Rating Health System

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Abstract

The rating health system is a web-based health system, whose main goal is to develop a website which facilitates access to approved doctors. It allows the public to rate their doctors in order to help others to source a suitable practitioner who best meets their needs, based on service user experiences of that doctor. Its search functionality allows doctors to be sourced based on a number of criteria: geographical location through the global positioning system (GPS); medical specialty; and name, so as to acquire further background information on the doctor. The system also enables the user to identify what type of illness they may be experiencing, using a symptom checker. This paper evaluates the rating health system by performing usability testing to ensure that all the task functions available on the system are working correctly and as specified.

Keywords—Rating system, GPS, Medical specialty, Symptoms checker, Usability testing

1. Introduction

In 1996, the Massachusetts state legislature passed a primary law requiring that the state provide information on doctors through online media. As a result, currently in the United States, the Internet is the first port of call for people seeking information on doctors, with each state operating a medical board website [1]. Founder of the Center for the Study of Services, Robert Krughoff, based in Washington, D.C., has stated that his organisation is endeavouring to develop a system that is fair to doctors and helpful to patients, by using an online system which adopts an organised, scientific approach to doctor ratings [2]. Krughoff also highlights the importance of gaining comprehensive information on each doctor prior to working collaboratively with them. In addition, as user needs are increasing following the advent of new technology, he recognises that the opportunity is now presenting to empower users to use the services provided through his online system. Such features include: locating a nearby service; appointment scheduling, along with communicating information; providing a rating section whereby users can rate each doctor on a five-point scale ranging from zero to five stars; allowing users to post comments on each doctor;

and, finally, providing a symptoms checker, with sequenced steps [2].

Nowadays, the existence of the Internet has made searching for someone or something relatively easy. It assists users to source information effortlessly, as compared to more traditional methods, such as books, newspapers, friends and family. However, not everything is accessible online, thus highlighting the importance of our role in ensuring information on community-based services is readily available on the Internet. Our experience had been that it was difficult to source reliable information on doctors based here in Saudi Arabia. This was the main impetus for choosing this topic, in that we recognise the importance of compiling other people's recommendations and reading comments on their experiences. Given that user feedback impacts upon the sale of online purchases, it would be logical to conclude that it would also influence the doctor an individual chooses to attend. This finding emerged in a study undertaken by [5] which emphasises the value of obtaining individual feedback as a means by which to establish the truth about someone or something.

Choosing a suitable doctor to meet one's individual needs, as well as establishing a trusting relationship, can present as a challenge. This is especially true if an individual has already had a bad experience with a particular doctor, or if he or she has moved to a new community. Therefore, the overall goal of this research is to develop a system to display top-ranking doctors based on patient feedback, which can assist communities to resolve some of the aforementioned issues [7].

This paper aims to facilitate the search process for users to source the best doctor, based on other people's experiences, in a manner which is much simpler, more comfortable and effortless than previously available. It also provides a forum through which users can rate a particular doctor, as well as speak freely about their experiences of engaging with him or her.

2. Literature Review

This section explores previous work covering Rating Health Systems, therefore providing a clear understanding for the technology used in the related systems and Rating Health Systems . There are many previous works such as the following:

1.1 Zocdoc, United States [2007]

Zocdoc is an online search, rating and scheduling appointments system for doctors [9]. It offers a number user interface search options, where its primary purpose is to connect multiple healthcare providers with potential service users. Zocdoc allows users to conduct searches based on a number of criteria, including medical specialty, geographical location, calendar availability and insurance. Users can initially select the doctor's area of specialty, following by entering their preferred location and finally selecting the insurance cover that they have. The system will then generate a list of all the doctors who match the selected criteria, accompanied by the star rating they have received and the next available time in which the user can book an appointment. When a user chooses a particular doctor, all relevant information will subsequently be compiled and available to read, including the doctor's contact details, the location of the practice, reviews written by other patients and the date and time of the next available appointment. If a person does not have an account with Zocdoc, all he or she has to do is to register through e-mail and enter other personal information, such as name, age, gender and password in order to set up a profile. Finally, all users are required to complete additional appointment-related information, as well as to add their phone number, so that an appointment with the doctor can be arranged. All relevant details regarding this appointment will be saved onto the healthcare provider's system. The Zocdoc system contains the following features [4]:

- Real-time availability and an instant booking facility
- Capacity to compare the verified patient reviews of various doctors
- Saving time by completing the required paperwork online
- Sending reminders about appointments and check-ups
- Access to user visitor history

1.2 WebMd.com, New York City [1996]:

WebMd.com is a web-based system that offers assistance to the general population by detailing information on medical situations and diagnosing the issues people may be encountering. Its symptom checker facility uses a human model to identify the symptoms of various illnesses, as well as to display the diseases that are typically associated with the symptoms entered by the user [7]. WebMd.com allows the user to:

- Research their symptoms or other disease-related information
- Self-diagnose by entering details on their age and gender, while their zip code and email are optional. A menu will be displayed when the users clicks on the part of the body which is of concern, and multiple symptom options are generated
- Diagnose other people, such as family or friends
- Source some information on the possible conditions that may have

1.3 WhatClinic, Ireland [2006]

WhatClinic helps patients to locate, compare and book the right clinic for them, serving in excess of 135 countries. It provides detailed listings of over 120,000 clinics on the site. These include doctors, dentists, beauty and cosmetic surgeons, physiotherapists, fertility practitioners and many more [8].

On the main page, users will find the services listed in their country, categorised by location. There is a search engine available to assist them to choose the service and the location, based on a list of clinics, along with other information about it, such as its rating and various reviews. Some of the clinics have compiled a list of price-related information, while others have not. The user can also book an appointment.

1.4 DoctorUna, United Arab Emirates [2012]

DoctorUna was launched in 2012 in the United Arab Emirates, Egypt, Jordan, Kuwait and Saudi Arabia. The main function it serves is to allow patients to quickly search for doctors across a broad range of specialties, undertake a comparative analysis, assess what type of insurance they accept and source information about these practitioners. [6] gives doctors access to a wider pool of patients, while also streamlining and managing their appointment booking process more efficiently.

3. Research Problem

People encounter the following problems when using more traditional methods to search for doctors:

1. Major lack of resources when seeking to source qualified doctors
2. Having to invest a substantial amount of time searching forums and blogs to source written content on the experience and opinions of others in relation to their doctors

3. No website currently exists which gathers patient feedback on Saudi Arabian-based doctors
4. People may misplace or forget contact details for the doctors
5. Individuals may be unable to self-diagnose their illness and may also be unsure as to which doctor they should visit

4. Research Objectives

The research objectives of this study are to develop a website that facilitates the process of finding doctors who have been approved and verified by other patients. This system will provide doctor information, identify the most suitable doctor to treat their specific condition and allows users to view patient feedback. Having completed an assessment of the doctor, the user can:

- Choose the best doctor to treat their specific condition, based on patient feedback
- Find a doctor with a particular medical specialty
- Use GPS to locate the nearest doctor
- Search directly on the system to locate a doctor by name
- Rate the doctor they have visited
- Establish what type of illness they have by using a symptoms checker

5. Methodology

1.5 Participants and Study Design

In order to collect the required data for the Best Doctor website, we conducted research on similar websites and then designed and circulated a questionnaire. The questionnaire was available in two languages, Arabic and English. Participant inclusion criteria comprised both genders, all age groups and those residing in Jeddah, Saudi Arabia. An online survey was developed using "Google Forms" and it contained eight questions. We recruited a total of 272 participants. Prior to creating the system, we distributed a questionnaire to acquire information on some important issues, such as: the community's acceptance of the idea; if users were of the belief that it would be assistance to them in making the process of finding doctors much easier; if people were open to rating their experiences; and if such ratings actually matter to them. The research findings helped us to learn from the experiences of others, and apply this knowledge to help us design the system in the most effective way possible.

Using the Best Doctor system, the user can visit the site and search for a doctor in a number of different ways, such as the name of the doctor, GPS to find the nearest practitioner or by specialty. Each doctor will have his or her own page on the site, which will contain relevant information, which the user can read, for example, office hours or the feedback from patients who

have already visited. This will help the user to make the right decision on who is the most appropriate doctor to treat his or her particular condition. Having attended the doctor, he or she can revisit the site to submit comments in the feedback section, while also rating his or her experiences of the doctor.

6. Data Analysis and Results

1.6 User Demographic Data

The questionnaire was in both Arabic and English. It was for all ages both genders in Jeddah, Saudi Arabia. It was an online survey using Google forms it contained 11 questions and got 272 responses.

User demographic data is shown in Table 1 below. The majority of participants were female (232/85%). Just over one-third (98/36%) were in the 20–35 years age group, while the lowest number were aged between 15–20 years (22/8%). Most respondents were college graduates (193/71%).

Table 1. Distribution of demographic data in the study cohort (N=272)

	N	%
Distribution of the participants based on gender		
Female	231	85%
Male	41	15%
Total	272	
Distribution of participants based on age group		
15-20 years old	22	8%
20-35 years old	98	36%
35-50 years old	87	32%
51 years and over	65	24%
Total	272	
Distribution the participants based on educational level		
Middle School	8	3%
High school graduate	49	18%
College graduate	193	71%
Other	22	8%
Total	272	

The results of the questionnaire administered are presented in Table 2 below. A total of 272 participants responded, all of whom were drawn from different organisational settings. The questionnaire was created

using Google Drive Google Forms and consisted of eight questions which were subsequently distributed through social networking sites.

Table 2. Participant Response to the Questionnaire

Question	Response			
	Excellent	Good	Poor	
1. How would you rate your skill levels in using the Internet?	49 %	48%	3%	
2. If you needed to see a doctor, which one of these methods would you first choose?	Ask family and friend for recommendation	Go to the nearest hospital	Online searches	
	56%	19%	25%	
3. If you had the name of a doctor and you needed to get further information about him or her, for example, phone number, practice location or working hours, how would you source these details?	Ask family and friends	Go online	Call telephone directories	
	17%	62%	21%	
4. If you wanted to purchase something online, what level of impact would consumer ratings of these items have on you?	Very high	High	Low	No impact at all
	19%	21%	52%	8%
5. Have you ever rated and provided written feedback on something you purchased online?	Yes	No		
	64%	26%		
6. What would you do if you felt sick and you did not know which doctor to visit?	Ask family	Go to hospital and ask to see a general doctor	Go online, identify the illness and go to a doctor based on the diagnosis you have received	
	18%	32%	50%	
7. Did you ever use a website that gathers doctor information and patient feedback?	Yes	No		
	22%	78%		
8. Would you find it helpful if you could access a website which gathers multiple feedback on doctors based in Jeddah?	Yes	No	Maybe	
	89%	6%	9%	

7. Design and Implementation of the Best Doctor System

We created the Best Doctor system to address patient problems, by initially facilitating the search process users undertake to find a suitable doctor, based on other people's experiences. It allows users to locate their nearest doctor through GPS, source a doctor who specialises in the medical area of interest to them or by name, if the user has some background information on the doctor. It also provides users with the opportunity to rate and speak openly about their experience with a particular doctor, as well as to check their symptoms against a list of appropriately trained treating doctors. The Best Doctor system structure is outlined below (see "Fig 1").
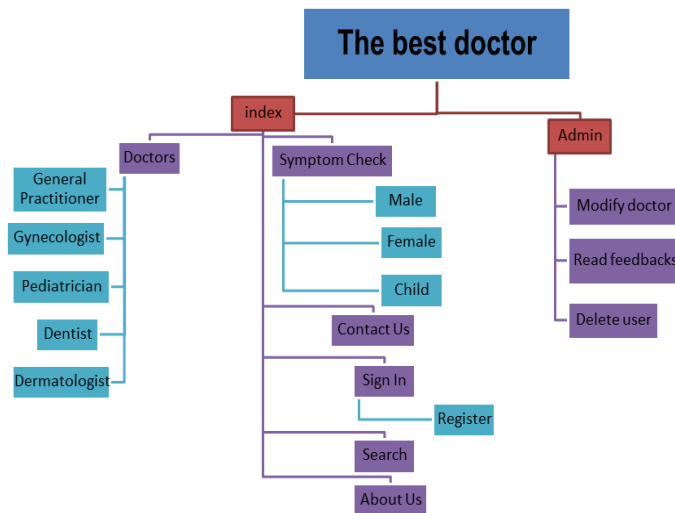

Fig 1. Best Doctor System Structure

8. Usability Test Results

1.8 Participants and Study Design

We recruited eleven people to participate in the testing process. They were subdivided into three groups: five people acted as administrators to test the system's administrative functions; three registered as users to test the site; and three unregistered users also tested the system. The website system usability testing was carried out at King Abdul-Aziz University. The test date was Sunday, 18th April, 2017.

2.8 Criteria Applied to Measure Usability

When writing about website usability, [3] describes usability as a "...quality attribute that assesses how easy user interfaces are to use". The following five principles were used to measure usability, as shown in Table 3 below. These criteria were applied to all functions included on our website, and were tested by both users and administrators.

Table 3. Criteria Applied to Measure Usability, Based on Nielsen's (2003) Theory

Measure	Strongly Agree	Agree	Disagree	Strongly Disagree	No Opinion
Learnability: How easy is it for users to accomplish basic tasks when they encounter the system design for the first time?					
Efficiency: Once users become familiar with the system design, how quickly can they perform the required tasks?					
Memorability: When users return to the system having been inactive for a period of time, how easily can they re-establish proficiency?					
Errors: How many errors do users make, how significant are these errors, and how easily can they recover from the errors?					
Satisfaction: Is the design user-friendly?					

3.8 Analysis of the Pre-Test Questionnaire Results

A pre-test questionnaire was distributed to participants in order to ensure that they met the required skills and possessed the appropriate qualities to complete the test and capture the users' feedback in relation to every task included on the website. In addition, participants were asked to identify the difficulties they faced during completion of each task, while users were also required to complete the pre-test questionnaire after each task on the test.

- Administrators' Questionnaire

The five administrators who used the Best Doctor health system were invited to complete an administrators' questionnaire, the results of which are presented in "Fig 2 to 12" below.

— **Task 1:** Login
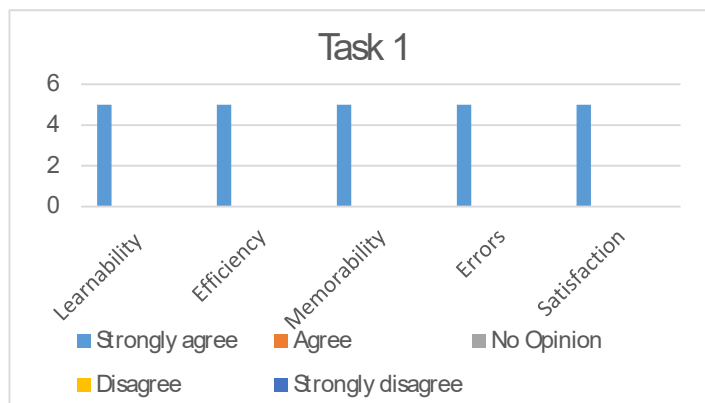
Fig. 2. Pre-test "Task1" for Administrators
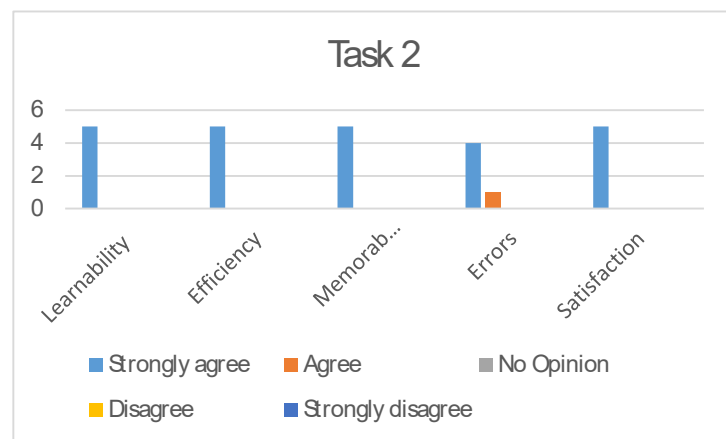
— **Task 2:** View all doctors

Fig. 3. Pre-test "Task2" for Administrators

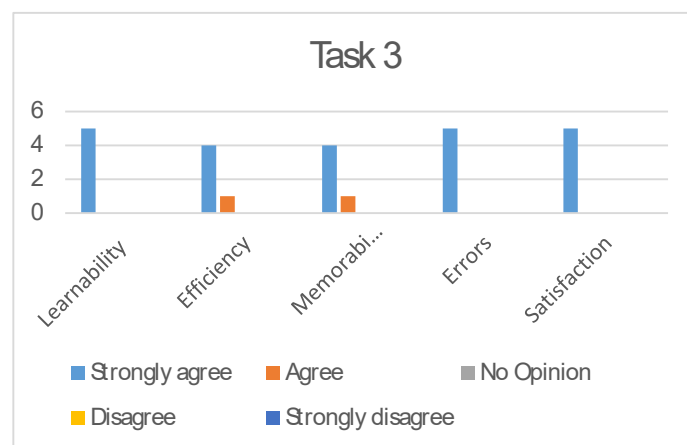— **Task 3:** View all registered users

Fig. 4. Pre-test "Task3" for Administrators
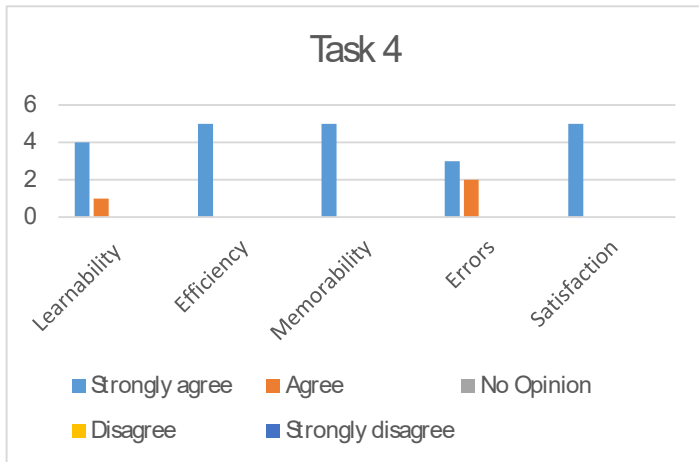
— **Task 4:** Update doctor's information

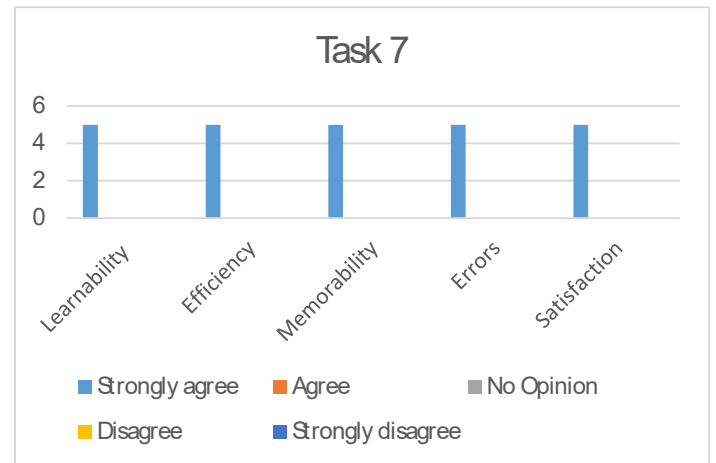Fig. 5. Pre-test "Task4" for Administrators

— **Task 5:** Delete doctors

Fig. 6. Pre-test "Task5" for Administrators

— **Task 6:** Add doctors

Fig. 7. Pre-test "Task6" for Administrators

— **Task 7:** Delete users
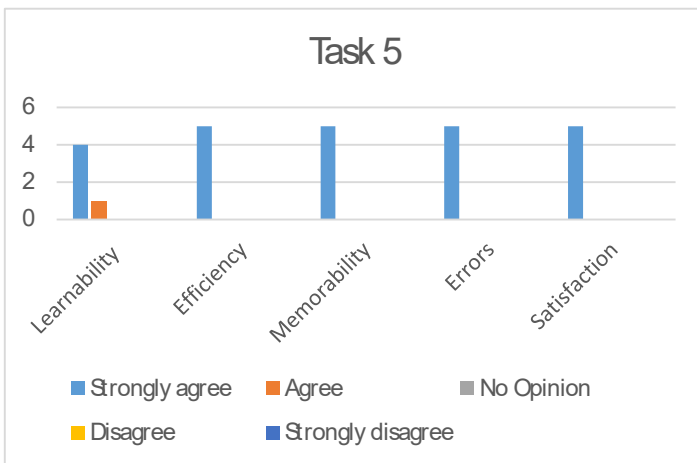

Fig. 8. Pre-test "Task7" for Administrators
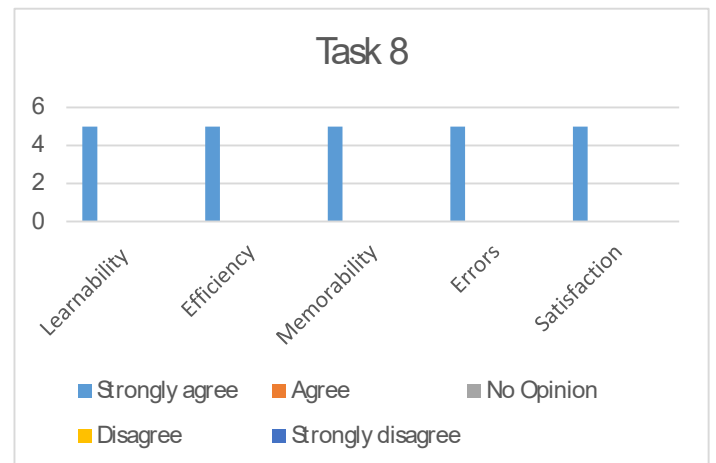
— **Task 8:** View all feedback comments

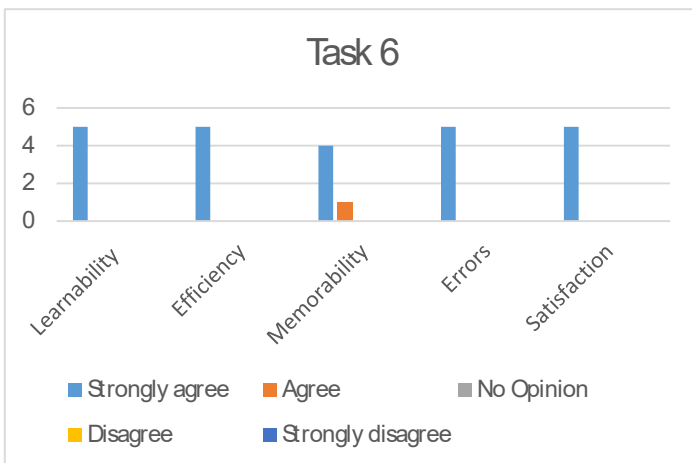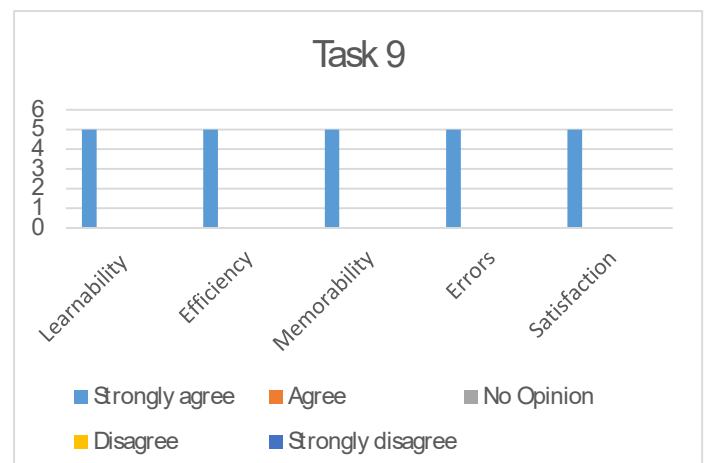Fig. 9. Pre-test "Task8" for Administrators

— **Task 9:** Delete feedback comments

Fig. 10. Pre-test "Task9" for Administrators

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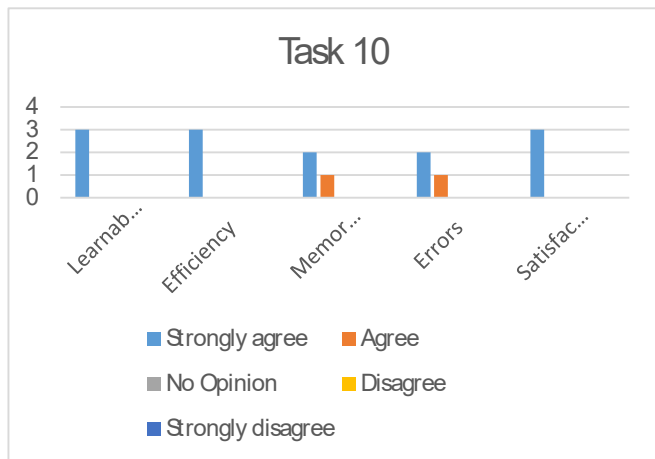— **Task 10:** View the entire website

Fig. 11. Pre-test "Task10" for Administrators
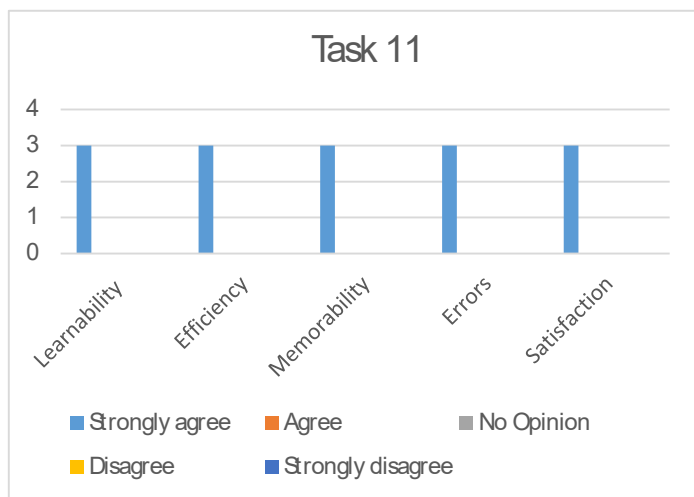
— **Task 11:** Logout

Fig. 12. Pre-test "Task11" for Administrators

4.8 Problems and Recommendations from the Pre-test Questionnaire

This section explores the problems and recommendations to emerge from the pre-test questionnaire, as illustrated in Table 3 below.

Table 3. Problems and Recommendations

Frequency	Description	Suggestions and Recommendations
Task 2 (Administrator): 1 in 5 administrators identified this problem	It is difficult to view every doctor listed on a single page	View list of all doctors on a single page

5.8 Analysis of the Results of the Post-test Questionnaire

Feedback obtained from the pre-test questionnaires specifically recommends that Tasks 2 and 6 be updated and improved, as proposed by administrators and registered users, respectively (see "Fig28 and 29" below).

- Administrators
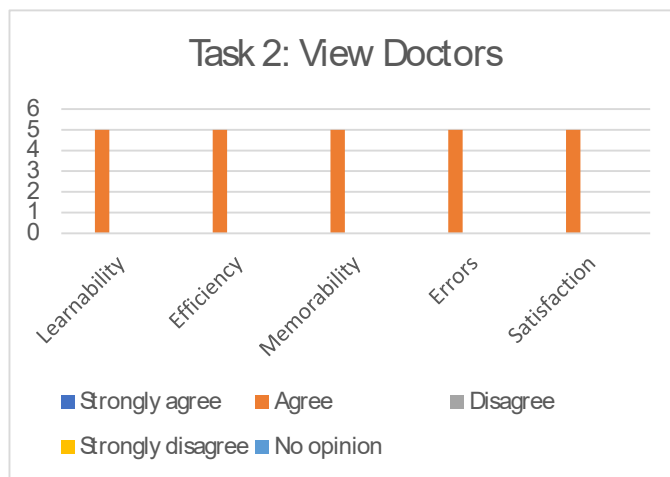
— **Task 2:** View doctors

Fig. 13. Post-test "Task2" for Administrators

9.   Conclusion & future work

This system was developed to facilitate a search process to identify reputable doctors; it allows the public to rate the doctors so as to help others to source a suitable practitioner who matches user criteria and is also ranked highly in terms of patient-doctor engagement. This web-based system has specifically been designed to help people to access supports conveniently, including many doctors offering different specialty services. Users can visit the Best Doctor system in order to search for a doctor in a number of different ways, such as name of the doctor, GPS to find a practitioner located nearby or by specialty. Each doctor has his or her own page on the site which contains key information, such as office hours or feedback posted by other people who have already visited this practitioner. Having made the decision as to who is the most appropriate doctor to visit to treat his or her specific condition, the patient can revisit the site after attending the appointment to submit comments in the feedback section and also provide a rating on his or her experiences of that particular doctor.

The target users for this system are practitioners working within the health sector, including hospital staff and clinicians, as well as those seeking treatment. It will

be rolled out in Jeddah and will gradually expand to include an ever-increasing number of professions. This paper explores the steps involved in usability testing, which include: identifying the applications' purpose; identifying the intended users and the test environment; specifying the tests to be carried out; conducting the usability testing; and analysing the information obtained. Currently the system only includes 4 medical specialties the plan is to include all medical specialties in the future, we intend to include the large cities in Saudi Arabia, develop a mobile application of the system, Complete the symptoms page to include all possible symptoms, and The user will be able to book an appointment from the website

10. Acknowledgments

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