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A subjective evaluation of attitudes towards E-health

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Abstract

E-health, the provision of healthcare services via the Internet, has the potential to address the limited capacity of the healthcare system and thereby improve health outcomes. While there is considerable development of e-health services in practice, research in this important area often lags practice and takes a restricted view of user needs. The study presented in this paper undertakes a holistic evaluation of perceptions of e-health services and tools by addressing the activities of diverse stakeholders from healthcare practitioners to the general public. The research uses Q-methodology to explore the opportunities, challenges, barriers, and potential benefits of e-health to guide the development of a holistic e-health strategy that targets all stakeholders. Q methodology is a research design that provides a foundation for the systematic study of subjectivity and so is appropriate as a way of fostering deep understandings of e- health phenomena from different user perspectives. A three factor solution was selected for the interpretation of the data. Our finding suggests that government authorities and healthcare providers should be aware of the existence of health literacy issue as well as other issues among diverse users of the health system. The design of universal (ubiquitous) online health systems must accommodate users with different skills, knowledge, age, gender, and disabilities.

A Subjective Evaluation of Attitudes towards E-health

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Abstract

E-health, the provision of healthcare services via the Internet, has the potential to address the limited capacity of the healthcare system and thereby improve health outcomes. While there is considerable development of e-health services in practice, research in this important area often lags practice and takes a restricted view of user needs. The study presented in this paper undertakes a holistic evaluation of perceptions of e-health services and tools by addressing the activities of diverse stakeholders from healthcare practitioners to the general public. The research uses Q-methodology to explore the opportunities, challenges, barriers, and potential benefits of e-health to guide the development of a holistic e-health strategy that targets all stakeholders. Q methodology is a research design that provides a foundation for the systematic study of subjectivity and so is appropriate as a way of fostering deep understandings of e- health phenomena from different user perspectives. A three factor solution was selected for the interpretation of the data. Our finding suggests that government authorities and healthcare providers should be aware of the existence of health literacy issue as well as other issues among diverse users of the health system. The design of universal (ubiquitous) online health systems must accommodate users with different skills, knowledge, age, gender, and disabilities.

Keywords: E-health, Q Methodology, Health & Computer Literacy, Accessibility

1. Introduction

Health sector is usually the biggest service sector of a nation, receiving enormous investments and growing at a rapid pace (Hernandez, 2009). E-health has the potential to address the limited capacity of the health care system, and thereby enable health improvement *(ibid).* Emerging evidence supports the beneficial effects of e-health, but many challenges remain for research in e-health in the approaches taken, methodologies used, and the evaluation of results. Stakeholder preference for information distribution and communication through e-health services is an important area of research because a better understanding could contribute to the quality as well as efficiency of future health initiatives. Despite its importance, this particular area of research is underdeveloped in theory and practice (Brender, 2006 and Hernandez, 2009).

The study presented in this paper undertakes a holistic evaluation of perceptions of e-health services and tools by addressing the activities of diverse stakeholders from healthcare practitioners to the general public. The main objectives of this study intend to identify potential benefits, barriers and challenges when dealing with complexities in the use of information and communication technologies in healthcare, and how these have potential to alter the healthcare infrastructures, costs and quality of the services. This study is part of a wider research program aiming to identify gaps and opportunities in tools development, policy and research of e-health. In this area research is needed to better understand and improve the role of technology in dynamic online socio-technical systems that can be generalized to the wider problem of e-health services and user interaction. Because it is an area of rapid change, the research method used must be able to anticipate the impact of new innovative web technologies that are just emerging and will emerge in the future.

2. Literature Review

The evolving capabilities of computer technologies are enabling healthcare providers to deliver evidence-based programs via the Internet in ways that are both cost-effective and individualized (Hernandez, 2009). The Internet plays a vital role in disseminating health information and is becoming an effective medium for facilitating communication to accommodate the public's growing needs for interaction health information services (McGrath et al 2007, Hernandez, 2009). For e-health to be used effectively it is important that individuals have an access to the Internet in order to obtain needed information and communication services. Several researchers have examined the issue of accessibility linking it to poor level of computer literacy, low income, high incurring costs, and other factors that may hinder the potential benefits of e-health solutions (Shi, 2007, Vitacca, Mazzu, Scalvini 2009, and others). The use of the web is a vehicle not only improve knowledge transfer from health professionals to the general publics, but also to help patients to improve their health and their general well-being by reducing the communications gap between health

professionals and the public, and complement the primary role of doctor-patient relationship (Kivitis, 2006). The quality of web-based health information has been examined by several studies including Eysenbach et al. (2002) and Kim and Chang (2007) concluding that there is a large quality variation between websites and medical information on the web.

Most of the literature in this area has involved studies of patients with specific diseases, e.g. cancer, or examine one explanatory dimension targeting certain segment of society. There is lack of research that takes a holistic approach to evaluating e-health or that explores the perceptions of diverse users toward e-health. What the study presented here contributes is the recognition that population diversity plays a role in understanding consumer attitudes and needs in this area. This research stresses the importance of emerging interactive technologies and fills a significant gap in further exploring the potential benefits and challenges of e-health by obtaining the views of a variety of users.

3. RESEARCH APPROACH

Q-methodology is a statistical research method that allows researchers to explore human subjectivity. In the first phase of this Q-study, the concourse, a representative group of users were encouraged to produce as many statements as they could concerning the elements they would want on a health website based on their experience. The collected statements were then redefined and clarified to remove duplicates, combined some into meaningful statements or to eliminate some because of their lack of relevancy to the topic. In addition to statements collected during the concourse, statements are added from secondary literature sources. In the second phase of a Q-study, participants are asked to sort the collection of statements, known as the Q-sample, in this case of 50 items, based on their personal experiences. Unlike the concourse, the Q-sort is conducted on an individual basis. This Q-sort involved a group of relevant potential users of health websites in Australia, and was composed of medical practitioners, medical students, other university students, academics, and the general public.

Seventy participants successfully sorted the 50 statements concerning what they would want on a health website. The participants took an average of 1 hour to complete the study with many respondents such as nurses, general practitioners taking time away from their duties to complete the sorts. The majority of participants were male (nearly 59 % or 41 males). Their ages ranged from 21 to 48 years. There were 29 or 41% female participants and their ages ranged from 21 to 55 years. 15 out of 29 females practiced nursing or worked elsewhere in the medical field such as general practitioner, pathology collector, pharmacist, or mid wife. There were a total of 54 students (11 undergraduates 25 graduates, 18 postgraduates): 23 domestic students and 31 international students.

The participants of the sorts were asked to make choices amongst the statements by sorting them and all statements were sorted from most agree (+5) to most disagree (-5) according to Table 1.1. The sheet given to participants consists of two main parts: a

demographic section, which asked for information about the participants and their feedback on the collected statements, and the Q-sort grid (Figure 1.2).

Under the instruction of the researcher, participants were asked to make an initial reading through the Q-sample to get the impression of the range of opinions and then roughly sort the cards of statements into three equal sets: those statements selected to be positive statements, neutral, and negative based on their individual perceptions. After ranking each set, they would start with the positive set at the +5 column on the Q sort scale as in the figure below (see Figure 1) and work down the ranking until all of the comments in the first categories have been placed on the data sheet (Q-grid) from the right.

A similar process occurs for the remaining category with activities that are rarely performed being placed in the -5,-4,-3, and -2 category and the remaining activities filling in the middle columns of the inverted pyramid on the datasheet. The consequence of the sorting process is a forced decision making process, where the participants must decide amongst the statements and produce a result that reflects their decisions (Cottle & McKeown 1980).

Table 1: Q Sort Distribution

	Most Disagree				Neutral				Most Agree		
Score	-5	-4	-3	-2	-1	0	1	2	3	4	5
Frequency	2	3	4	5	7	8	7	5	4	3	2

Figure 1: The Q-Grid for 50 statements
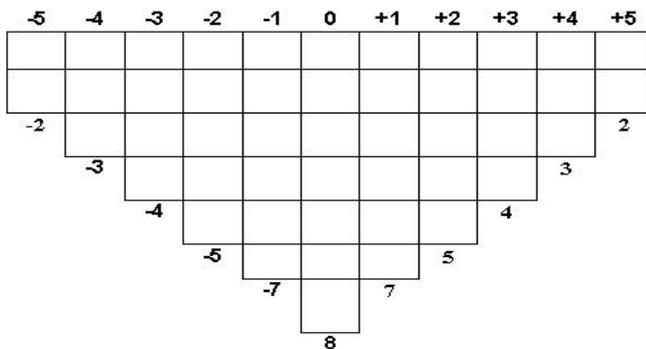
4. RESULTS

In this study, a three factor solution was selected for the interpretation of the data as it has a high number of sorts, a low level of confounded sorts and insignificant sorts. The 3 Factors are now described.

4.1 Factor 1- Service-Oriented Users

Factor 1 consists of 22 participants. Tables 2 and 3 contain the extreme statements from Factor 1, 11 statements with which these participants strongly agreed and 12 statements with which they strongly disagreed. The Z-scores are used as the criterion of selecting these statements. This Factor sees the practical service benefits that online health may bring to all

parties in society including both patients and health care providers. The strongly agreed statements in Table 2 imply that the participants in Factor 1 recognize the importance of e-health services (No. 1, 18, and 20). Statements 20 and 18 suggest the potential benefits of the interactivity attributes of being online. Therefore, Factor 1 is labeled as 'Service-Oriented Users'. On the other hand from the strongly disagreed statement in Table 3, this group in Factor 1 does not have concerns around trust as reflected in statement 43 or risk as reflected in statement 41 but do see online health as an opportunity (statement 12). The participants on this Factor also do not seek to be empowered or being fully interactive members of the online community (statements 30, 33, 35). It is also worth noting that this Factor dislikes having extensive information that could targets everyone in the society (statement 46). There were 16 males (73%) and 6 females (27%) in Factor 1.

Table 2: Factor 1- Strongly Agree Statements

No.	Statement	Z Score
4	I prefer immediate (fast) access when I am using a website.	2.288
1	I believe that health websites can improve the overall quality of healthcare	1.959
20	I think interactive health features (emails, chat rooms, forums, and bulletin boards) can improve relationships between patients and health care providers	1.682
2	I find Health Websites reliable - I rarely encounter any broken links when I navigate through the website.	1.582
18	I believe that interactive health features (emails, chat rooms, forums, and bulletin boards) do improve the delivery of health care	1.224
11	I expect Health websites to provide me with useful features such as search engine, help page, and site map.	1.215
16	I believe that I can get the depth of information that I need from health websites	1.138
10	I want to be able to print the information needed from online health	1.119
3	I like to be able to download Audio, Video, and Podcast from health websites	1.105
26	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	1.062
15	I want Health websites to offer me a choice of language.	1.043

Table 3: Factor 1- Strongly Disagree Statements

No.	Statement	Z Score
43	Even with a password, a website cannot be trusted to keep information confidential	-1.462
41	Interactive features such as online diagnosis and "ask a doctor" are risky for the user and the professional	-1.366
30	I like the opportunity to participate by using facilities such as surveys, polls, and games.	-1.252
12	I do not believe that health websites improve the delivery of healthcare	-1.214
33	I think the public should be able to make online donations to support healthcare and research	-1.176
50	Fully interactive media can create a situation in which the roles of senders and receivers are interchangeable	-1.171
35	I like to see practical features such as request an appointment and refill prescriptions	-1.147
38	Health websites are responsive because of the availability of 'about us' and 'contact us' sections and help options they contain	-1.13
46	I like to see variety of topics covered within one single health website (one-stop- and-shop health portal)	-1.104
48	Interactive health websites are time consuming	-1.047
45	Public forums on websites can be abused by malicious contributors and so cannot be used in Healthcare	-1.013
49	The health care profession should make more use of the Internet to improve services.	-0.975

4.2 Factor 2 Interactive Users

Factor 2 consists of 22 participants. Tables 4 and 5 contain the extreme statements from Factor 2: 8 statements with which these participants strongly agreed and 10 statements with which they strongly disagreed. The 8 strongest positive statements presented in Table 4 which reflect a communicative view of health work practices and roles. These participants favor collaborative work practices which promote them to share information and knowledge as reflected in statement 31. Among this group there is an increased sense of community belonging and involvement, as reflected in statements 21 and 14, and increased self-empowerment through participative roles and being active members of the healthcare society as in statement 30. So this Factor values collaborative and interactive working which requires a great deal of communication. Consequently, this Factor shows communicative, collaborative and interactive activity as valuable and challenging. Therefore, this Factor is labelled as 'Interactive Users'. On the other hand, the strong disagreement statements on Factor 2 as presented in Table 5 support this view further by explaining what it is not. For instance, it does not support the argument for reliable e-health, nor does the website need to be "accessible" or have an "extensive informatics". The negative statement have considerably helped by dismissing the notion of health information systems being static, but rather concentrating more on being communicable, interactive, and allow influential collaboration. In total, there are 22 participants on Factor 2.

Table 4: Factor 2- Strongly Agree Statements

No.	Statement	Z Score
31	I would like to be able to share my story on a health website	1.994
21	I like to be highly involved in online discussions and feel like I am part of the community	1.484
14	I like to be involved in online discussions such as chat rooms, forums, and bulletin boards.	1.354
30	I like the opportunity to participate by using facilities such as surveys, polls, and games.	1.309
15	I want Health websites to offer me a choice of language	1.212
17	I feel empowered because I can add and contribute my idea through useful features such as a public bulletin board.	1.183
47	An interactive website would make more work for healthcare workers	1.038
23	I like to see a Weblog/Blog in a health website because I can read and add my comments.	0.989

Table 5: Factor 2- Strongly Disagree

No.	Statement	Z Score
28	I feel that it is important that the quality of information provided on this website is scientifically correct	-2.361
4	I prefer immediate (fast) access when I am using a website	-2.117
5	I want to be able to get extensive information through links and related links of that specific information.	-1.641
10	I want to be able to print the information needed from online health	-1.541
8	I focus on the health information posted, rather than the website design	-1.138
32	I want to see the date when the website was created and the date of the last updated	-0.983
27	I find it easy to access online health information from home and anywhere else.	-0.965
36	Website should enable the public to ask more questions so that they are informed and can make better health decisions	-0.96
24	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).	-0.886
41	Interactive features such as online diagnosis and "ask a doctor" are risky for the user and the professional	-0.803

4.3 Factor 3: Health Information Seekers

Factor 3 consists of 6 participants. Tables 6 and 7 contain the extreme statements from Factor 3 10 statements with which these participants strongly agreed and 10 statements with which they strongly disagreed. In Table 6 the 10 positive statements show that the participants, who are all from general public, see online health as an opportunity to improve health care delivery, quality and services (statements 28, 1, 49). They emphasize the importance of as the use of simple language (statement 26. It is interesting to note that one significant attribute of today's health information seeker is the growing use of the search facility to locate health information sources (in statement 11). This fact is inline with other studies (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 (statements 36, 44, and 46). Therefore, this Factor is labeled as 'Health Information Seekers'. The negative statements in Table 7 expand this view by identifying the statements with which the participants strongly disagree. They do not see any disadvantage of health website (statement 12). Trust is not an issue among the participants on Factor 3 (statement 43). A prevalence of graphics and visuals did not distract from the quality of health websites (statement 6). It is also worth noting that this Factor only does not see online health as enabling interactivity and sharing through downloading tools and techniques (statements 21, 31, 17, 14, 3). In total, there were 6 participants on this Factor: 2 females (33%) and four (4) males (67%).

Table 6: Factor 3- Strongly Agree

No.	Statement	Z Score
26	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	0.275
28	I feel that it is important that the quality of information provided on this website is scientifically correct	0.256
1	I believe that health websites can improve the quality of healthcare	0.206
36	Website should enable the public to ask more questions so that they are informed and can make better health decisions	0.201
44	Health websites should target a variety of users (patients, healthcare providers, community...etc.)	0.198
15	I want Health websites to offer me a choice of language.	0.167
46	I like to see variety of topics covered within one single health website (one-stop- and-shop health portal)	0.167
11	I expect Health websites to provide me with useful features such as search engine, help page, and site map.	0.162
49	The health care profession should make more use of the Internet to improve services.	0.157
35	I like to see practical features such as request an appointment and refill prescriptions	0.125

Table 7: Factor 3- Strongly Disagree

No.	Statement	Z Score
12	I do not believe that health websites improve the delivery of healthcare	-0.308
43	Even with a password, a website cannot be trusted to keep information confidential	-0.219
6	I dislike too much graphics/visual as it slows down my access to the health website	-0.214
21	I like to be highly involved in online discussions and feel like I am part of the community	0.206
31	I would like to be able to share my story on a health website	-0.175
45	Public forums on websites can be abused by malicious contributors and so cannot be used in Healthcare	-0.169
32	I want to see the date when the website was created and the date of the last updated	-0.167
17	I feel empowered because I can add and contribute my idea through useful features such as a public bulletin board.	-0.164
14	I like to be involved in online discussions such as chat rooms, forums, and bulletin boards.	-0.135
3	I like to be able to download Audio, Video, and Podcast from health websites	-0.132

5. DISCUSSION

The factors that emerged from the research represent three subjective perspectives of online health, and were labeled as Factor 1, 'Service-Oriented Users' (22 participants), Factor 2, 'Interactive Users' (22 participants), and Factor 3, 'Health Information Users' (6 participants).

According to Factor1, the 'Service-Oriented Users' view accessibility as being the most important service that e-health can deliver in healthcare because it enables individuals to make better healthcare decisions as expressed in statement 4. The participants on Factor 1 view the benefits of e-health in improving the overall quality and the value of healthcare delivery while reducing health care costs (statement 1). These users also view e-health as a way to extend the healthcare system by meeting the information needs of a greater variety of end-users (statement 18). This particular finding is inline with previous studies include Nazi (2003), Brailer (2008), Hill and Powell (2009). This Factor points to the need for e-health

literacy overcoming the difficulties that individuals are having in accessing and understanding e-health content which could be a barrier to internet use as indicated in statement 26. This group use health-related sites because of usable features: smooth direct navigation as well as simple language and printout 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 avoiding exhaustion in retrieving and reading online health information. This finding is in line with the research of Bansil et al (2006).E-health may enhance the traditional model of physician-patient relationships and the communication among healthcare providers where all users move beyond simple information collection to integrated interactive healthcare systems as indicated in statements 20 and 18. This finding confirms the findings of Nazi (2003). Consequently, the potential of e-health may maximize the value of the limited time and contact with patients of busy healthcare providers (Gibbons, 2005). As technology advances, current usability problems may decrease, e.g. multimedia may become faster to load and no broken links encountered as expressed in statement 3. This finding also confirms the work of Nazi (2003).

According to Factor 2, the 'Interactive Users' believe that the basic tenet of e-health is to access not only quantities of health information, but to improve the quality of e-health by empowering the public to increase their knowledge to support decision-making as indicated by statements 31, 17, 23. The perceived benefits of using emerging interactive health information technologies support the notion of 'knowledgeable patients'. This can thereby enhance patient empowerment, autonomy, and satisfaction with health care. This group also places more emphasis on collaboration and sharing as specified in statements 21, 14, and 30 which claim that e-health should include more than static content and images. It should have consumer-directed electronic tools to facilitate such as communication tools that allow people to post information on line, collaborate, and share knowledge among users. This finding is inline with Bath (2008), Akesson, Saveman, and Nilsson (2007), Harland and Bath (2008), and Lau and Kwok (2009). 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 as indicated in statement 15. The availability of such an option may overcome anxiety when searching and retrieving e-health among non-English speakers and individuals whose first language is not English language. Participants in this factor strongly believe that interactive technologies would make more work for healthcare workers as revealed in statement 47. As a result physicians may find it significantly difficult to adopt and embrace these technologies due to disruption to their workflow, financial costs and lack of time.

According to Factor 3, the 'Health Information Seekers' place more emphasis on the simplicity of e-health information by the use of non-technical language and readable formats as indicated in statements 26 and 28. Therefore, according to them, it is important to improve the health literacy levels among individuals. One way to address this issue is by designing

e-health system that incorporates online communities for the social networking as in Web2.0 as implied in statement 36. This group is more likely to seek out other people with the same personal experiences. Those participants in Factor 3 believe that the quality of e-health is an essential component to improve the overall healthcare delivery as specified in statement 28. It is one of the main challenges that stakeholders in health are faced with today. Determining the quality of health information is not always straightforward. There is the risk that inaccurate, outdated, or low quality health information is disseminated among the huge volume of online information. This implies that although healthcare professionals are recognized as the most reliable source of health information, consumers have responsibility to critically question the source of information posted on a health website when using the Internet as a secondary source of health issues (Nsuangani and Perez, 2006). Critical thinking skill is another essential element of health literacy. This is 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 e-health via systems to test, rank, and distinguish legitimate online sites from the ones that are merely attractive becomes necessary to implement (Bomba 2005, Ahern et al, 2006). The information seekers in Factor 3 search for information on a variety of health topics offered by e-health as implied in statement 46. This is not surprising, as research indicates that most people want to have detailed health information (Charles, Gafni, & Whelan, 1997). The findings here also stress the importance of designing a health website as 'one-stop-and-shop' to reduce their anxiety and facilitate their decision-making process (Sillence et al, 2007). Information seekers also stress the importance of have a health website that targets all users and stakeholders as indicated in statement 44. Information seekers acknowledge the benefits of e-health as depicted in statement 1. The availability of web-based health has the potential to save the time and effort of e-health users than paper-based sources, avoiding users' exhaustion, and hence reducing the costs of health and improve the quality of healthcare. Health information seekers prefer to have a choice of language as a utility in e-health as expressed in statement 15. The availability of such an option will assist this group in simple and smooth access to e-health and better match their needs due to different culture and language backgrounds.

6. CONCLUSION

E-health is attracting the interest of diverse consumers. It is important when discussing e-health to focus on the variety problems and the issues to be resolved. This study uncovers different views of potential benefits and issues of e-health even though some of these views may conflict with each other. For instance, the interactive users in this study believe that interactive technologies make more work for healthcare workers whereas participants in the

other Factors, as one would expect, thought that e-health tools should minimize work loads and save time. This significant finding is worth further investigation to explore the perceptions of practitioners on this issue.

Widespread availability of computers has increased the breadth of the knowledge, skills, and experiences of computers users. Therefore, universal online health systems must accommodate users with different skills, knowledge, age, gender, disabilities, etc. In the health context, this paves the way for future developments such as improved online healthcare systems and expanded government services. It is necessary to bridge the gap between what users know and what they need to know, in respect of user diversity, and technology diversity. This indicates the importance of including the universal utility design that targets different users in effective web-based health systems.

Limited e-health literacy may mean that consumers who need it the most are the least able to take advantage of new healthcare technologies. This particular finding suggests that government authorities and healthcare providers should be aware of the existence of such a problem. We suggest that one way to tackle this dilemma is by promoting educational programs to elevate the level of health literacy amongst the general public.

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