

Improve elderly's online healthcare experience based on interactive design

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Abstract. 1) Research Background; It has been suggested that improve elderly's online healthcare experience has become one of the most important social issue, researchers have found that there is a trend that elderly have become more likely to use online information while solving their medical problems. However, the accessibility of the specific website still exists great gap to fill on. 2) Research Purpose; Due to that, the research topic of this paper is about to design a developed interactive website to improve elderly's healthcare experience. 3) Research Methods This paper includes the following sections: 1. introduce data collected from user experience survey, 2. analyse these data by thematic analysis, 3. discuss the possible formation of the result and extend it for suggestions, 4. analyse the insufficiency of the research and show how to improve it. 4) Research Meaning; According to the interview, most existed healthcare website present various problems and cause inconvenience for elderly to use. Besides, most elderly wish to add some practical functions like locate nearby hospital or get simultaneous reply from the doctor on the website. Due to that, designer should focus more on accessibility of the website instead of its appearance.

Keywords. Interactive design, Experience survey, Thematic analysis, Healthcare.

1. Introduction

Nowadays, Interactive design has been used broadly on many fields especially for interactive website. An interactive website means a webpage on the Internet that utilizes a variety of coding languages to achieve an interactive experience that enables the user to actively interact with the website. Any website that enables viewers to do more than merely read text and look at graphics is considered interactive. Instead, this kind of website can also let the user play games and complete different activities, or it can let the viewer change how the page shows [1]. Adding healthcare elements to this kind of interactive website could be both innovative and practical. The considerable development of internet has improved the online inquiry system to a great extent. Building graded healthcare service system and improving the user's experience of online inquiry platform has significant meaning. Therefore, various healthcare website or application were designed and introduced to people. Elderly was also part of the potential user of these evolutionary stuffs. Under the joint promotion of medical needs and various policies, the user scale of Internet medical industry continues to expand. Data shows that in 2019, the number of Internet medical users reached 466 million, an increase of 39.52% over 2018. In the future, under the trend of continuous development of the industry and continuous standardized operation, the scale of Internet medical users will maintain a rapid growth trend [2]. As the platform was being popularized,

many people response that learning how to deal with healthcare issues on internet was quite fresh. Due to that, the existed healthcare platform still present various problems: 1) The content is mixed, and it fails to fully conform to the basic principles of truth, completeness and science: the content of medical departments, medical institutions, scientific research institutes and medical schools is generally more accurate and scientific. The content of websites hosted by non-professional medical institutions is mostly excerpts from relevant books and reprints from other websites. The medical quality of information collecting and editing personnel is limited, and the quality of collecting and editing needs to be improved as well. 2) Frequent reprints and serious duplication of information. 3) Information lags and content updates are slow. 4) Limited amount of information and limited search function [3]. Designer ought to figure out these questions and provide a relatively complete and interactive healthcare platform for older people because it presents great advantage for elderly and improve their experience on a large scale. Healthcare websites make full use of the convenience and speed of the Internet, with no borders and regional restrictions, wide coverage, large amount of information, strong interactivity, and low cost, etc., to transmit health information and medical knowledge to the elderly, and improve the way of medical services. The elderly would be more active in understanding medical knowledge and save a lot of time and high medical expenses. The online medical information service improves the health awareness of the elderly, facilitates medical treatment, and provides a fast and convenient platform for the elderly to inquire about their own safety issues and online consultation services. Today, when people pay more attention to health, medical websites have received extensive attention of the elderly by virtue of their own advantages [4]. This paper would analyse insufficiency base on various existed healthcare websites or applications and try to introduce some plausible design thoughts for elderly users. This paper would first obtain data from questionnaires or interviews with a designated population, analyse the data and make assumptions about possible outcomes. Secondly, this paper would display various existed websites or applications and analyse their insufficiency. Thirdly, this paper would provide some plausible and practical design thoughts. Then, this paper would compare the previous assumptions and thoughts. After that, this paper would discuss the reasons for the formation of the research results; especially the results that do not match the assumptions, analyse why the assumptions are wrong. Finally, extend the research results and analyse the shortcomings of the research and how to improve it. The aims of this paper are to show how interactive design connects with elderly's daily life and how it solves possible issues. The results would be particularly relevant to those who has experience of online medical service or wish to learn how future online medical service would be. The convenience of online medical service would help many elderlies familiarize with their health condition and save many times as well. The Methods section is divided into two parts: 2.1. *User experience survey* and 2.2. *Thematic analysis*. For the first part, this paper would introduce an interview using Qualitative research and adopted by semi-structured and open-ended way. The second step would utilize a classic method called Thematic analysis, this paper would extend six steps of it and discover how it solves the problems. The Results section would conclude what the interview and analysis has found and provide possible direction of future designs. The Discussions section would discuss the possible reasons of formation of the Results and provide practical suggestions, then analyse confinements and insufficiency of this paper. The Conclusion section would discuss existed issues and try to provide plausible suggestions.

2. Methods

2.1. *User experience survey*

The development of online healthcare service for the elderly requires not only scientific data support, but also older people's feelings. The research data is collected from interviews with specific groups of people. Generally, the interviewees are some elderlies that familiar to internet and have potential needs of online healthcare service. Taking the X nursing home as an example, this paper examines the elderly feelings of existed online healthcare website on the basis of qualitative research. Qualitative research is a research model with a holistic view and a situational view. It is a type of research where the researcher,

or a designated co-researcher, gathers and analyses data, making them both equally important to the research process as the participants and the data they contribute [5]. It is that vast area between the rigorous social novel and the hard sciences. It helps people to comprehend the causes of and mechanisms underlying human behaviour. Thus, qualitative research entails human competence in the depiction of human interactions, situations, relations, meanings, and goals—which can never be fine, accurate, or full [6]. The semi-structured and open-ended individual interviews were adopted, taking into account the elderly's individual conditions and extent of receiving service, to select elderly health management services that had received 3 or more times of health management services, those over 65 years old, with clear thinking, better hearing, vision and language ability, have numbered with A1, A2, and A3. Family medical history, employment history and age were also taken into account when selecting the sample. Each respondent was interviewed for 15 minutes through semi-structured interviews, which are conducted in a fairly open setting that allows for targeted, conversation-oriented and bidirectional communication. Most questions were created during the interview, allowing the interviewer and the interviewee to ask or discuss questions [7]. On the basis of literature research, this study finally identified three main questions for the interviewees: 1) Have you ever had the experience of using online healthcare website or application? And what for? 2) What inconveniences do you find in the process of using such website or application? (If you have used before) If not, what inconveniences you suppose there would be? 3) What function do you wish will appear for this service in future? Before the start of the interview, the researcher established a good relationship with the interviewee, and firstly stated the content, purpose, method, contribution and contribution of the participants of the study's interests, principles of research, etc., All respondents agree to participate in this interview after considering above principles. The interview site was selected in the psychological counselling room inside the nursing home.

The detailed records of interviews:

Q1: Have you ever had the experience of using online healthcare website or medical application? And what for?

A1: Yes, I do have such experience. My son taught me how to search medical information that I might need. Sometimes I might feel a bit uncomfortable but it seems unnecessary to go to the hospital so I would use online healthcare website or application.

A2: No, I am afraid not. I am an active internet user but I haven't used any online healthcare website or medical application.

A3: Thanks for inviting me! Actually, I am quite interested on this kind of healthcare website or medical application. I used to buy medicine or medical instruments there.

Q2: What inconveniences do you find in the process of using such website or application? (If you have used before) If not, what inconveniences do you suppose there would be?

A1: The content is sometimes mixed; it provides wrong information. And there also presents information lags and the content updates are slow.

A2: Well, maybe some frequent reprints and serious duplication of information because these issues also exist on many other websites.

A3: Right, that's what I want to talk about. I found a lot of websites contain limited amount of information and provide limited search function. For instance, I usually buy medicines for high blood pressure but the one that the doctor told me to buy is missing. I believe it's because of the origin of the production country is limited here.

Q3: What function do you wish to appear on this service in future?

A1: Probably update the information per month. Therefore, we can check out the latest news and information with no lags.

A2: I wish the designer could reduce the complexity of the webpage and leave only the useful message. Thus, people won't have to distinguish useless information to their needs.

A3: The main function that needed to add is displaying links that could jump to another website where I can get what I need.

2.2. *Thematic analysis*

The method of analysing interview data on this document is based on thematic analysis, which is defined as "a method to identify, analyse and report on trends in the data." It allows a certain flexibility in the selection of the theoretical framework by researchers. Thanks to this flexibility, thematic analysis allows your data to be described in a rich, detailed and complex way [8,9]. It provides a way to separate qualitative research from these broader debates, where appropriate, and to make the results of qualitative research accessible to a broader audience. Its availability as a method is also suitable for multi-method research carried out by research teams, where not everyone is a qualitative expert [10]. Thematic analysis contains six clearly defined steps.

2.2.1. *Familiarizing with the data.* This is the step to transcribe the verbal data and reread it. Based on the recording tape, the data is divided into 3 personal profiles.

Profile 1:

I do have such experience of using online healthcare website or medical application. My son taught me how to search medical information that I might need. Sometimes I might feel a bit uncomfortable but it seems unnecessary to go to the hospital so I would use online healthcare website or application. During the process of using such websites, I found the content is sometimes mixed; it provides wrong information. And there also presents information lags and the content updates are slow. Due to that inconvenience, I wish the future website could update the information per month. Therefore, we can check out the latest news and information with no lags.

Profile 2:

I am afraid I haven't used such healthcare website or application before. I am an active internet user that exceed peer of mine. I am a crazy fan of electronic games and I have made friends of many young lads through that. But for medical website, I am just a rookie. And if you want me to share my feelings about that, I would probably say that some frequent reprints and serious duplication of information would be the shortcoming because these issues also exist on many other websites. As I said, I wish the designer could reduce the complexity of the webpage and leave only the useful message. Thus, people won't have to distinguish useless information to their needs.

Profile 3:

Thanks for inviting me! Actually, I am quite interested on this kind of healthcare website or medical application. I used to buy medicine or medical instruments there. I found a lot of websites contain limited amount of information and provide limited search function. For instance, I usually buy medicines for high blood pressure but the one that the doctor told me to buy is missing. I believe it's because of the origin of the production country is limited here. The main function that needed to add is displaying links that could jump to another website where I can get what I need.

2.2.2. *Generating initial codes.* This step consists in producing initial codes for the data. Once all the data has been coded, the data identified with the same code must be grouped together. Codes spot a trait of the data that shows up attractive to the analyst, and refer to 'the mainly essential section, or component, of the basic data or information that can be evaluated in a significant way with respect to the prodigy. Based on the profile displayed in step 1, this paper has identified various initial codes [11,12]. The initial codes for Profile 1 are Experienced, Uncomfortable, Learning, Mixed content, Wrong information, Information lags, Slow updates, Wish. The initial codes for Profile 2 are Unexperienced, Active user, Crazy fan, Sociable, Rookie, Reprints, Duplication, Complexity. The initial codes for Profile 3 are Positive qualities, Interested, Active, Limited, Interactive design.

2.2.3. *Searching for themes.* This phase is determined on the broader concentration of themes and includes categorization the diverse codes into latent themes. This stage, which re-focuses the analysis at the broader point of themes, rather than codes, involves organization the dissimilar codes into probable themes, then collating altogether the pertinent coded data extricates within the recognized themes [13]. This paper has collated a collection of themes as following showed.

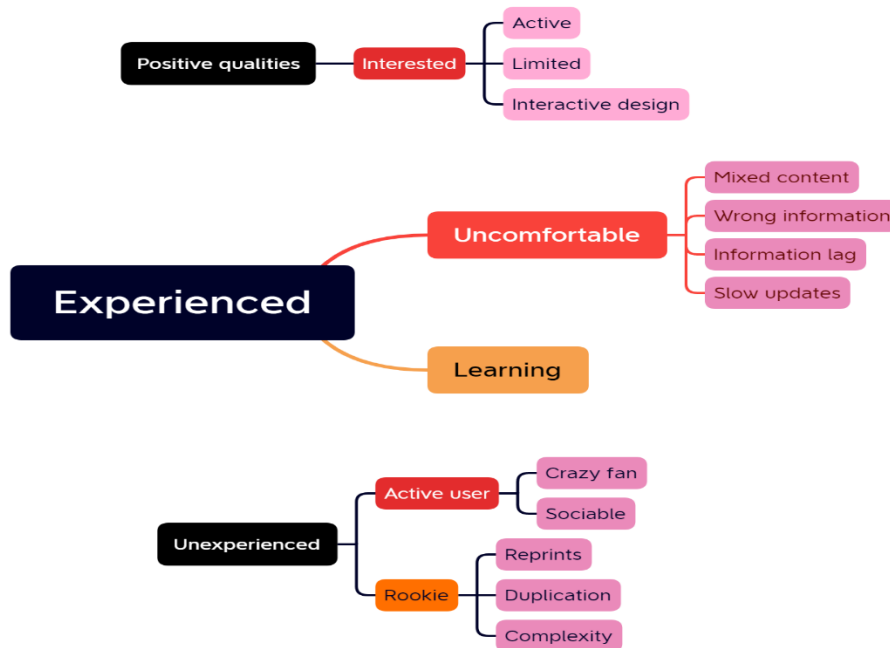


Figure 1. Initial themes.

2.2.4. Reviewing themes. This step involves improvement of the themes. Some themes will collapse into other themes while several of the themes may require to be broken down into slighter components. This step has two levels, level 1 is to reassess at the level of the coded data, level 2 is to go over at the level of the themes. After reviewing the mind maps from previous step, a thematic map has produced as below.

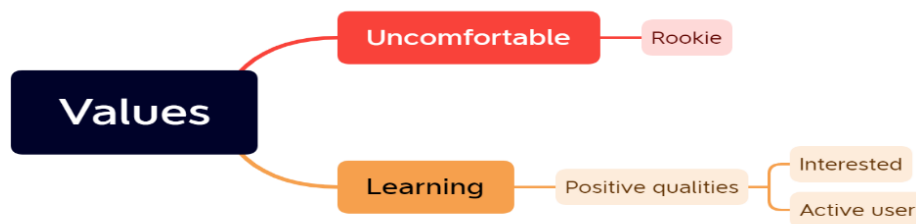


Figure 2. Reviewed themes.

2.2.5. Defining and naming themes. The main function of this stage is to capture the core of what every theme is about and what aspect of the data each theme. At this point the themes would be officially named. The names have to be concise, effective and instantly give a sense of what the theme is regarding. Then a last thematic map should be made after continuous review of the themes in connection to the data.

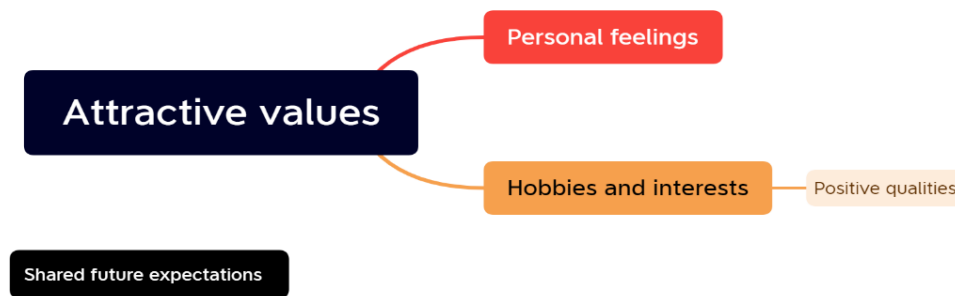


Figure 3. Core themes.

2.2.6. *Producing the report.* This phase involves ending analysis and write-up of the account. Offer adequate proof of every theme utilizing flamboyant illustrations from the data.

3. Results

The research shows that the elderly has a clear understanding of the current situation and problems of healthcare websites or application and can put forward personal feelings and corresponding suggestions. Based on the interview set in the X nursing home, information quality and function losses are the weaker link of existed healthcare websites. Throughout the interview survey, the data are mostly conformed to expectation and it also shows a large scale of potential market. The codes collected from thematic analysis show that elderlies gain interest from their own habits and experiences. For those who has experience or wishing to learn how this kind of service, they show more interest and provide various suggestions which would be beneficial for future development. Thus, designer ought to provide sufficient information on such websites which could lead those who wish to learn the function get familiar with the service in a relatively short time. From most elderly's demands, interactive design and simultaneous updates are most required to add to future production. The needs of building completed online medical service is getting more and more attention. In the future, the development direction of healthcare websites' services will be gradually transformed from the basic needs to more user-centric functions through interactive design. This kind of transition would change existed environment and consequently improve people's especially elderlies' daily life. Due to that, designer should consider more of possible difficulties in elderlies' daily usage of online medical service. Although the current elderly healthcare websites services meet most of the needs of elderly online medical usage, there is still a lack of attention to individual needs such like costs or personal diseases conditions. Completing individual needs of such online medical service also has far-reaching meanings. It represents that the society has entered a brand-new era, which shows strong inclusiveness and accessibility.

4. Discussions

The essential effects of today's healthcare websites' inconveniences may be for the following reasons. 1) Questions and answers are often confused in the column, which is not easy for the elderly to find, and the phenomenon of repeated questions is also existed. 2) Without the guidance of doctor, the description of the condition provided by non-professional institutions is incomplete. The physician's inability to obtain an accurate medical history hinders the judgment of the disease. 3) The doctor's examination process cannot achieve through simple online consultation, and many physical examinations cannot be carried out either, which is not conducive to accurately answering patients' questions [14]. 4) The development's lack also present in network size, number of users, access to broadband, etc. The construction of information source is also considerable. 5) The security issues of healthcare websites [15]. The inconveniences of healthcare websites have become a long-existed issue, the website developer and government should play a more positive role on future. Due to that, this paper has made various feasible suggestions. 1) Discuss the characteristics of the website, pay attention to the scientific, systematic, professional and popularization of the medical and health website. 2) Use the latest network

technology to create an interactive and diverse virtual environment, try to make bold innovations and use the openness of the Internet to accomplish the construction and sharing of medical information resources. 3) Designer should focus more on optimize websites by using new technology such as AI technology or Model GPT-2. For instance, locate nearby hospital or get simultaneous reply from the doctor on the website. It ought to be noted that since the data collected from this research is based on comprehensive investigation and thematic analysis, there are confinements of some variables in the content. Firstly, the survey cardinality of this paper is limited to a relatively small amount of elderly. Furthermore, as the technology developed, many other aspects of development on healthcare websites would emerge.

5. Conclusions

Based on research, this paper observe that existed healthcare websites present various practical issues. Therefore, developer ought to utilize interactive design on future healthcare websites and try their best to provide user-centric experience for elderly. This paper has concluded various suggestions to apply on possible inaccessibility. One is to improve the acknowledge of characteristics of the websites, another is to utilize the most developed technology to create an interactive virtual environment. Finally, the designer should focus more on fix the accessibility. The main contribution of this paper is that it utilizes plausible user experience survey to conclude issues presented on existed healthcare websites which is in favor of the website developer and designer of such websites. This could bring convenience for them to fix more accessibility. This research still exists many insufficiencies like the cardinality of the survey is relatively limited, the future research should pay more attention on investigate various regions and classes of people.

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