Evaluation of Mobile Application Prototype in Context of Design Against Human and Computer Interaction

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ABSTRACT
Application design is part of a process to produce a prototype or multimedia product by integrating several multimedia elements, including text, graphics, audio, video and animation. In the process, it involves some of the important features of Human Computer Interaction (HCI). This study aimed to identify appropriate application designs and evaluate the quality of the prototype which is a tool for teaching special education students. In this study was conducted a summative test of prototypes to see the effectiveness of application design taking into the characteristics of human and computer interaction. Results showed the application excellent in the quality of the application and management. In terms of the pedagogy strategies and integration of multimedia elements showed is good and accepted to proceed as a tool in teaching and learning. In the conclusion, the design of teaching and learning tool should follow that criteria for giving the impact to the students.

Keyword : Human computer interaction, prototype design, mobile application, special education, teaching and learning tool.

1 INTRODUCTION

The prototype is the process of developing a model that has the same characteristics or the same as the actual model. Prototype is a system that is almost identical to the real product.

The application, even it is not fully completed yet, but the basic function is like the real system. The prototype is also must have in multimedia product development, where it is used to develop into one end product that everyone can use. Additionally, it is also an efficient and effective way to review and optimize application designs or content, assignments through repeat discussion, browsing, testing and review processes.

The development of prototypes is aimed at obtaining feedback from consumers' targets in an educational context known as teaching design or teaching technology. It aims to ensure more effective teaching and learning process and meet the needs of students [1]. In the context of teaching and learning, some elements need to be emphasized as teachers, teaching materials, media, and learning environments. Researchers in this study design mobile applications based on the ADDIE model. Based on that model, its design is systematic that involves several phases including analysis, design, development, implementation and evaluation. The development of this application uses adobe flash 6 software with 3.0 action script, and adobe premiere.

2 PROBLEM STATEMENT

Recent studies showed that there are many advantages of mobile applications practiced in teaching and learning but in the context of human computer interaction design (HCI) it is still under-explained especially in the context of special education. As practiced at the university level, mobile applications has been widely used for communication, establishing collaboration and building clearer knowledge and understanding.
This learning pattern is more effective. Therefore, researchers need to look at this important aspect to improve the quality of disability students especially at the school level [2]. Special studies need to be done to identify the designs that suit the needs of the students.

Besides that the study performed by showing mobile applications has access problems to browsers which takes a long time to loading the files [3]. It may be affected by slow internet access as well as large file sizes. Therefore, a summative evaluation is done on mobile application design to improve the quality of an application that is appropriate to the student's level and needs. This assessment is also expected to be a guide to designers to develop a mobile application.

3 RESEARCH OBJECTIVES
i. To identify appropriate application designs for students with hearing impairments and conversations
ii. To evaluate the quality of the prototype which is a tool in teaching and learning for special education students

4 HUMAN COMPUTER INTERACTION

Human computer interaction (HCI) is the concept of interaction or relationship between humans and computers as well as applications [4]. The association for computing machinery states that (HCI) is a discipline that includes design, evaluation and implementation of interactive computer systems for humans to make it easy to use. The main thing in the interaction between humans and computers is the satisfaction of using the system in performing a task or learning.

In our daily lives, we will always interact with others to do all the important things in life. Computer also has an influence in daily life in improving good achievement in most aspects of life. While computers come with a great variety of technologies, this human computer interaction concept needs a variety of support tools such as keyboards, mouse, and others as a support tool for interacting.

The concept of human computer interaction (HCI) can provide interaction processes in a better learning environment. Although the computer was originally only used by users to deliver messages that were understandable, it had gone through the process of providing more effective interaction. Hand movement is one of the elements in human computer interaction [5] and it is an element that has a great influence on sign language learning in education [6]. In the context of sign language learning, hand movement elements are the main means of translating feelings, actions, and instructions because sign language is the language used by deaf and mute persons.

5 EVALUATION CRITERIA

In this study the prototype has been developed through the testing process to see the quality or usage of the application. Usability testing is a common thing that comes after a given application is designed to see how far an application works according to the needs of the user. Based on feedback from developer users to analytics to improve the quality of the app.
5.1 The overall quality of the application

Quality evaluation of a prototype involves criteria such as user interface designs that involve several aspects such as usability, consumerism, consumer satisfaction and interactivity. Past studies showed that good prototype quality as a whole involves the aspect that is being emphasized in a prototype [7, 8]. As for usability, it refers to how the feature works well and does not have any errors in the application system [9]. Consumerism refers to how the application is used as their daily needs. In the context of education, the application refers to the need for students to help them in their lesson.

While customer satisfaction involves the feeling of the user which depends on the advantages of the application that can provide benefits and thus create a satisfaction. Digital learning is a learning that has a better effect as it is more interactive. This aspect of interactivity is also assessed to obtain positive feedback on the application. Interactivity is aimed at two-way communication between users and applications where users can give directions to the applications and subsequently applications can respond to users. It sees a systematic data processing.

5.2 Quality of application management

Management quality refers to how each component is organized neatly, where the layout is more systematic and neat. And this makes it easy for users to use the app. And it affects to the user's age in which the learning process takes place faster and easier. Previous studies by [2] say mobile applications practiced in education have complex layouts and have hidden choices. Hence researchers in this study measure the quality of management and look at end-user acceptance and make this application acceptable to other users in deaf and mute communities.

5.3 The suitability of teaching and dissemination strategies

Looking at the technology of today's mobile technology is a necessity not just for parents but students also have their own smartphone. Smartphone are not only limited to their functions for communication but they can be utilized in broader contexts. Among the areas that can be used is education where many mobile applications have been created to help students. As mobile apps it is now a culture of teaching and learning as it can be done at anytime and anywhere according to the ability of learning [2] [10].

5.4 Multimedia elements in mobile applications

In this application the designer integrates four multimedia elements as follows,

5.4.1 Text

It is a basic element of conveying information. Put emphasis on the content you want to convey. Have a variety of types and forms of writing that are capable of attracting information delivery. Most multimedia systems use texts as it is an effective way to communicate, an easy way to provide instructions to users, to deliver information in various fields and to be information mediation.
medium. Text consists of four printed texts, scanned texts, electronic texts and hypertext. In multimedia applications, the text will clarify the required information. The existence of the text will be further clarified with the use of other multimedia elements and it is an important element. Text can be presented in various forms to attract users like graphics, animations, titles and others. Text presentation to users depends on the purpose and number of users.

5.4.2 Graphic

Graphic is a presentation of immovable images such as pictures, drawings, sketches, illustrations and others. It is very important to emphasize in the process of delivering information. Graphic is able to make a presentation more interesting and able to focus the attention of the users with the information they want to convey. According to [11] Info graphic becomes one of a good platform as a visual communication in promoting the knowledge in an efficient manner. The importance of graphics in an app is to increase the emphasis of information, attract users' attention, illustrate a concept, and act as a backdrop for a concept.

5.4.3 Audio

Audio is one of the most frequently used media in any interaction between computer and user. Music elements, background sound and sound effects are some examples of audio usage that can be used in a multimedia application. As with other multimedia elements, audio is able to deliver information more effectively, creating a more prominent atmosphere and attracting attention to what it wants to convey. Audio works to help deliver information more effectively. It also helps to increase the attractiveness of a presentation as well as to increase motivation among consumers to be more interested in following a process of information delivery and creating more attractive atmosphere and will focus on the content presented.

5.4.4 Animation

Animation is a fast show of the sequence of 2-D or 3-D static images to create the illusion of movement. Animation will leave the effect of optical illusion of movement due to the phenomenon of vision retention, and can be demonstrated and done in several ways. The most frequently used method is to present animation as a movie or video program. Animation works to deliver feedback and reinforce activities, describing the structure, function, sequences between components within a specific domain. Animation is capable to convey huge information in successive images. Moreover, animated info graphic can make the audience to be more understandable with the things that are not clear enough [11]

6 RESEARCH METHODOLOGY

The researcher in this study uses a survey method whereby, the respondents are conducted to four respondents who are classified as experts in the field. Each respondent is selected based on their background. It involve difference field of background, they who have been taught more 15 years of teaching and expert in the sign language. Also involved in this study are designers who have served as designers for more than 10 years. This study also involved 2 students and 2 lecturers in which the selection was made to identify the needs of students in an application.

Using the assessment form a survey was conducted against the six respondents to complete the assessment form. The researchers conducted a summative assessment of the prototype. Summative evaluation is more appropriate for the evaluation of a prototype it seeks to obtain results based on user responses [11]. Before the respondents completed the evaluation form they were given a prototype to use it, and subsequently they completed the assessment form. Analysis is done based on accepted assessment forms. Figure 1
shows the prototype testing framework to identify the usability and functionality of the mobile application.

![Figure 2. Test method](image)

App review using test form by [12]. There are two divisions that are objective and subjective. On the objective part of each test item uses four likert scales as shown below. In the subjective section, users need to provide comments and suggestions to improve the quality of the app.

<table>
<thead>
<tr>
<th>Score value</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
</tr>
<tr>
<td>Good</td>
<td>2</td>
</tr>
<tr>
<td>Modest</td>
<td>3</td>
</tr>
<tr>
<td>Poor</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1. Likert scales

7 APPLICATION DESIGN

![Figure 3. Loading/home/menu design](image)

8 DATA ANALYSIS

Respondent demographic

The assessment was given to three groups of teachers or lecturers, designers, and students each group has to respond. Respondents for this test involved a woman and five men. However the respondent's gender did not influence the results of the test.

![Figure 4. Letters/numbers/words](image)

![Figure 5. User feedback](image)

Results showed that the quality of the app showed that 4 persons (66.67%) stated that the quality of the application was excellent and 2 (33.33%) were good. On the other hand, in the application management aspect, 3 person (50.00%) were excellent and 3 person (50.00%) were good. The pedagogical strategy aspect shows that 2 person (33.33%) are excellent and 4 person (66.67%) are good and the aspect of multimedia element integration is 2 person (33.33%) are excellent and 4 person (66.67%) are good.

Based on the expertise made by the expert it shows that this mobile application prototype can be used and applied in learning because it works well like real applications. However, from the teacher's perspective and the suggestion it suggests that the
background of each word reflect its purpose to make it clearer. Additionally, users also recommend that this app adapt augmented reality (AR) technology to provide more effective learning experience. From the designer's perspective, it also suggests that animation should be streamlined to make it attractive.

9 CONCLUSION

Dependence on technology in life is helpful in any field and has been proven by many earlier researchers. Technological contribution in education also has a tremendous impact. Based on the results of the study it shows that the acceptance of users towards technology in education is very good, this is clearly supported by [13]. However it should be based on the characteristics and needs of the students to meet the needs and to complete a learning process.

Design suitability affects the frequency of application usage so the design aspect should include the user’s features to meet the needs of users in order to more user friendly technology. Good design improves the students academic achievement and more critical thinking skills. It also makes students active learning and improves their professional knowledge and application of knowledge [14]. Thinking ability can make students more visionary and make students more innovative. This finding is clear and aligned with [15].

The need for technology in education makes the design aspect should be the focus of the prototype development because learning depends on the modules provided. And it is also proven by [16] that is suitable for learning. Self-learning, informational presentation needs to be more creative so that it has more impact on users. Aspects of application management are also an important issue in development, so users can communicate with the system so as not to lose purpose. Hence some of these aspects are for mobile application development and it is evident that mobile applications can enhance student motivation in learning [17].

REFERENCE


