

Usability Analysis for An Android Based Application

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Abstract

The Android-based application tagged as “FPI-STUDENTS APP” was developed to support students of The Federal Polytechnic Ilaro to calculate their GPA/CGPA, set-up lectures timetable reminder and get familiar with the school’s rules and regulations. As an Android-based application developed to support students, its’ Usability has to be tested, to determine how easy the interface is, the percentage of the application’s usefulness and to know the aspect of the application to re-design. The objective of this research is to determine the result of usability testing for the application based on three characteristics: Effectiveness, Efficiency and Satisfaction. Primary data used were collected from 15 respondents/users that were involved in the testing of the application on phones. Effectiveness and Efficiency were calculated from some tasks/activities given to respondents/users, and Satisfaction was derived from questionnaires that were answered. The result shows that Effectiveness and Satisfaction analysis delivered 86.67% and 85.83% respectively, while the result of Efficiency was 79.56%. The average results of Efficiency, Effectiveness and Satisfaction resulted in overall Usability of the application, which is 84.02%. This implies that 84.02% of respondents/users found the application to be useful effectively, efficiently and satisfied with the applications’ functionality. We can, therefore, conclude, based on the usability analysis that, the percentage of the applications’ usefulness is 84.02%, and easiness of the interface recorded the same percentage while the aspect of the application to be re-designed is 15.98%

Keywords: Android, Application, Efficiency, Usability.

Citation

Alawode, A.J. & Adegboye, O.J. (2020). Usability Analysis for an Android Based Application. *Journal of Women in Technical Education and Employment (JOWITED), The Federal Polytechnic, Ilaro Chapter*, 1(1), 84-89

1. Introduction

Educational institutions have been greatly influenced positively by information Technology in all ramification. The advent of communication technology has made it possible for people to access contents through the internet wherever they are via mobile devices or smartphones. A higher percentage of people across the globe are active users of smart communication gadgets such as phones and get benefits from many applications that are built on software (Nyembo & Christian, 2013). The use of smart communication gadgets and corresponding software applications such as learning-related websites, social-medial and smartphones in educational procedures has been pervasive and growing. Soyemi & Alawode (2018) developed and presented a supportive application in educational institutions called “FPI-STUDENTS APP”. This is an Android-based application with three modules to support students of the Federal Polytechnic Ilaro. The application performs three main functions, respectively, with the number of modules. The first module provides information about the Institution rules and regulations with the Students’ Union Constitutions and related information. The second module enables students to automatically calculate their GPA/CGPA, while the last module provides an electronic copy of lectures timetable for easy access.

The application has been put to use, but the degree of usefulness among the users was not known. Therefore, the problem addressed in this paper is, to determine the App’s level of usefulness to the users and in this case, students. The level/degree of the App’s usefulness is of great importance, as this

ARTICLE HISTORY

Received: March 29, 2020
Revised: May 29, 2020
Accepted: July 24, 2020

will keep the App up to date concerning users’ need. The work done by Soyemi & Alawode (2018), did not cover the usability aspect of the application. Therefore, the objective of this study is to determine the Usability of the application based on three characteristics: Effectiveness, Efficiency and Satisfaction.

International Organization for Standardization (ISO) defined Usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specific context of use”. Annie (2020) identified Usability as an essential aspect of mobile application development that performs a significant role in creating excellent user experiences that are enjoyable, fun-filled, pleasant and effective. Dorian (2016), emphasised the importance of usability testing for healthcare applications, while Mona (2015) stressed the importance of usability testing for educational applications.

2. Methodology

Usability analysis was carried out on FPI-STUDENTS APP to determine the Effectiveness, Efficiency and Satisfaction based on International Organization for Standardization (ISO) definition of Usability. Which says, Usability is the extent to which a product can be used by specified users to achieve defined goals with Effectiveness, Efficiency and Satisfaction in a specific context of use.

Respondents cover 15 Students from NDI to HNDII. Overall respondents are familiar with and accustomed to using Android-based mobile devices. Preliminary Observations on the respondents show that all of them can identify icons and menu on the application and ability to collect necessary information in the digital environment through browsers or other means.

Respondents were asked to carry out three different tasks and corresponding time (T1, T2 and T3) to complete or quit each Task was recorded accordingly. Status of the tasks (S1, S2 and S3) were also recorded. Any successful task was given the status of “1” while failed, or aborted Task was assigned “0”. Primary data were used to calculate Effectiveness and Efficiency, using (ISO) formula for Efficiency and Effectiveness. (ISO, 9241).

Satisfaction was measured in this research work through a formalised questionnaire featuring satisfaction scales. A 5-point questionnaire was designed with a numeric value of satisfaction coefficient from 0 to 4. Each questionnaire contains three positive and three negative questions with weight driven answers reflecting subjective users’ opinion after interaction with the application. Brief descriptions of the questionnaire used for Satisfaction are presented in Tables 1, 2 and 3.

Table 1: Five-Point Scale Questionnaire used

NO	RATHER NOT	NEUTRAL	RATHER YES	YES

Table 2: A positive question with weight driven answers

(I am pleased with the operation and speed of this application).

No	Rather not	Neutral	Rather yes	Yes
0	1	2	3	4

Table 3: A negative question with weight driven answers

(I often made a mistake while doing tasks)

No	Rather not	Neutral	Rather yes	Yes
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4	3	2	1	0
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Similarly, the response of the users was used to calculate the satisfactory level of the application, according to ISO formula for Satisfaction.

Usability analysis for the application was calculated by finding the percentage average of Effectiveness, Efficiency and Satisfaction of the application through data recorded from all the Respondents/Users. Table 4. Shows the respondents and the parameters used to measure the application’s Usability. Effectiveness, Efficiency, Satisfaction and corresponding Usability levels were demonstrated for each respondent, and the whole Usability for the entire App was given as the average of all respondents’ Usability.

Figure 1: shows the Usability Testing Flowchart, which described the procedures and activities involved in this study from beginning to the end in sequential order.

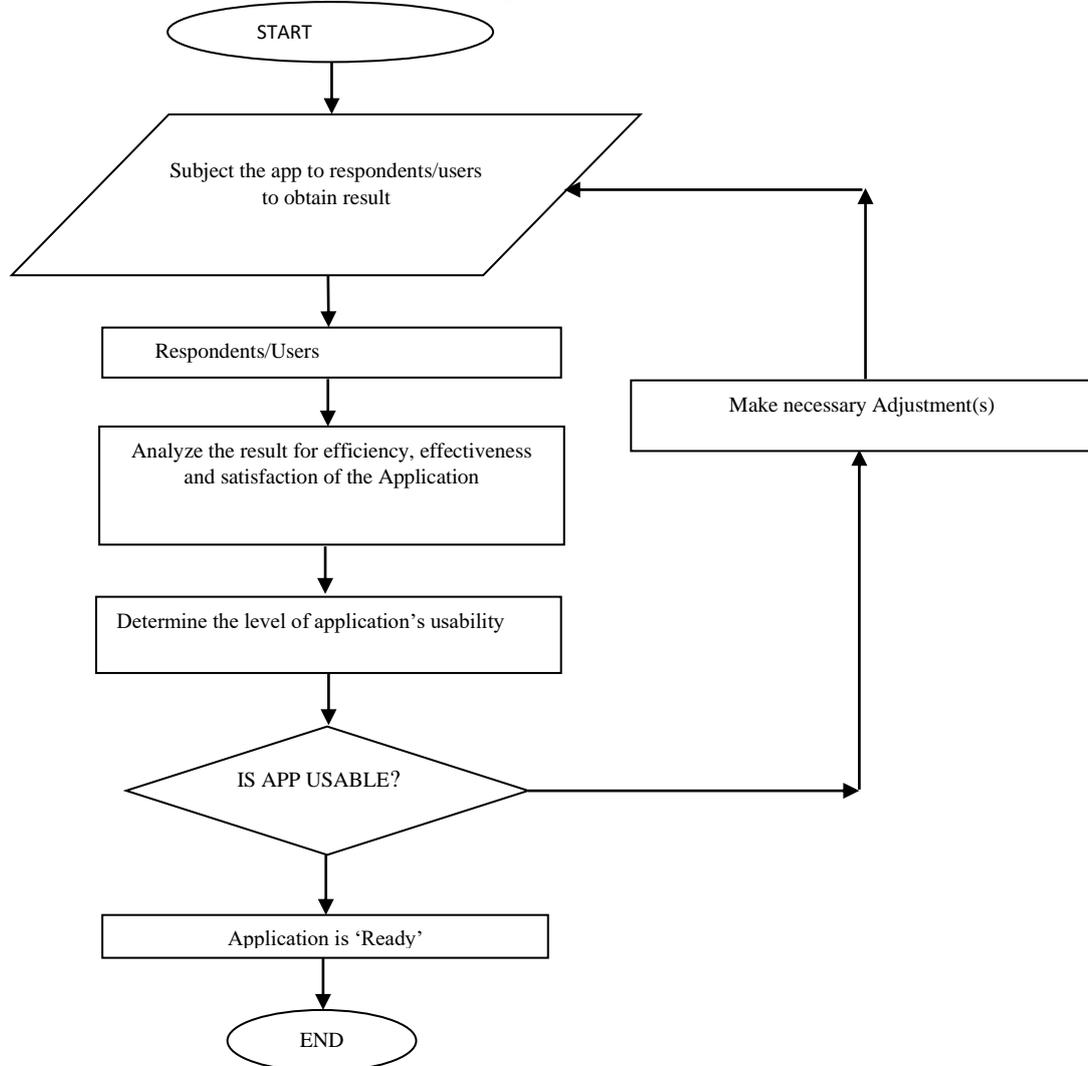


Figure 1: Usability -Testing Flowchart.

The Effectiveness is evaluated using the formula.

$$\bar{E} = \frac{\sum_{j=1}^R \sum_{i=1}^N n_{ij}}{RN} * 100\% \quad (1)$$

Where N is equal to the number of Tasks, and R is equal to the total number of users.

n_{ij} is the outcome of Task i by User j ; $n_{ij} = 1$; if user j successfully finished the Task. Otherwise, $n_{ij} = 0$;

Similarly, the best description given to Efficiency is “resources spent by Respondent/User to ensure accurate and complete achievement of the Tasks (goals). It, therefore, evaluated with:

$$\bar{P} = \frac{\sum_{j=1}^R \sum_{i=1}^N n_{ij} t_{ij}}{\sum_{j=1}^R \sum_{i=1}^N t_{ij}} * 100\% \quad (2)$$

The only additional parameter needed to evaluate Efficiency is Time taken (t_{ij}) to complete the required Task i by User j or quit after failure.

Satisfaction was also evaluated using the formula.

$$\bar{S} = \left(\frac{\sum_{j=1}^R \sum_{i=1}^N \frac{P_{ij}^+}{4} + \sum_{j=1}^R \sum_{i=1}^N \frac{P_{ij}^-}{4}}{(Q_+ + Q_-)R} \right) * 100\% \quad (3)$$

The percentage of the applications’ Usability is evaluated by finding the average of Effectiveness, Efficiency and Satisfaction.

The comprehensive results from Respondents/Users were recorded accordingly, and relevant evaluations were done to ascertain the percentage of the applications’ Usability.

3. Results

The levels of Effectiveness, Efficiency, Satisfaction and corresponding Usability for each Respondents are presented in Table 4. The last column is the usability levels for each respondent, while the last row of the last column is the overall Usability of the application.

Table 4: Respondents and parameters used to measure Usability of the application

S/no	Respondents	Effectiveness (%)	Efficiency (%)	Satisfaction (%)	Usability (%)
1	1	66.667	45.106	92.667	68.147

2	2	100.000	100.000	96.834	98.945
3	3	100.000	100.000	71.833	90.611
4	4	100.000	100.000	93.667	97.889
5	5	66.667	48.216	84.333	66.405
6	6	100.000	100.000	100.000	100.000
7	7	100.000	100.000	84.333	94.778
8	8	66.667	58.739	84.333	69.913
9	9	100.000	100.000	88.500	96.167
10	10	66.667	40.000	84.333	68.667
11	11	100.000	100.000	92.667	97.556
12	12	100.000	100.000	80.067	93.356
13	13	66.667	57.212	61.033	61.637
14	14	66.667	44.192	84.333	65.064
15	15	100.000	100.000	88.500	96.167
Average		86.668	79.564	85.828	84.020

4. Discussion of results

Effectiveness and Satisfaction of the application gave 86.67% and 85.83% respectively. This can be interpreted that a good number of respondents/users were able to achieve their goals effortlessly. Efficiency shows the least value of 79.56% compared to Effectiveness and Satisfaction, which is also a good performance. The Usability of the application was calculated to be 84.02%, which is considered as a good result. It is therefore established that the level of usefulness of “FPI-STUDENTS APP” is 84.02%. This implies that, the application passed usability test with 84.02% of usefulness. Furthermore, the only aspect of the application that required modification is just 15.98%.

5. Conclusion

Usability of the application simply shows 84.02% which means usefulness of the application and easiness of the interfaces measured 84.02%. While the aspect to be re-designed is just (100 – 84.02) %. Similarly, developer will also like to re-use useful 84.02% of the application and this is referred to as application’s re-usability. Better performance can be recorded, if Efficiency of the application is worked upon by implementing affordance in the design.



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