

# Design And Evaluation of a Mobile User Interface Usability

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## ABSTRACT

*This research has intended to identify the importance of the usability factor in the creation of a mobile application. Basically, when it comes to directory information, most of the tourists use a conventional method, such as printed maps, traveling books, online or traveling websites and also travel agents. From my perspective and with support from the field research, language impediments and directory issues have been the most common problems in this research. While Smartphone's and apps are, increasingly, being used nowadays, there are not sufficient studies addressing the usability of smartphone user interfaces or applications that are focused for tourist guides. This paper describes the design and evaluation process of the user interface of a smartphone application designed to be a guide or directory for tourists.*

*Two successive versions of the user interfaces were tested with different groups. The results and findings from two rounds of usability tests led to recommendations regarding an inclusive design and the designing of apps that are useful for tourists and which may be a useful contribution to the broader community when designing interfaces for smartphones. Overall, the users enjoy using the new application that is more user friendly and easier to use and navigate with. The findings can be used as a reference to set certain standards in mobile application design and creation, and also to be used for academic benefits.*

**Key words:** Usability, Mobile Interface, Mobile Apps, Human Computer Interaction

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## 1. INTRODUCTION

Mobile phone technology is developing rapidly and will expand every year. From the first handheld cell phone in 1973 until now, with the latest generation of Smartphones, this is just the beginning of better communication. Recently, the mobile phone has been used not only for communication, but it has also become the key to worldwide information dissemination, and it has proven its usefulness in various fields such as web browsing, social networking, gaming and others.

Mobile phones that fulfil the users' needs play an important role in society. Many industries have begun to realize the potential of mobile phones as a device to guide tourists. In the mobile phone application context, there are a number of mobile applications that are designed to provide a guide, directory and other options for the user. Although the amount of signage in the city has improved, there remain weaknesses in the provision of directional signage to some tourist destinations and interpretation panels at key attractions, as well as in the availability of comprehensive, up to date city maps. Inadequate directional signage and other information on tourist sites is a major issue (DBKL, 2018).

Here is where mobile applications play the role to fulfil the users' expectations by providing applications that have good usability and are user friendly. There are several methods of usability evaluation, and they each have advantages and disadvantages. Some are difficult to apply, and others

are dependent on the measurers' opinions or instruments. In addition to these challenges, mobile devices and applications change very quickly, and updated methods of usability evaluation and measurement are required rapidly.

## 2. LITERATURE REVIEWS

Usability is defined as the level to which a product can be used by precise users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use ([www.iso.org](http://www.iso.org)). The three measurable usability attributes defined by ISO 1998 are effectiveness, efficiency and satisfaction ([www.iso.org](http://www.iso.org)). Effectiveness refers to the accuracy and completeness with which users achieve their specified goals, and efficiency refers to the resources expended in relation to the accuracy and completeness with which users achieve their goals; while, satisfaction has been explained as being free from discomfort and having positive attitudes towards the use of the product ([www.iso.org](http://www.iso.org)). Usability is a quality attribute related to how easy something is to use, and it refers to how quickly people get used to it. (Jacob Nielsen, 2000). The challenge is to design a mobile interface that brings the user to all the features without any difficulties. More recently, ISO 25010 broke down the notion of quality-in-use into usability-in-use, flexibility-in-use and safety-in-use. In addition, ISO 25010 defines satisfaction-in-use as likeability, pleasure, comfort and trust ([www.iso.org](http://www.iso.org))

Google has also developed Android user interface guidelines, which guide developers to take into account factors such as touch gestures, size and location of Icons and Buttons, Contextual Menus and their responsiveness, simplicity, size and format of Text and certain aspects of Messages. These guidelines also explain how these characteristics should be considered during the development and testing of the Android applications (Google, 2018).

Mobile usability includes some of the new mobility-related challenges, such as mobile context, connectivity, small screen size, different display resolutions, limited processing capability and power and data entry methods (Adipat, 2005).

## 3. METHODOLOGY

This research used a few methods that are commonly used for qualitative studies to gather data and information and to achieve the aim and objective of the research that have been determined. This qualitative research objectives are described below. This research has attempted to answer these few questions.

- a) How can one analyse the usability of mobile apps?
- b) How does the structure and design of mobile apps influence and attract the users?
- c) Which design recommendation is the best in terms of function and usability?

To obtain the result, three general stages of the research process were conducted as suggested by Ian Noble and Russel, Bestly (2011). They were investigation, information gathering and transformation of the design. There were a few possible techniques to evaluate usability throughout the survey. Analysis of user interaction by checklist was one of the techniques. Users could fill in a detailed checklist about the acceptability of various aspects of usability to highlight a particular type of issue (Nigel Bevan, 1991). The size of the sample, whether 2, 10 or 100 cases, does not transform a multiple case into a macroscopic study, but the goal of the study should establish the parameters, and then should be applied to all the research. In this way, even a single case could be considered acceptable provided that it has met the established objective (Tellis, 1997). The sampling for this research was 30 respondents, who were selected among the students from the art & design faculty, as well as those majoring in multimedia and graphic design. The reliability of the respondents was based on their knowledge of multimedia and web design.

The interview is one of the research methods that researchers use in order to gain the primary data from the users' or individuals' experiences. In this research, the respondents were local and international

tourists. Self-assessment, expert interviews, online assessments and surveys were conducted on students/professionals in the related field. (Pre-test and Post-test) Usability testing was performed to ensure that the users could complete common tasks with the application without complexity.

#### 4. RESULTS & DISCUSSION - COMPARATIVE ANALYSIS BETWEEN THE PRE-TEST AND POST-TEST DATA

At this stage, after pilot testing for the Pre and Post-tests had been completed, all the data was analyzed and combined together, to find out the weakness and strength of a certain issue in this research as well as whether it needed to be improved or not. In addition, in the pre and post-test processes, the researcher wanted to find out whether the application had successfully solved the problem or reduced the percentage of the problems.

##### SECTION 1 INTERFACE DESIGN

Figure 1.0 showed the pre and post test results that had been performed on the earlier part of this chapter. From the pre-test result on section 1 Q1, Is the background colour suitable with the direction of this app?, 63.5% of the respondents chose *agree* and 4.8% chose *strongly agree*. In addition, on the post test result, the percentage of the respondents that agreed declined to 57.7%. However, on the *strongly agree* answer, the percentage increased from 4.8% up to 12.9%. When both percentages of the pre-test and post-test for agree and strongly agree were combined, the pre-test total percentage was 68.3% and the post-test percentage was 70.6%. From another point of view, the post-test percentage was higher than the pre-test.

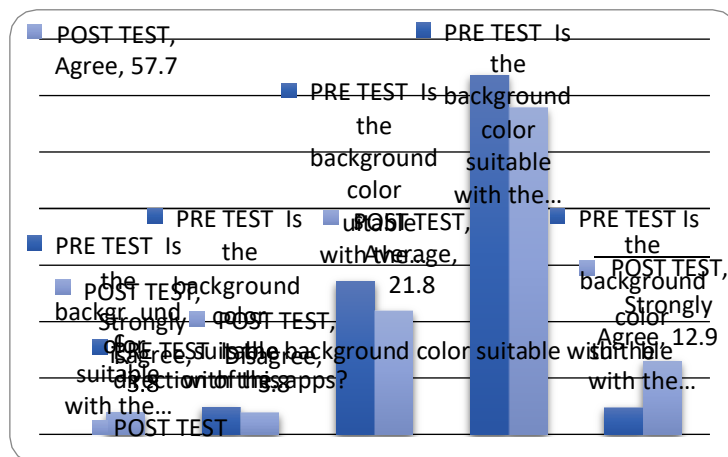


Figure.1.0: Comparison graph for section 1 pre and post test.

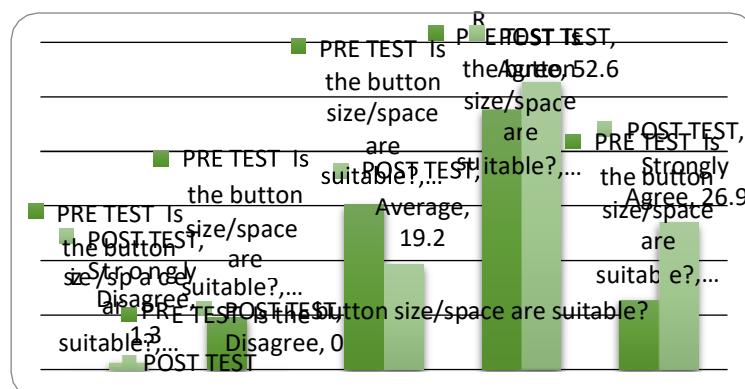
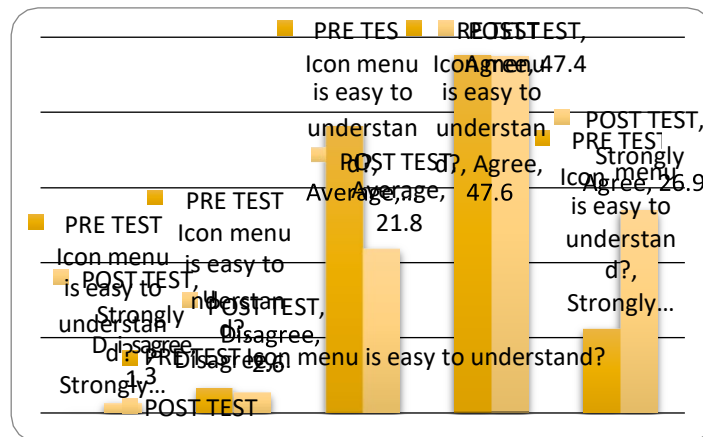


Figure 2.0: Comparison graph for section 1 Q2 pre and post-test.

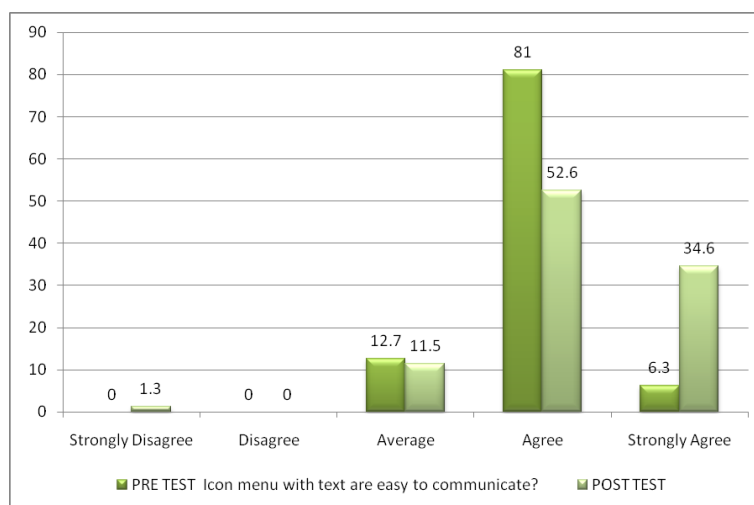
On Figure 2.0, Is the button size/space suitable for the apps?, the percentage for both agree and strongly agree increased in the pre-test result from 47.6% to 52.6% agree and from 12.7% strongly agree to 26.9%. Overall, the respondents were somewhat comfortable with the size and space used for the button menu that was redesigned for the post test. From the graph above, different results between the pre and post tests can be clearly seen. The result turned out to reveal that there was a change from the previous negative to positive. In the pre-test, 30.2% of the respondents chose *average*, but the percentage of those who selected *agree* increased from 47.6% to 52.6% and there was a huge increase in the *strongly agree* group from 12.7% up to 26.9%. This shows that the weaknesses on the pre-test had been changed and the users were somewhat comfortable with it.

Figure 3.0 showed that some respondents agreed with the question that the icon menu was easy to understand. There was no major difference between both results but there were firm answers on the fact that there was no major issue in this section. The respondents were contented with the icon used.



**Figure 3.0:** Comparison graph for section 1 Q3 for pre and post-test.

This question was prepared to get a suggestion from the respondents, is the icon menu design with text is easy to communicate. From the result above it can be concluded that most of the users agreed that the icon menu with text was easier and better to communicate with and to deliver a message; because, from the pre and post-tests' results, the percentages were from average and above. The percentage of strongly disagree and disagree were also at the minimum.



**Figure 4.0:** Comparison graph for section 1 Q4 for pre and post-test.

As shown below, the percentage from the pre-test was higher than the post test. On the pre-test,

79.4% of the respondents agreed with the question, but on the post test, the percentage of those who chose *agree* declined to 55.1%. However, for the post test, 38.5 % of the respondents selected *strongly agree* that the text was readable. This was more than 14.3% on the pre-test. Overall, the percentage was on average and above, which may conclude that there were no major changes needed, but rather, maybe a minor arrangement would suffice.

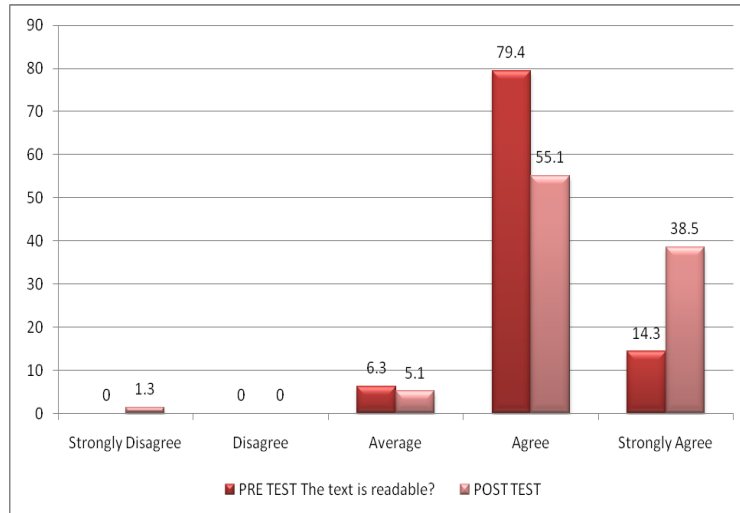


Figure 5.0: Comparison graph for section 1 Q5 for pre and post-test.

## SECTION 2 USABILITY

From Figure 6.0, it can be concluded that the percentage of those who chose *disagree* on the pre-test was 28.6%. This figure declined to 1.3% on the post test. This shows that the improvement of usability on the post test was successful; it changed the percentage from negative to positive. On the pre test, 55.6% selected *average* for the question, but on the post-test 24.4% selected *average* for this question. For the remaining answers, the percentage on the pre-test was 22.2% *agree*, but this increased sharply to 50% when the question was answered on the post test. It is believed that the post-test had improved the usability of this app.

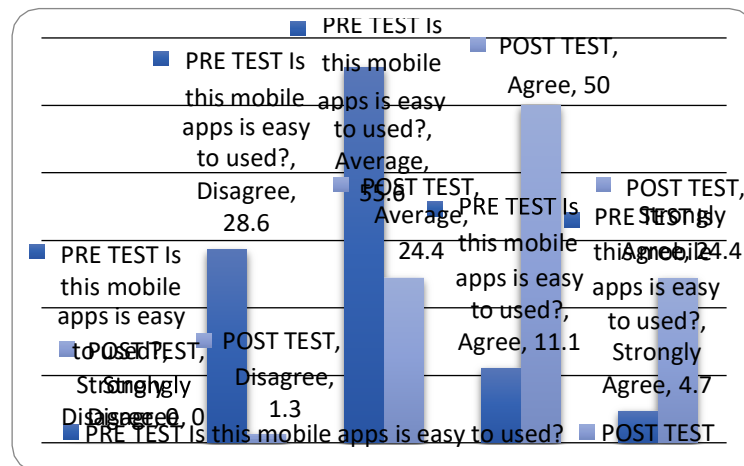
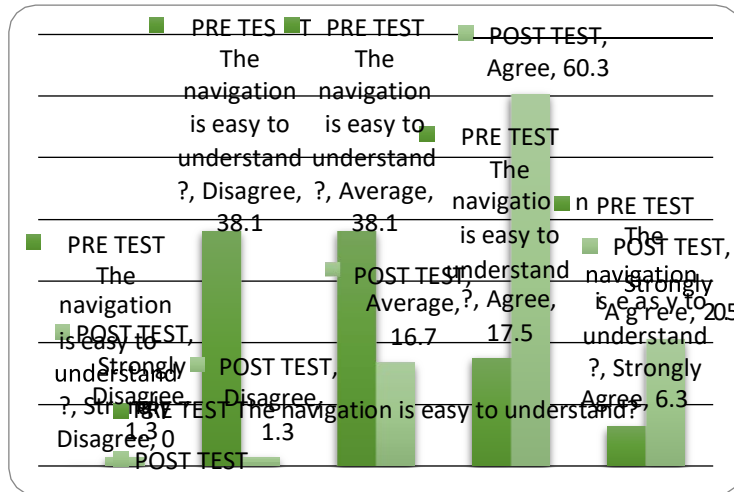


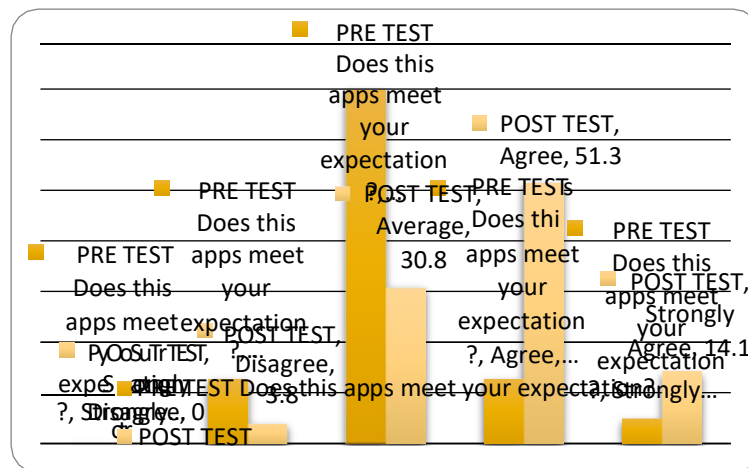
Figure 6.0: Comparison graph for section 2 Q1 for pre and post-test.

On Figure 7.0, both percentages for *disagree* and *average* were 38.1%, but on the post test, this number increased up to 60.3%; the respondents selected *agree* for the question more often compared to 17.5% on the previous pre-test.



**Figure 7.0:** Comparison graph for section 2 Q2 for pre and post-test.

In Figure 8.0, the percentage of the respondents who agreed with the question on the pre-test was only 12.7%, but this increased on the post-test to 51.3% for those who selected *agree*. From 4.8% of those who chose *strongly agree* on the pre-test, on the post test, the number went to 14.1%. from the post test results, we can see that the percentage of the respondents that selected *disagree* declined to 3.9% from 12.7% on the pre-test. This shows that this application was upgraded to fulfil or offer possible solutions towards the users’ needs.



**Figure 8.0:** Comparison graph for section 2 Q3 for pre and post-test.

On the pre-test design, the interface design used a scrolling menu, but due to the response to the pre-test outcome, the scrolling menu was changed to a rotation menu. From the 33.3% of the respondents on the pre-test who disagreed with using the scrolling menu, the number declined to 2.6% of those who disagreed with the function of the rotation menu. From 19% of the respondents who chose *agree* for the question on the pre-test, the number increased to 50% *agree* with the function of the rotation menu; and, 3.3% of the respondents who strongly agreed on the pre-test, went up to 34.6% *strongly agree* with the rotation menu on the post test.



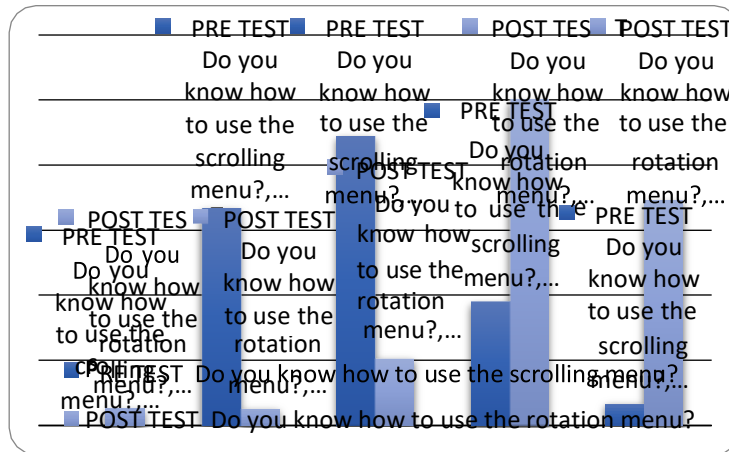


Figure 9.0: Comparison graph for section 3 Q1 for pre and post-test.

### SECTION 3 FUNCTIONALITY

For a validation of whether the scrolling or rotation menu was more suitable for this application, the researcher requested the respondents to choose between the two applications. As shown below, from 15.9% who chose the scrolling menu on the pre-test, it went up to 52.6% of the respondents agreeing that the rotation menu was better. Meanwhile, the on pre-test, 3.2% strongly agreed with the scrolling menu, which increased up to 33.3% voting for the rotation menu.

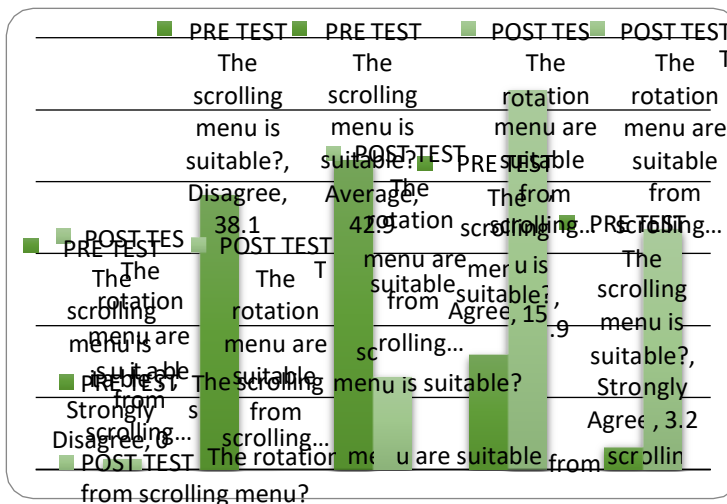
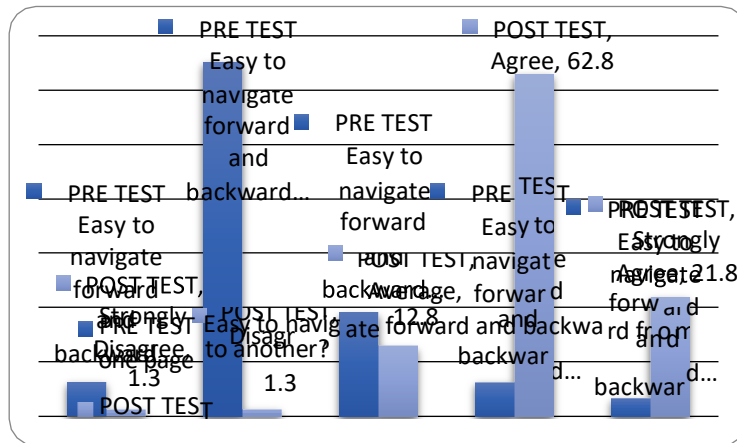


Figure 10.0: Comparison graph for section 3 Q1 for pre and post-test

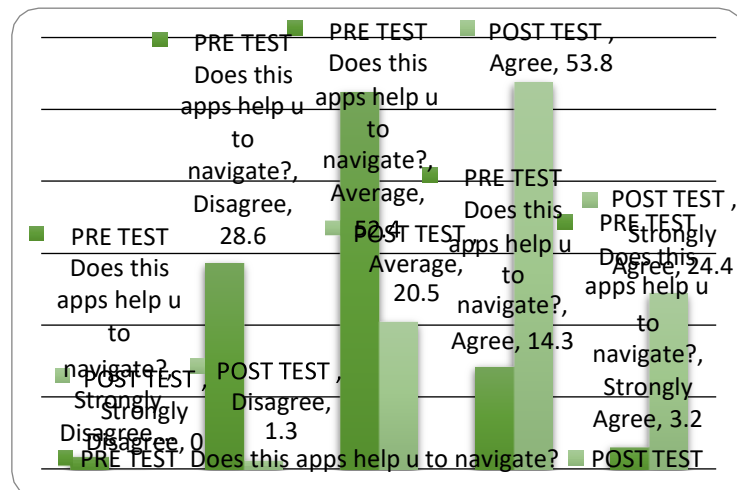
### SECTION 4 NAVIGATION

There are major changes noted between the pre and post-tests in this section. 65.1% of the respondents on the pre-test selected *disagree* with the question. However, there was an increase up to 62.8% to show that the respondents were comfortable with the changes made with the post-test navigation.



**Figure 11:** Comparison graph for section 4 Q1 for pre and post-test.

Referring to Figure 12, for the pre-test, 52.4% of the respondents selected *average* and 28.6% chose *disagree* with the question. However, after changes were made on the post test, there was a sharp increase where 53.8% of the respondents selected *agree* for the question on the post test, which came up from 14.4% from the past pre-test.



**Figure 12:** Comparison graph for section 4 Q2 for pre and post test

## CONCLUSION

This study analyst usability factor of the mobile app through the interface design, usability, functionality and navigation aspect will influence and attract mobile app user. If a good usability was applied to the app, user will directly and easily guide to achieve the information that needed. This research analysed the usability of mobile apps that has been design regarding the usability factors using questionnaire and pilot testing. The interface was designed to feed the users' needs by using simple interface and simple instruction or screen flow to be followed. This research also had revealed that the post -test design has a good standard in term of usability. This research also establishes that users are comfortable with the new navigation menu or rotation menu rather than the scrolling menu. This application interface and usability is considerably acceptable by the respondents and the researcher alleged that something can be put as an added value into this application in future to fulfil the users' needs conferring to development of mobile application nowadays.



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