Usability Analysis of Instant Messaging Platforms in a Mobile Phone Environment using Heuristics Evaluation

Muhammad Muaz Naeem
Department of CS & IT
University of Sargodha
Lahore, Pakistan
muaznaeem5@gmail.com

Mr. Abid Rafiq
Department of CS & IT
University of Sargodha
Sargodha, Pakistan
arafiq@uos.edu.pk

***Abstract*—Today, the mobile phone has become popular for everybody. It is playing an important role in social and political interaction. The fast evolution and adoption of mobile phones, the chance of developing an application and user interface are also increasing. Most of the applications are the complex and sophisticated user interface. It's necessary to take the usability test of mobile applications. There are several methods to determine the usability level of an interactive system, but heuristic evaluation is one of the methods most broadly used to evaluate UIs. The main objective of this study is to identify usability problems in the design of instant messaging applications.**

Keywords—usability, usability engineering, usability analysis, heuristics evaluation, heuristics, usability evaluation, usability evaluation methods, human computer interaction, mobile app usability

I. INTRODUCTION

Over the last few years, cell phones are playing a very important role in our daily lives. Market increasingly calls for better mobile applications, but most of them are becoming more complex and sophisticated user interface. While dealing with the applications, a high degree of usability is desired in the user interface. Usability is mainly concerned to provide valuable information to the designer to improve interaction with the system. But user experience takes a whole association with products and in addition, the consideration, feeling and recognition that outcome form that collaboration [1]. Usability evaluation assesses the ease of use of function and how strong they empower a user to play out their assignments proficiently [2]. Usability guideline, standard and ethics to guide and help developers in designing and developing the interface for their applications [3]. Reference [4] has presented the usability evaluation methods. They defined different usability evaluation strategies have been developed and can be defined into three types. Usability testing, inquiry and inspection. Heuristic evaluation is an inspection method in light of assessment over a real-time framework or model led by specialists [5]. The aim of this study is to find out the usability problems within the user interface design of instant messaging applications and discover new facts and ideas to make user-friendly applications. We selected six different android instant messaging apps to conduct this study. These apps include IMO, Facebook Messenger, Kik, Nimbuzz, WeChat and Soma. In order to achieve the objectives of this work, we used the approach of usability evaluation using a heuristic evaluation. Through this technique, we can enhance the usability of applications, create user-friendly apps and develop the new interface.

II. LITERATURE REVIEW

Usability evaluation provides the ease of function to be used and how strong they empower the user to play out their errands effectively [6].

A. Usability

Usability is the key to create a user-friendly product. Usability procedure, present rules and principles to guide that help developer in designing and developing the interface for their applications [7]. The term usability describes as "the capability of an output of a product to be understood, learned, operated and be attractive to clients or use when used to achieve certain objectives with effectiveness and efficiency in specific situations" [8]. But basic definitions of usability that is proposed by the ISO/IEC 9241: "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" [9]. The term product describes as any software application, website or any device used by the user. The important aspect of usability is to make a successful product and it indicates you, the user's feedback to the various product through usability testing.

B. Usability Evaluation Methods

Evaluation is the process of examining a program for identifying problems. Usability evaluation is the process to determine the usability problems and improve the design of the product. Evaluations are normally divided into two categories.

- Formative evaluation
- Summative evaluation

C. Formative Evaluation

In formative evaluation, it is helpful to make a better design and identifying the problems in the activities that are in progress. This evaluation is used in any phase of the ADDIE process. Formative evaluation is basically done to immediately improve the design of the product and refine the development specifications. Heuristic evaluation, cognitive walkthrough, pluralistic usability walkthrough, thinking-aloud testing and user interface inspections are some methods that can be used for formative evaluation.

D. Summative Evaluation

In summative evaluation the assessment of the program at the end of the activities or at the end of an operating cycle. Questionnaires, surveys, interviews, observation and testing are some methods that can be used for summative evaluation.

E. Heuristic Evaluation

It is a method for finding the usability of software, initially created by Nielsen and Molich and later refined by Nielsen [10][11]. It is also called the 'inspection' method. Heuristic evaluation helps to recognize usability issues in the user interface (UI) design. HE method is easy to implement. It is hard for an individual to recognize the usability issues in an interface. Therefore, it is possible to enhance the effectiveness of the method by including multiple evaluators applying a set of rules called heuristics as they review a given application.

III. Research Methodology

Research is an intelligent and deliberate path for gathering helpful data on a specific theme. It is an approach to explore and discover the arrangements towards logical and social issues through the target and precise investigation. A few research zones are dynamic, arduous and efficient to find, clear up realities and overhaul certainties, occasions, practices and hypotheses. Researchers arrange their examination by detailing and characterizing an exploration issue. This causes them to center the exploratory procedure will the goal that they can make inferences mirroring this present reality in the most ideal way. Research methodology is a science of studying how the research is to be carried out. Basically, it contains information about procedures, methods and tools that used to extract, describe and predict the information [12].

Fig. 1. Explanation of conducting the overall research work

IV. Evaluation Criteria

A. Heuristic Evaluation Guideline

Heuristic evaluation is a usability inspection method that helps to identify UI problems. It specifically involves evaluators examining the interface and used the principles 'the heuristics' to recognized usability problems (see Table 1). Heuristic evaluation is used at all stages of product development at early stages, released products and product review.

B. The Participant

The participants of the questionnaire varied in age from 18 to 52 years. From the sixty-one participants used in this survey. In which 42.5% are females and 57.5% are males who have filled the questionnaires.

TABLE I. Nielsen Usability Heuristics

1	**Visibility of system status**
Description: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.	
2	**Match between the system and the real world**
Description: The system should speak the user's language, with words, phrases and understandable to the user.	
3	**User control and freedom**
Description: Users control the system and they can exit the system at any time even when they have made mistakes. Support undo and redo.	
4	**Consistency & standards**
Description: Users should not have to wonder whether different words, situations or actions mean the same thing.	
5	**Error Prevention**
Description: Even better than good error message is a careful design which prevents a problem from occurring in the first place.	
6	**Recognition rather than recall**
Description: Minimize the user's memory load by making objects, actions and options visible.	
7	**Flexibility & efficiency of use**
Description: Make the system flexible that the user can easily understand the system and learn the system with efficiency without any help of the expert person.	
8	**Aesthetic & minimalist design**
Description: Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.	
9	**Help users recognize, diagnose & recover from errors**
Description: Error messages should be expressed in simple language, also show the issues and suggest a solution.	
10	**Help & documentation**
Description: Even though it is better if the system can be used without documentation, it may be important to give help and documentation.	

C. Survey Evaluations Among End-Users

In the questionnaires, you can get the data from a large number of people. Questionnaires are the best way to improve the product interface design. We designed a questionnaire on Nielsen's method and take feedback from a large group of users. Questionnaires included close ended questions. These questionnaires are about features of different apps. Designed questionnaire consist of 30 questions. For questionnaires (see Table II). Each question has

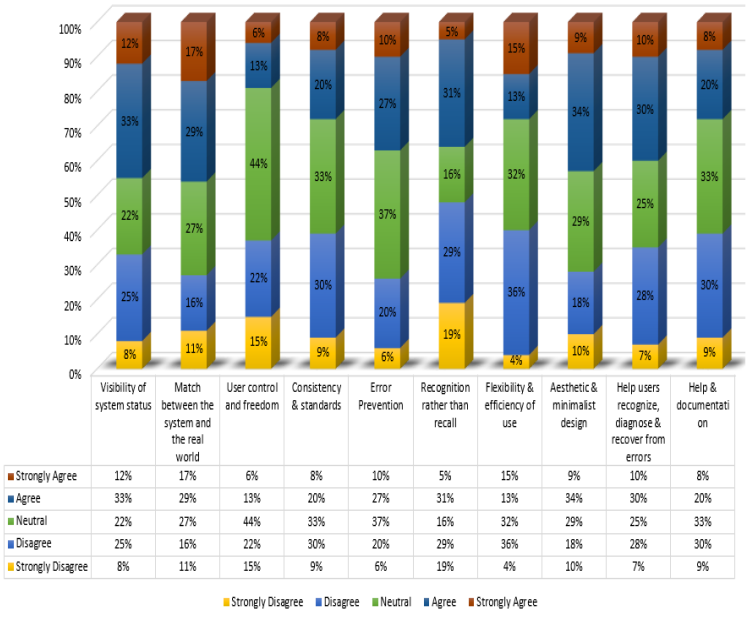
five options 1 to 5 to be select as a response. 1 is used for low priority and 5 for highest priority.

TABLE II. QUESTIONNAIRE ON NIELSEN'S METHOD

No.	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Is the application is complex to use?	12%	30%	48%	10%	
2	Is the application support both voice and video calls?		1%	19%	60%	20%
3	Does it tell about the status of audio or video calls?		25%	35%	38%	2%
4	Is the application support group video chats?	17%	34%	42%	7%	
5	Does the dial or disconnect button is visible for audio or video call interfaces?			33%	61%	6%
6	Should video call support a pause option?		7%	29%	55%	9%
7	Should application support video messages?	2%	10%	36%	49%	3%
8	Is the tasks can be performed in a straight forward manner?		25%	35%	38%	2%
9	Is error messages are show in the form of text and sounds?	6%	30%	48%	10%	6%
10	Does the application take time to recover in error situation?		7%	85%	8%	
11	Are the functions in the application were well integrated?		27%	61%	12%	
12	Is the navigation of the app reached the task?		13%	35%	45%	7%
13	Does it tell about the status of messages?		6%	27%	52%	15%
14	Is edit option is available after sending the message?	17%	39%	42%	2%	
15	Does the application allow to delete the multiple message?	9%	29%	51%	11%	
16	Are you satisfied with the message window style?	4%	19%	39%	20%	18%
17	Is the text easily readable?		7%	29%	55%	9%
18	Has it multiple font size options?	18%	47%	35%		
19	Is it easy to type message?	25%	35%	38%	2%	
20	Can we find the any old conversation using search option?	16%	35%	41%	8%	
21	Does the system provides 'undo' & 'redo' functionality?	7%	37%	53%	3%	
22	Does each window has a title?		27%	38%	35%	
23	Does the system clearly distinguishes between numerical and alphabetical fields?		18%	68%	14%	
24	Is the user can easily reverse actions?		12%	30%	48%	10%
25	Is icons are used in appropriate way?		17%	39%	42%	2%
26	Does each windows have the same color combination?	2%	10%	36%	49%	3%
27	I can use it successfully every time?		27%	39%	28%	6%
28	I easily remember how to use it?		7%	34%	59%	
29	I like using the interface of this application?	5%	19%	31%	38%	7%
30	Overall, I am satisfied with this application?		29%	37%	34%	

V. DATA ANALYSIS & RESULTS

We observed that people have emphatically concurred with that interface, which is anything but difficult to use. Based on the data from the questionnaire, 45 usability problems were identified by the user, showing that HE can play a meaningful role. Chi-square test is applied to check the association between apps and users, so the results depict that (0.000<0.05), there is no association. Generally means with the change of apps the responses also changed. Online help about apps also affected there is the association between apps and online help. Message window style of apps should also easy so that the opinion of peoples also changed by changing application. There are some points that we have extracted such as. In Imo, the message shown to the sending user without sending. Apps do not support video call with slow internet speed or bad video quality. Noise problem in both audio and video calls.



	Visibility of system status	Match between the system and the real world	User control and freedom	Consistency & standards	Error Prevention	Recognition rather than recall	Flexibility & efficiency of use	Aesthetic & minimalist design	Help users recognize, diagnose & recover from errors	Help & documentation
Strongly Agree	12%	17%	6%	8%	10%	5%	15%	9%	10%	8%
Agree	33%	29%	13%	20%	27%	31%	13%	34%	30%	20%
Neutral	22%	27%	44%	33%	37%	16%	32%	29%	25%	33%
Disagree	25%	16%	22%	30%	20%	29%	36%	18%	28%	30%
Strongly Disagree	8%	11%	15%	9%	6%	19%	4%	10%	7%	9%

Fig. 2. Rate the principle of heuristic

Availability problem in the Soma app. If the user is not online and you call this person the app not show any status or

any kind of message that the person is available or not. A user does not like the delete message function because it displays on the chat interface when you delete the message. Font size option also affected, there is no association between apps and font size which means the change of apps the responses also changed. Most of the user wants a new function of redo and undo the message and they also demand to introduce the different writing styles.

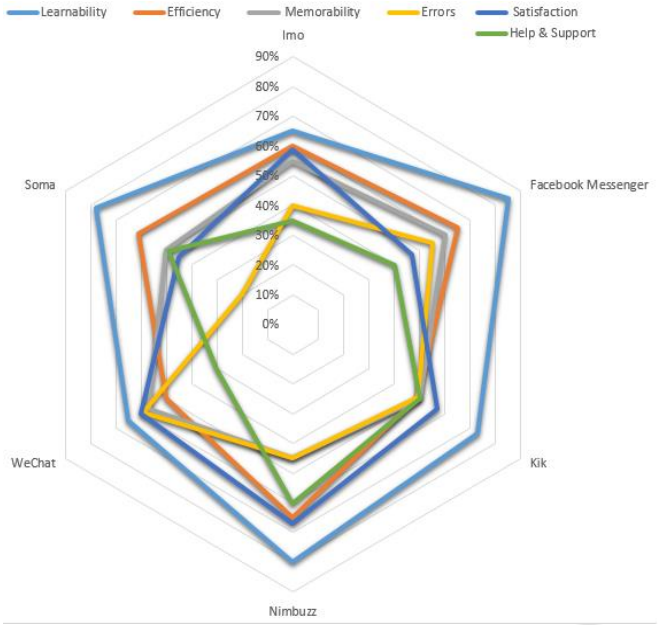


Fig. 3. Performance of the applications as a part of heuristic

VI. Conclusion

The design of a UI is the central point that decides the user experience and the user's choice on whether to continue utilizing a specific product. In this way, there has been a very substantial research exertion done in the UI plan and assessment territory. This research covers the Heuristics evaluation technique used to evaluate the user interface design to improve the UI. In this research, we checked the usability of various android applications. Usability is used to check how much an application is simply being used. We observed that peoples are strongly agreed with that interface, which is easy to use. On the other hand, most peoples commanded on chat messenger, that it should also contain the edit options of a message after sending. People want a new function of a video message. Most of the users want pause button option during video calls. Some of the users also demand that the company should introduce the new function in the form of multiplayer games during chat or calls. Most of the user wants to video call recording function in the app. Heuristic evaluation of the instant messaging platform was found to be extremely useful in assessing applications and to be most appropriate to finding usability problems early in the development process. Instant messaging applications may benefit from such a set of heuristics, because they provide precise feedback regarding issues to the designers. Further work should focus on how to modified usability evaluation for mobile devices and expanding the validation of the instant messaging app so that usability evaluators can use it with confidence when evaluating the design of instant messaging applications.

Acknowledgment

Our thanks to the anonymous reviewer's comments and Mr.Abid for all his assistance throughout the usability evaluation.

References

[1] Wang, Jianfeng, and Sylvain Senecal, "Measuring perceived website usability," Journal of Internet Commerce, vol. 6.4, pp. 97–112, 2007.

[2] Leavitt, Michael O, and Ben Shneiderman, "Research-based webdesign & usability guidelines," US Department of Health and Human Services, 2006.

[3] Albert, William, and Thomas Tullis, "Measuring the user experience: collecting, analyzing and presenting usability metrics," Newnes, 2013.

[4] Albert, William, Thomas Tullis, and Donna Tededco, "Beyond the usability lab: Conducting large-scale online user experience studies," Morgan Kaufmann, 2009.

[5] Yanez Gomez, Rosa, Daniel Cascado Caballero, and Jose-Luis Sevillano, "Heuristic evaluation on mobile interfaces: A new checklist,"The Science World Journal, 2014.

[6] Wang, Jianfeng, and Sylvain Senecal, "Measuring perceived website usability," Journal of Internet Commerce, vol. 6.4, pp. 97–112, 2007.

[7] M. O. Leavitt, and B. Shneiderman, "Research-based web design & usability guidelines," Washington: US Department of Health and Human Services, 2006.

[8] Hombaek. k, and L. E. Lai-Choong, "Meta-analysis of correlation among usability measure," ACM, pp. 617–626, 2007.

[9] ISO/IEC. 2000, "Ergomomic requirements for office work with visual display terminals (VDTs) Part 9 Requirments for non-keyboard input devices," Tech. rep. International Organization for Standardization, Geneva Switzerland, ISO 9241-11.

[10] R. Molich, and J. Nielsen, "Improving a human-computer dialogue," Communications of the ACM, vol. 33.3, pp. 338–348, 1990.

[11] J. Nielsen, John Wiley, and Sons, "usability inspection methods and heuristic evaluation," 1994, Accessed June 18, 2017.

[12] S. Rajasekar, P. Philominathan, and V. Chinnathambi, "Research methodology," arXiy preprint physics/0601009, 2006.