) dan mencadangkan penyelesaian secara teknikal untuk memenuhi keperluan sosial tersebut pada jaringan komuniti kesihatan.

A STUDY ON SOCIABILITY ASPECT IN E-HEALTH COMMUNITY :

A CASE ON CANCER COMMUNITY

ABSTRACT

An e-health community serves as a medium for patients and survivors to support each other and hence improving their life. Patients need more emotional support to help them cope with their diseases. So, technical accuracy alone is not enough to make an e-health community successful. Developers must also focus on the social aspects in designing an e-health community to suit the community's social needs. The purpose of this research is to investigate cancer community's sociability needs using Preece (2000) sociability guideline which is "people, purpose and policy" in a specific real life active cancer support community in Penang. A preliminary study was conducted by an observation on a community's activities and interview techniques (n=7) to gather sociability needs in the community. The preliminary result shows that the community socializes through events/activities. Therefore, event management module is proposed as a technical solution to encourage sociability for this particular community. This module is then embedded in existing cancer web portal prototype. Then, usability testing (n=15) is conducted using cognitive walkthrough, think aloud and interview techniques to evaluate usability of event management module because there is no actual measurement to evaluate sociability in e-health community. The results from the usability testing shows that the event management module developed is easy to use and it is a useful technical solution that can encourage members to participate in community's activities

as well as to increase sociability among members in the particular community. Overall, this research studies a particular existing real life cancer community to investigate the sociability needs using Preece (2000) sociability guideline and proposed a technical solution to suit their sociability needs in e-health community.

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CHAPTER 1

INTRODUCTION

A social network system allows individuals to (1) construct a public or semi public profile within a bounded system, (2) articulate with other users, and (3) view and traverse their list of connections and those made by others within the system (Boyd & Ellison 2007). Social websites such as Facebook, Myspace and others have become a major medium for social interactions (Keenan & Shiri 2009). These websites encourage sociability with features and design which enables a user to socialize with other users (Keenan & Shiri 2009). Online communities are all about social interactions. According to Maloney-Krichmar & Preece (2005) and Preece (2000) whether in social or technology perspective, online communities can be described as activity or people they serve, supported by technology. Besides that, online communities can be the medium for support, entertainment, information, knowledge sharing and a way to interact with millions of people in the world. Thus, online community has to offer something more valuable than just usable technologies to support social interactions.

Online communities in healthcare or e-health community are more active than ever with the support of Web 2.0 technologies. In today's perspective, community can be formed over the Internet, because the Internet represents a medium for social discourse. At the same time, researches in online communities keep growing as there are a lot of social sites that represent certain communities available over the World Wide Web.

In 2006, almost 21,773 cancer cases were diagnosed among Malaysians in Peninsular Malaysia (Omar, Ali, & Tamin 2006). The most frequent cancer during this

period in Malaysia was breast, colorectal, lung, cervix and nasopharynx cancer. As stated by Weiss & Lorenzi (2008), when cancer survivors lack in social interaction and are not exposed to the community programs, it will lead to the risk of lower quality of life and care. In this research, the term e-health community and cancer web portal will be used interchangeably. From healthcare perspective, e-health community can provide comprehensive care for patients, because patients can get information from Internet about their illness, exchange information among other patients and even have discussions with their physician. It can serve as the second alternative for communication other than the face-to-face interaction. However, some cancer patients and survivors are not aware of the availability of these services.

In order to enhance comprehensive care for the cancer survivors, new approaches needed to be proposed, to improve sociability in e-health community and at the same time to avoid social isolation. According to John (1997) "*We write software to meet system requirements, but we must consider how we ensure system acceptance*". An e-health community needs to be designed with sociability features to encourage community members to use the community resource for everyone's benefit. Usually, developers will focus on usability aspects in designing online communities which meets users needs and use (Preece 2004). As stated by Preece (2001) usability can be described as how easy users learn, use and interact with the software or product. Usability is always important but developers should also be concerned with the sociability aspects in designing online communities, because online communities are developed for people. Sociability should be planned in the early phase when designing online communities. According to Preece (2000), developers have much less control over social interactions compared to usability, but planning good sociability features to

support social interaction at the early stage of an online community can lead to a strong and positive impact on how it develops. Software developers are able to control usability by ensuring that the system is easy to use. However, sociability could not be controlled, but could be influenced (Martins 2006). Consequently, Demiris (2005) have addressed sociability and usability aspects as one of the technical challenges in healthcare online communities. E-health communities should be designed with features that support communities' social needs.

This research will investigate cancer patients' sociability needs in one of the most real life active cancer support community in Penang, Malaysia. It is a non-profit organization for cancer support community which consist of cancer patients and survivors and non-patient members as volunteers. The real life cancer community have almost 100 members registered but only 30 members are active. Sociability component applied in this research are purpose, people and policy by Preece (2000) which have been widely used as a sociability guideline. A preliminary study was conducted to study a particular cancer community's social interaction. There are two techniques used in preliminary study which are observation and interview. These techniques are used in order to study the community's social interaction in an activity and gather their sociability needs. The preliminary study shows that the reason cancer patients and survivors join the community is to get more friends, sharing experience, exchange information and motivating each other to increase their quality of life. The community has their regular events or activities to gather members so that the social interaction among members can be increase. The preliminary study result shows that members in the community socialize through events.

In this research, a technical solution was proposed to suit community's sociability needs in e-health community. Therefore, event management module is proposed as a technical solution to encourage sociability in e-health community for the particular cancer community. The event management module was embedded in the existing cancer web portal prototype. The existing cancer web portal prototype or also known as "Mykanser Portal" is a space for cancer patients to build an online community as a support mechanism developed by undergraduate students, Lim, Khor and Siew on 2008. The cancer web portal build in accordance with the Web 2.0 requirements and among of first of its kind in Malaysia. The event management module consist of features which allow community members to be aware with the upcoming activities/events and inform member's participations to alert other members with the community's activities. Keeping aware of the community's activities and let others who cannot attend physically in activities on that time to know what others are doing are one of the important aspects of collaboration and socializing (Sharp et al. 2007).

According to Preece (2001), there are no accurate measurements to measure sociability. Hence, usability testing is a method chosen to evaluate the event management module in cancer web portal prototype. There are three steps to conduct the usability testing which is cognitive walkthrough, think aloud and interview. There are fifteen participants took part in the usability testing from the particular cancer community. Usability testing was conducted to get feedback from users on what they think about the technical solution proposed which is the event management module. The event management module is evaluated using five usability criteria which are easy to use, easy to learn, easy to remember, low error rate and satisfied to use. The results from the usability testing shows that the event management module developed is easy to

use and it is a useful technical solution that can encourage members to participate in the community's activities. When members in the community are alert with the community's activities, it can encourage members to participate in community's activities as well as increase sociability among members in the particular community. Usability testing is useful in this research because it is the essential element of software development process which bridges Human Computer Interaction (HCI) and Computer Science (CS) (Manaris & McCauley 2004).

1.1 Research Problems

With the growth and advance in technology and communication, e-health community needs to become an alternative medium for cancer community to socialize with others to avoid social isolation. Some patients are not aware with the availability of e-health community as an online support group. Technology and features in existing e-health communities did not support communities social needs. Software developers did not concern with sociability aspects at the early stage of designing e-health communities.

1.2 Research Objectives

The objectives of the research are listed in following:

- i. To investigate cancer patients' and survivors' sociability needs in existing real life cancer support community based on sociability guideline by Preece (2000).
- ii. To identify a technical solution to meet sociability needs for a specific cancer community in existing cancer web portal prototype.

1.3 Contributions

The contributions of the research are listed in following:

- i. This research showed sociability guideline by Preece (2000) can be used to identify which factors are important for a specific real life community.
- ii. The result showed that the technical solution developed which is event management module is a useful tool to increase sociability in e-health community.

1.4 Organisation of thesis

The research is divided into 5 chapters. Chapter 2 contains literature reviews which are related to the present study. The literature review begins with the discussion of online communities and cancer patients with e-health communities. It continued by the topics of Human Computer Interaction (HCI) and healthcare. Section fourth in Chapter 2 discusses the sociability features in this research. Then, the next section discusses the usability and relationship between usability and sociability. Chapter 2 ends with the summary about the overall literature review.

Chapter 3 deals with the methodology that has been used in this research. This chapter includes the research procedure and design. The research starts with identifying problems and conduct preliminary study. Next, a prototype is developed and usability study is conducted to evaluate the proposed prototype. The usability testing deals with the steps to run the actual testing such as preparing for usability testing, conducting usability study and analyzing test result. It continued with the preliminary study analysis and result. The back up plan discusses the on how to deal with the accidental situation when conducting usability study. Chapter 3 ends with summary for the whole chapter.

In chapter 4, four major sections are broadly divided: Usability Testing, Cognitive Walkthrough and Think Aloud results, Interview results and summary from the findings. In this chapter, usability testing deals with the process to run the study. The cognitive walkthrough result is the evaluation of ease of learning the registration and event management module. The think aloud result is to obtain participants' verbalizations when using the registration and event management module in cancer web portal prototype. The interview evaluation is to gather the in depth data from participants perspective. Chapter 4 ends with summary for the whole chapter.

Chapter 5 includes the discussion and conclusion of this research. This chapter begins with the discussion of findings in the research. The limitation and future work of this research also discussed in this chapter. This chapter ends with the overall conclusion of the whole research.

CHAPTER 2

LITERATURE REVIEW

2.1 Online Community

Community can be described as a group of people who interact with each other and share the same interest(s) (Conner 2000; Maloney-Krichmar & Preece 2002; Preece 2000). Online communities result from the emergence of social networking software along with the influence of Web 2.0 technologies. Currently, there are various online communities and electronic communication tools that are designed to provide health care services. “The Wellness Community, which provides “cancer support, education and hope” (<http://www.thewellnesscommunity.org/>) is an example of an e-health community that provides emotional support, care and a forum for people in the community to share the same health concerns as the cancer survivors.

Based on the 2009 Annual Internet Survey done by the University of Southern California, in 2007, only 45 percent of the respondents agree with the fact that Internet is a medium to socialize. However, in 2009, the percentage increases to 52 percent. In fact, 15 percent of the respondents who agreed with this statement are members of online community (Villarica & Bailey 2009). This proved the importance and the need of social networking particularly online communities for cancer patients and survivors to sustain their social relationship.

2.1.1 The emergence of online communities

The existence of community can be formed through communication and writing. As stated by Conner (2000). Socrates believed that “*writing would lead to the end of civilization because people didn’t have to be amongst one another anymore*”. The Internet today allows people to form a community in virtual environment, extending communities wider and increasing community’s reach, content and impact on users (Conner 2000). Email was until recently the most popular communication tool developed by ARPANET in 1971. Its popularity continued in the mid late 1980s with the appearance of graphical user interfaces in systems (Preece, Maloney-Krichmar & Abras 2003). Despite point-to-point communication via email, moderated newsgroups were introduced on Usenet in 1984. It provided open areas to discuss topics clustered in hierarchies, like a bulletin board. The most first well-known non-technical online community was established in 1985 (Preece et al. 2003). Ambrozek & Cothrel (2004) summarized a brief history of online communities over 40 years, as seen in Figure 2.1.

| A brief history of online communities, 1968-2004 | |
|--|--|
| 2002-03 | "LINKED" SOCIAL NETWORKING [FRIENDSTER, LINKEDIN, ETC.] "SMART MOBS" |
| 2000-01 | B2B COMMUNITIES [CISCO, SAP, ETC.] CAMERA PHONES GOOGLE GROUPS |
| 1998-99 | "COMMUNITIES OF PRACTICE" BLOGGER "THE CLUETRAIN MANIFESTO" RSS |
| 1996-97 | INTRANETS HOMESTEADERS [GEOCITIES, ETC.] "NET.GAIN" SIXDEGREES.COM |
| 1994-95 | COMMERCE COMMUNITIES [EBAY, AMAZON.COM, ETC.] TEXT MESSAGING |
| 1992-93 | "THE VIRTUAL COMMUNITY" COMMUNITIES ONLINE [BLACKSBURG, ETC.] |
| 1986-91 | LOTUS NOTES INTERNET RELAY CHAT LISTSERV WEB CROSSING |
| 1979-85 | ONLINE SERVICES [COMPUSERVE, PRODIGY, AOL, THE WELL, MINTEL, ETC.] |
| 1978-79 | BBSs USENET NEWSGROUPS MUDs |
| 1973 | FIRST E-MAIL MESSAGE "THE STRENGTH OF WEAK TIES" |
| 1968 | ARPA PAPER PREDICTS EMERGENCE OF VIRTUAL COMMUNITIES |
| KEY: IDEAS TECHNOLOGIES INITIATIVES | |

Figure 2. 1 History of online communities

The World Wide Web (WWW) developed by Tim Berners-Lee was released by European Organization for Nuclear Research (CERN) to replace ARPANET in 1991 (Preece et al. 2003). From this point on, web sites and online communities have been rapidly growing with lots of technological support in media, graphic, and real time communication (Preece et al. 2003). The increasing interest in Internet and the emergence of Web 2.0 terms in 2003 have affected the existence of online communities.

Since 2004, the terms Web 2.0 has replaced Web 1.0 and has been the terms used to describe the current age of the Internet. There are the difference between Web 2.0 and social network concept. According to Graham & Balachander (2008) "*Web 2.0 is both a platform on which innovative technologies have been built and a space where users are treated as first class objects*". One of the major differences between Web 1.0 and Web

2.0 is the existence of social features which is more like real-world social network that support Web 2.0 applications (Graham & Balachander 2008).

2.1.2 E-health community

Vitacca et al. (2009) have stated that e-health is widely defined as electronic tools for health purpose between patients and physicians. An e-health application with valid and up-to-date information supporting with communication technology tools can improve the quality of healthcare services to suit the needs of not only patients, but for the whole human benefits (Vitacca et al. 2009). Before developing an online community, the targeted users are being determined and for whom the community is made for. Besides, it must be concern with the needs of the user. Technology should support user's social needs.

According to Meier et al. (2007), mailing lists can act as a portal for members to discover the external, socioeconomic and structural factors that contribute to their health concern. They can organize such as communities of interest to address social injustice for cancer people. However, as many cancer patients and survivors use the Internet to seek information and emotional support, the features in cancer online community can be improve in the relationships between technical and social aspects by visualization techniques (Maloney-Krichmar & Preece 2005). There are boards at the online community that allow members to see how much activity available on the board and they can participate in answering questions, giving opinions and help increase support for social activity. This technique allows the moderators of the community to evaluate whether it is a balance community from time to time (Maloney-Krichmar & Preece

2005). Social multimedia can also be embedded in the design of e-health so that the information displayed can be in more attractive way (Tian et al. 2010).

Many online support groups have established over the network. In Malaysia, there are some non-profit organization and social society which provide services, support and online information sharing to educate community on cancer disease. Organizations such as National Cancer Society Malaysia (NCS) (<http://www.cancer.org.my/>) and Majlis Kanser National (MAKNA) or National Cancer Council (<http://www.makna.org.my/>) is dedicated to preventing cancer, saving lives from cancer and improving quality of life of those living with cancer through patient care and education programmes. There is also an initiative to provide cancer support online such as *KanPortal* (<http://www.cancereducation.org.my/>) which is conceptually organized to provide online information on cancer. However, these organizations and society website did not allow two way interactions. These sites contain a lot of information and if users want to join the community programmes for example, they need to contact the organizer via email or telephone. These sites did not support social interaction features such as discussion board, chat or any other synchronous features. Figure 2.2, Figure 2.3 and Figure 2.4 show the screenshots for NCS, MAKNA and KanPortal websites accordingly.



Figure 2. 2 : Screen shot for National Cancer Society (NCS)



Figure 2. 3 Screen shot for MAKNA

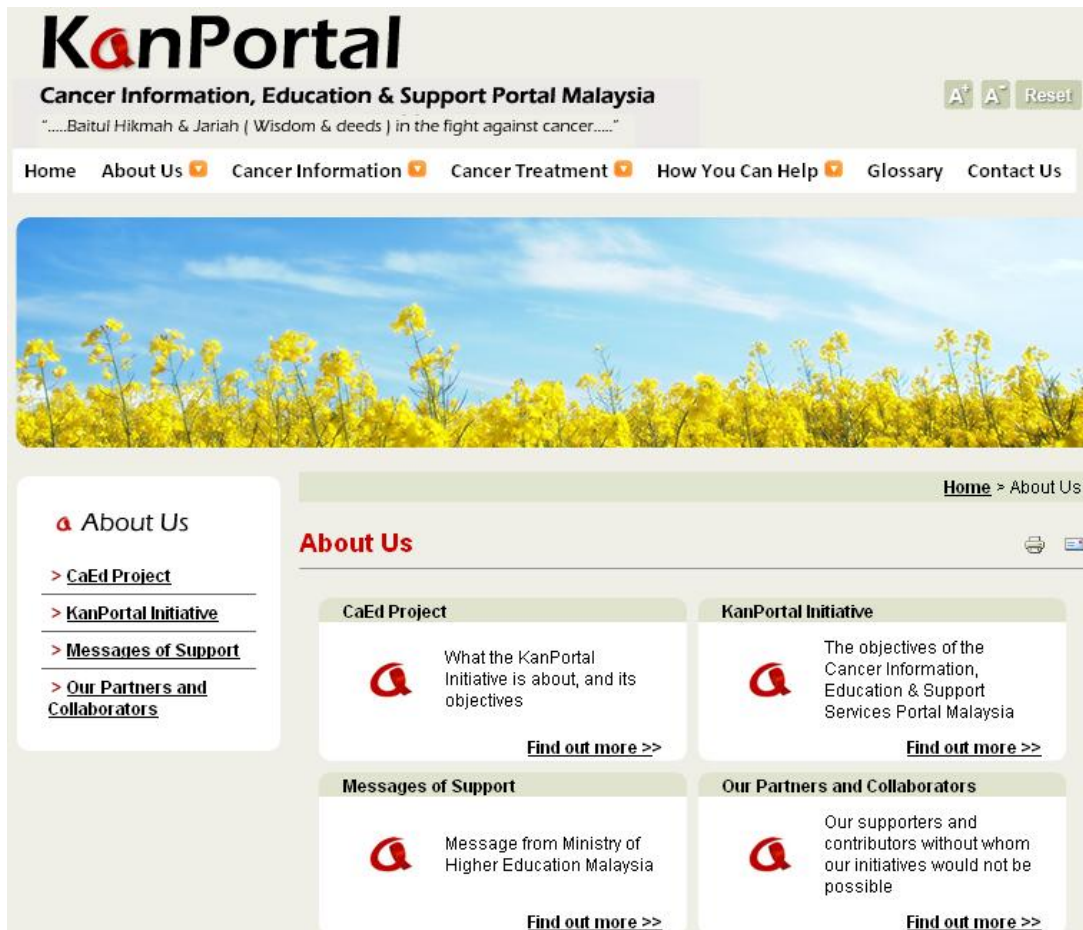


Figure 2. 4 Screen shot for KanPortal

With the age of Web 2.0, e-health communities should support synchronous and asynchronous communication to support online interaction. It is important for people with physical disabilities to socialize through online network for their emotional support. For example, in “mykanser Portal”, users including cancer patients, their friends and family are able to show their own creativity, express their feelings and shared experience to gives support to others. The cancer web portal is accordance with the Web 2.0 requirements and emphasized the social networking aspects. It provides a space for cancer patients and survivors to build an online community within the World Wide Web as a support mechanism. Cancer patients need more emotional support to

survive with the disease so that they will realize they are not alone in their struggles with cancer. According to Weiss & Lorenzi (2008), combination of social networking technologies with real-world collaborative partnership can improve cancer patients' and survivors' awareness towards community programmes and resource available.

2.2 Cancer patients and e-health community

In Malaysia, cancer is the fourth leading cause of death among medically certified deaths (Lim 2002). Nearly 70,000 new cases reported over two-year period recently, with breast cancer as the biggest threat. Cancer is one of the chronic and potentially life threatening illness. Patients who diagnosed to have cancer will have a great shock and often falls into a psychological crisis at the early stage of their illness. Therefore, social support is essential to not only cancer patients but other types of illness for their psychological benefits to reduce the stress that arises from the disease (Ruiter et al. 1993). They will seek for information and treatment methods for cancer, attain emotional support from equally affected person and started to interact with each other to cope with the distressing situation (Besselaar et al. 2005). Cancer patients will have many online peer friends during their early stage of their illness because at this stage, they need more emotional support (Ruiter et al. 1993; Villarica & Bailey 2009). New research findings and update information are available much faster through the Internet. The study to increase cancer patients' quality of life with the aid of technology offered in e-health is the subject of a great deal of research (Besselaar et al. 2005; Mayer et al. 2007; Ruiter et al. 1993; Spiroch et al. 2000; Villarica & Bailey 2009; Weiss & Lorenzi, 2008). Most of the results show positive impact on cancer patients' quality of life when

using e-health and community resources to socialize and seek information online about their illness.

Results from studies of online support groups for cancer patients have proved that the existence of the support group can contribute to greater emotional well-being, reduce stress and depression and can provide group members with anonymous and private space to communicate about personal topics (Alejandro et al. 2008). According to Ruiter et al. (1993) quality of life for cancer patients can be defined as “*the subjective judgement of the good and satisfying nature of life as a whole*”. Cancer patients’ prefer to use Internet to obtain the health information they needed (Alejandro et al. 2008). One of the challenges to provide support and care for cancer community is the e-health community should provide valid and reliable information (Besselaar et al. 2005; Leydon et al. 2000). Research by Mayer et al. (2007) have found out that all cancer survivors choose to seek cancer information from online network as one of their health care provider.

2.3 Human Computer Interaction

According to Carroll (2009), since early 1980s, HCI have been rapidly growing as an area of research and practice integrating many approaches and disciplines particularly in computer science. The style of communication between human and computers started to expand in 1970s when people started to use computers as personal productivity applications around 1980 (Carroll 2009). In the software engineering area, HCI become a challenging domain in 1970s where software development and complexity started to concentrate on nonfunctional requirements such as usability and functionality with other non-linear software testing process (Carroll 2009). The terms

“Human Computer Interaction (HCI)” started to replace “User Interface” terms in 1980s. The HCI definition has expanded not only considering the interface design, but concern with all aspects regarding relationship between users and computers (Preece et al. 1994). Starting from 1980s onwards, HCI seems to become one of the most valuable and demand area which bridge human with technology in various research interests including healthcare area.

2.3.1 HCI design discipline

Preece et al. (1994) have defined HCI according to Association for Computing Machinery (ACM) Special Interest Group on Computer-Human Interaction (SIGCHI) as “*HCI is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them*”. This definition support the statement that HCI is an area which contains of multidisciplinary knowledge and methods. Four major areas contribute to HCI are computer science, cognitive psychology, social and organization psychology and ergonomics and human factors (Preece et al. 1994; Wania et al. 2006). HCI can be viewed as a model which correlates people, activities, technology and the environment (Preece et al., 1994).

Hinze-Hoare (2007) and Preece et al. (1994) has reviewed the history of HCI principle and highlighted five main goals of HCI principles to be expanded:

- i. Safety
- ii. Utility
- iii. Effectiveness

iv. Efficiency

v. Usability

HCI design principles are widely used in many research areas such as in game design. Xinyuan (2009) has applied HCI principle which is “simple, natural, friendly and consistent” proposed by Don Norman to guide the design of the game. The result affecting the game quality, create better communication relationship between players and computers as well as achieving the entertainment value from the games.

2.3.2 HCI challenges

According to Preece et al. (1994), one of the HCI design challenge is to keep technological development concurrent with human social aspects for maximum human benefits. Research by Wania et al. (2006) on how HCI field is constructed by the analysis of HCI authors since 1990-2004 have highlighted seven major topics in HCI: Participatory Design (PD), Computer-Supported Collaborative (or Cooperative) Work (CSCW), User-Centered Design, Cognitive Engineering, Cognitive Theories and Models, Design Theory and Complexity, and Design Rationale. Table 2.1 summarize the seven major topics in HCI.

Table 2. 1: HCI major topics presented by Wania et al. (2006)

| No | HCI topics | Description |
|----|---|--|
| 1. | Participatory design (PD) | Focus on the involvement of users and designers to participate in the system design process. |
| 2. | Computer-Supported Collaborative (or Cooperative) Work (CSCW) | Focus on people to enhancing workplace activities and less attention to the system. |

| | | |
|----|-------------------------------|---|
| 3. | User-Centered Design | Focus on method to create usable system for user. |
| 4. | Cognitive Engineering | Focus on how cognitive properties of people influence people's interaction with element in environment. |
| 5. | Cognitive Theories and Models | Focus on understanding users, how they accomplish tasks and why they think something is usable. |
| 6. | Design Theory and Complexity | Focus on the system design and functions. |
| 7. | Design Rationale | Focus on the reason why the design takes place, communication and problem solving in design. |

Most of the seven diverse viewpoints within HCI focus on users and people interaction with the environment in the system design process. Therefore, in HCI research nowadays, not only technological part should be concern, the study of human behaviour and interaction should be addressed in designing the system.

2.3.3 HCI and healthcare

Advances in health informatics promise to radically change and improve health care. The increasing interest in social networks have made more people inquire about health-related information via virtual environments, seek out advice, exchange experiences and support from online peer networks (Demiris 2005; Preece et al. 2003) . In healthcare area, patients will seek advice and explore solutions to their health problems in the early stage of illness (Villarica & Bailey 2009). Usually, in the early stage of their illness, patients are depressed and shy to share their problems with others.

That is why Internet and online community has become one of the most important medium in searching for information and communication.

The concept of HCI research idea which concerns human and technology aspects can be a challenge in healthcare area as well. There is a need to reduce medical costs and at the same time increase the quality of life by applying both technical and social aspects of Information and Communication Technologies (ICT) (Linnehan 2003). Advances in ICT have made healthcare services can be accessed and reached by millions of users through the World Wide Web. There are a lot of advantages in using the online community as a tool for online health information and support. These include the elimination of time and space constraint, interaction with variety of people from different background over the world and it helps to overcome discomfort face-to-face meeting. According to Tian et al. (2010), the individual's social network are also impacted some factors such as their physical and emotional health and habits.

Furthermore, Vitacca et al. (2009) in the research on how to widen e-health implementation stated that the future of e-health implementation depends on human factors, economics and technology. Service oriented approach needed to be considered rather than product oriented strategy in designing e-health model which put users or patients as a person, the product as a service and the service must be validate by the person (Vitacca et al. 2009). Thus, HCI design principles such as Participatory Design (PD), Computer-Supported Collaborative Work (CSCW) and User-Centered Design can be implemented in designing e-health community. In this research context, HCI design principles are being concerned to develop a useful prototype for cancer patients to increase social interactions in the cancer web portal.

2.4 Sociability

2.4.1 Sociability aspects in online communities

The term “sociability” in the online community context can be described as human human interaction in a virtual environment. From a sociology perspective, based on Rutter & Smith (1999), the study of sociability initially began with a paper written in 1911 by Georg Simmel. With sociability, an individual must share their personal thoughts and objectives when dealing with others rather than holding them private (Rutter & Smith 1999). Sociability in online gaming can be enhanced from the group cooperation and communication tools that connect members in the community (Pan et al. 2007). In an analysis of online gaming communities, Pan et al. (2007) defined sociability from the Computer Mediated Communication (CMC) perspective as “*The sociability-related strategy and technical structure which can promote an intimate relationship, friendly communication process and togetherness in the group, and which supports group collaboration to achieve the common goals*”. In CMC perspective, Alejandro et al. (2008) have define three basic ways where technology was used to support communication from which are 1) email, including email list or mailing lists, 2) asynchronous discussion forum, or bulletin boards; and 3) synchronous (real time) discussion forums or chat rooms.

Furthermore, in other study by Barab et al. (2001) have blended social and technical aspects in the Inquiry Learning Forum (ILF); the initial design of the community combines functionality and a sense of social connectedness, personal interaction and interactivity for active participation in ILF. A study by Keenan & Shiri (2009) about sociability aspects on social sites such as Facebook, Myspace, Twitter and LinkedIn

showed that sociability can be fostered by using features, design and technologies in the websites that incite users to interact with others within the network. They came out with two main factors that influenced the sociability in these four major social sites (Facebook, Myspace, Twitter and LinkedIn); which are people focused and activity focused (Keenan & Shiri 2009). People focused in social sites apply socialization through user's content such as their personal information and profile page in their sites, for example in Facebook. Meanwhile, activity focused is according to the site-specific theme where users can create their own contributions for community, for example Youtube which provide videos as their activity-focused in their sites.

Preece (2000) describes the influence of sociability in online community as “*The collective purpose of a community, the goals and roles of the individuals in a community, and policies generated to shape social interaction all influence social interaction in the community*”. Preece (2000) came up with three components of sociability, and these components have been widely used as a guideline to describe sociability factors: purpose, people and policy as summarized in Table 2.2

Table 2. 2 Preece (2000) Sociability Guidelines

| Components | Description |
|-------------------|--|
| Purpose | Communities' goal to motivate people to join and interact within the community. |
| People | The main pulse of any community. |
| Policy | To determine requirements for joining the community, style of communication among participants and repercussions for noncomformance. |

In the education context, Abedin & Daneshgar (2008) provided a summary of previous studies which addressed the presence of off-task social interaction in CMC and Computer Supported Collaborative Learning (CSCL). Many researchers have come across the importance of sociability aspects in various research areas because the role of members and their active participation to establish relationships will leads to successful online communities. Both knowledge areas such as social science and Information Communication Technology (ICT) are important elements that influence to the development of online communities (Maloney-Krichmar & Preece 2005; Xiarong Li 2008).

2.4.2 Sociability concern in various areas

Sociability is concerned with developing software, policies and practices to support social interaction online. Previous studies have looked at current features in existing online communities and come up with ideas for future features that online communities and social software from various areas should have, in order to increase sociability among users in the network (Maloney-Krichmar & Preece 2005; Keenan & Shiri 2009; Lau & Kwok 2009; Pan et al. 2007). Several studies concerned with sociability aspects in online communities have been reviewed. Table 2.3 summarized sociability design and the extend of Preece (2000) sociability guideline which is purpose, people and policy.

Table 2. 3 Previous research on sociability

| Author | Design for sociability | Preece sociability guideline | | | Context |
|---------------------------------|---|------------------------------|--------|--------|---------------|
| | | Purpose | People | Policy | |
| Barab et al. (2001) | video-based classroom observations | / | / | | Education |
| | video access & indexing, web forum, like the video and artefact | / | / | | |
| | recorded a debriefing teacher session-discussion | | / | | |
| | asynchronous discussion area by “videocast” | / | / | / | |
| | Inquiry Learning Forum session | / | / | | |
| | “video trailer” function | / | | | |
| | discussion forums | / | / | | |
| | provide ILF members with personal space for them to store their information, pictures | / | / | / | |
| Maloney-Kichmar & Preece (2005) | provide valid resource and information for user | | / | / | Healthcare |
| | link members to local & outside group | / | / | / | |
| | provide information & discussion group | / | / | | |
| | provide “ready-audience” for real-world support | / | / | | |
| | chat | | / | / | |
| | provide windows onto discussion board | / | | | |
| | service reliable & available all the time | | | / | |
| | statement of online community purpose on window | / | | | |
| Pan et al. (2007) | instant messaging service | | / | / | Online gaming |
| | chat e.g. for sharing image design | | / | | |
| | short message function e.g. for their birthday, congratulation messages | / | / | | |