Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X
IMPACT FACTOR: 7.056

IJCSMC, Vol. 9, Issue. 7, July 2020, pg.144 – 153

DEVELOPING A SMARTPHONE APPLICATION BASED ON CCI STANDARDS TO TEACH COMPUTER PARTS FOR CHILDREN

Ahmed Abdelgader Fadol Osman[1]; Shrooq Aqal Al-Sulami[2]; Fatima Abdullatif Al-Jumaiah[3]; Fatimah Ismael Al-Doullah[4]

[1]Computer Science Dept. AL-Imam Mohammad Ibn Saud Islamic University, AL-Ahsa, Kingdom of Saudi Arabia
[2]Computer Science Dept. AL-Imam Mohammad Ibn Saud Islamic University, AL-Ahsa, Kingdom of Saudi Arabia
[3]Computer Science Dept. AL-Imam Mohammad Ibn Saud Islamic University, AL-Ahsa, Kingdom of Saudi Arabia
[4]Computer Science Dept. AL-Imam Mohammad Ibn Saud Islamic University, AL-Ahsa, Kingdom of Saudi Arabia
aaosman@imamu.edu.sa; Shrooq.aq@gmail.com; Fatima_aljumaiah@hotmail.com

Abstract: developing a smartphone learning application for children has become very important at present, therefore, The main aim of this study is to develop an educational application running on a mobile phone-based on the user interface design principles, and CCI standards together, the proposed application deal with this matter by designing a simple system contains effective feature enables children to learn basic information about computer parts and its components easily. That makes learning for children easy and enjoyable, through simple lessons contains questions and pictures, in different ways. The application used an attractive assessment method for children. To determine if their answers for questions are correct. During the design phase, some factors were considerate, such as children's privacy in terms of age, level of awareness and speed of learning the researchers implemented the application using java language, android studio and MySQL for databases.

Keywords: Java, android, MySQL, smartphone Application, E-Learning, CMS, CCI standards, HCI Principals

I. INTRODUCTION

Today, children live a wide experience in a world where technology is advancing every day, there is an urgent need to teach them some information about the computer, which has become an indispensable device in our lives, many studies endorsed the importance of using a computer in teaching children such as touch screen technologies or tablet computer technologies [1] [2].

Using these devices has become easy and very simple, children less than two years can work with the tablet through a touch more than once, and this includes the use of smartphones, which have become an important learning and entertainment tool for children [3]. Thus, the researchers a mobile application that aims to introduce the important parts of a computer to them, that makes teaching the basics of computers easy and attractive at the same time, the application contains two levels, the first level is the names of computer parts, their shapes, a mouse, a keyboard, and so on. In addition to a simple test, when the child selects the correct answer, the applause sound appears. But if the user chooses the second level the application takes him towards learning how to operate the computer such as how to turn off the computer, how to use paint or other programs.

Besides, the application includes a simple test; by using this application, the child can learn much information about the fundamentals of computers.

II. LITERATURE REVIEW

Researchers began preparing research to see if children were able to learn from interactive tablet applications that designed to be educational [4] many studies have focused on children's learning from tablet apps on literacy outcomes by comparing e-books with traditional books. From these studies [5], [6] did not see a difference in children's understanding of two different types of books. The search for children's learning for science, technology, engineering and mathematics topics from digital applications is more limited, although it appears that children can learn from smartphone games. For example, Aladé and others [7] found that children who exposed to the tablet-measuring game had a better performance on the measurement transfer task than the control group, who played an immeasurable game. Many recent research and studies also support these findings, indicating that exposure to high-quality educational applications designed to teach science, technology, engineering and mathematics skills can support desirable science, technology, engineering and mathematics learning outcomes [8] [9]. Learning computer for kids via smartphones is a new way that will provide education tutorials in an easy and fun way to learn. This way will help to change from usual teaching methods and make children exited to learn. Parents have no idea whether any of their children will choose to work in the computer science field, and even If they will not work in it, the technology becomes part of any specialty, for the reason children need to understand the importance of computer technology in the life. It would be useful for them to understand how computer programs work, what code is, and how it works. These prompted researchers to build an application for smart phones that aims to introduce children to the computer's components and basic concepts, so that the child can deal with it easily, and that perhaps push them to learn building and programing of computer in the future.

The researchers used Child Computer Interaction (CCI) standard, this term means computer interaction with children. It used for the community of children who are familiar with computers and their technologies [10]. The CCI community includes children from 4 to 15 [11]. Therefore, the educational requirements of the CCI community differ from other children due to their experience and use of computers and tablets. The applications interface must be directly relevant to good learning because the interest will be only on learning not on understanding the application interface [12]. Finally, the main goal is helping parents to educate their children at least the basics of computers.

III. METHOD

a) Proposed Process

During the design phase, several factors were taken into consideration, firstly the users are children under the age of seven, secondly, they use this application will be carried out under the supervision of their parents or one of them. The children interface design principles proposed by Kraleva (2017) were considered in detail. As known, these principles form the basis of the CCI standards. To start using this application the user must create a personal account, using the email, password, and verification code. This data saved in the database. Then the system will display the home page, through which the desired level can be chosen, whether it is the first level, whose lessons include displaying some basic components of the computer such as a mouse, keyboard, screen, processor and memory with a simple explanation for each of them, followed by a simple test to see whether the child can distinguish these components. the stages for the design of the user interface for mobile applications aimed at children should include the following factors.

- The target age was defined as 5–10.
- The objects on the screen were larger so that users could deal with them easily.
- The sound was used wherever possible, such as a question response.
- The steps inside the application were designed to be easy since difficult tasks make children bored.

- The application was designed to be subject to a privacy policy.
- The application contains very short lessons of no more than 3 minutes to avoid make children bored

b) Proposed application functional requirements:

First, an account must be created by entering user data such as name, age, email and password, and one parent's data can be used. The system displays the existing levels and introduces the contents of each level of lessons and tests, and then the child can choose. As shown in **Figure 1**

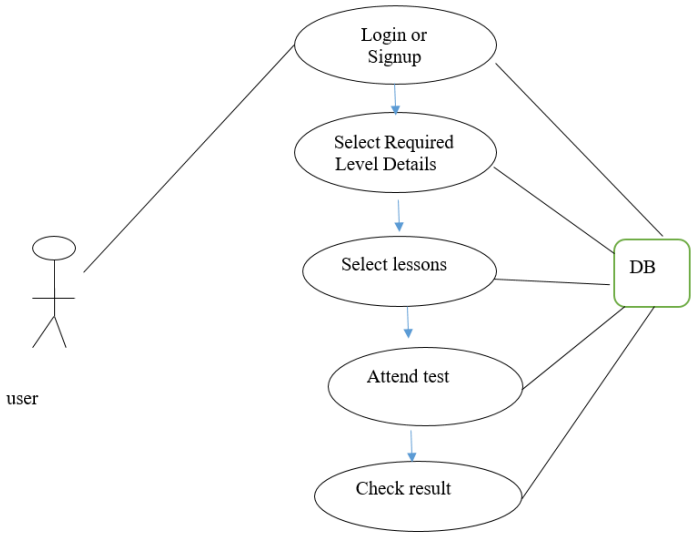

Figure 1: Use case for Functional Requirements

C) System Modelling:

The system modeling stage is the process of developing abstract models of the system, where each model provides a different perspective of the system that presents its main components and functions. It comes to representing a system that uses a type of graphical symbol, which now relies on symbols in the Unified Modeling Language UML, and Data-flow diagrams, which provide a graphical representation of the system that aims to be accessible to computer specialist and non-specialist users alike. The models enable software engineers, customers and users to work together effectively during the analysis and specification of requirements.

1. Activity diagram:

The researchers used the activities diagram to illustrate the progress that controlling the system and the relationship between it and the use case diagram. The graph in **Figure 2** used to represent the sequential and concurrent activities of this system. The researchers essentially charted the workflow within the application which clearly showing the activities and functions of the system, focusing on the flow and sequence state Events, which precisely describes the causes of a specific event and the reaction to that.

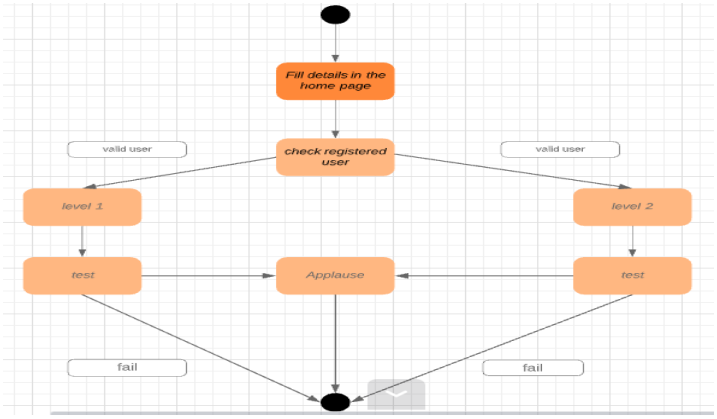

Figure 2: activity diagram.

2. Class Diagram

The class diagram shows the system objects and their properties, beside clear definition for the operations of each object and the relations among them. The system consists of the following classes (user, admin) as shown in figure 3

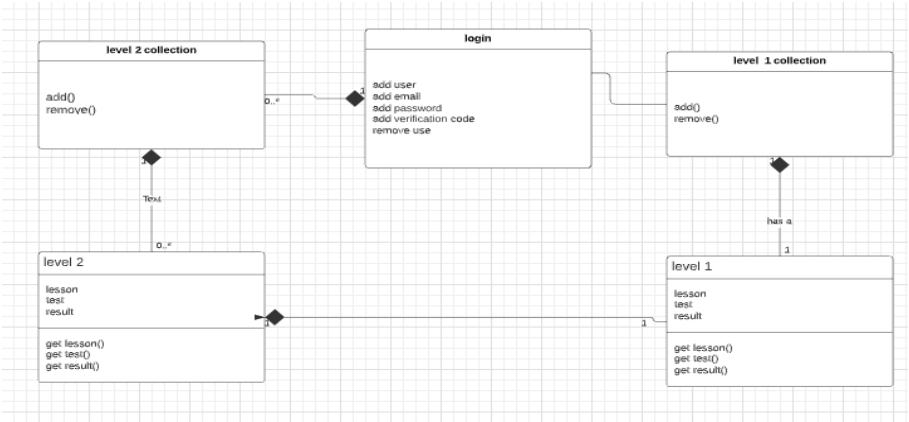

Figure 3: class diagram.

3. Sequence Diagram:

A sequence diagram simply depicts interaction between system objects in a sequential order i.e. the order in which these interactions take place. We can also use the terms event diagrams or event scenarios to refer to a sequence diagram. Sequence diagrams describe how and in what order the objects in a system function. As shown in figure 4 the sequence diagram shows the system functionalities.

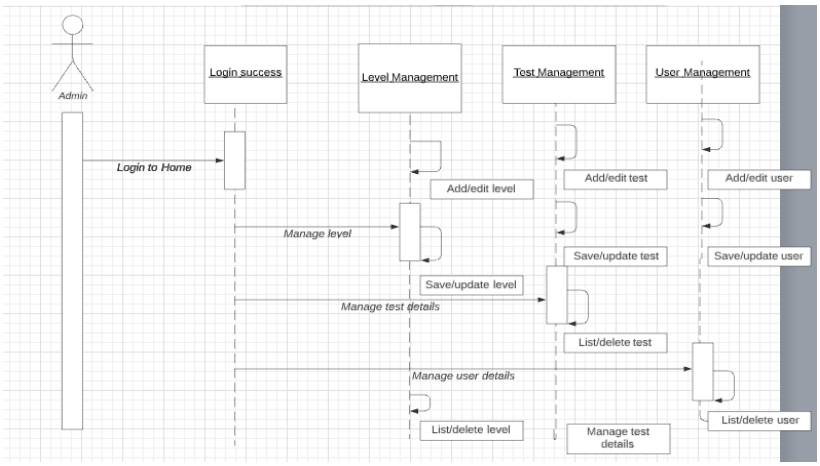

Figure 4: Sequence Diagrams.

d) Data Modelling:

1. Entity Relationship diagram

The Researchers used the entity relationship model (E-R) as shown in figure 5 to design diagram that help to understand the relationship among application entities such as users, and system administrator, also used to determine the needs and elucidate the characteristics of each of them separately, including the general structure and methods of interaction of different data types

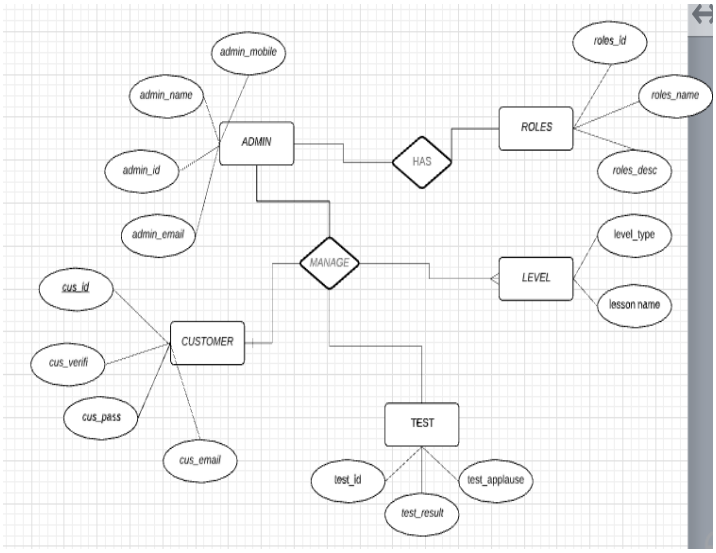

Figure 5: Entity Relationship Diagram

2. Data Dictionary

As shown in table1, the researcher designed the data dictionary to build the system database.

TABLE 1: DATA DICTIONARY

Field Name	Description	Data type	Data size
LG_ID	User ID	varchar	6
Password	User password	varchar	6
Name	User Name	varchar	30
Email_ID	User email ID	varchar	30
Veri_code	User verification code	int	6
Contact No	User contact No	int	10

3. Component Diagram:

Schematic diagram of the proposed system components Figure 6 shows a diagram of the components that designed to help implement and determine the details of the model; in addition, researchers used it to verify that all required system functions covered as planned.

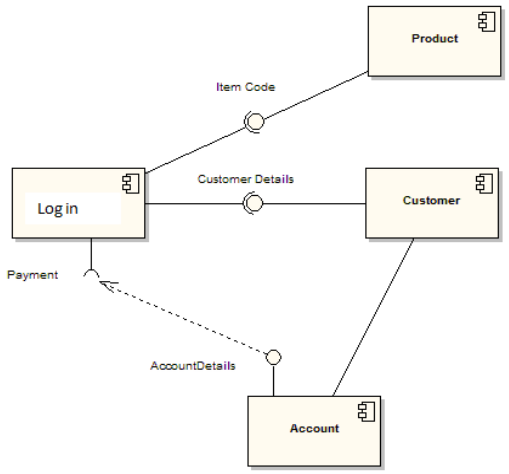

Figure 6 Component Diagram.

e) Programing Language:

The project has been implemented through the java language for the backend of the website and using android studio a dynamic, high level, free open source and interpreted programming language. It supports object-oriented programming as well as procedural oriented programming. SQL also used for databases.

f) System requirements:

The system requires a tablet or mobile device used android 8 with RAM 2 GB, 1 GHz processor, Storage: 1,5 GB. as minimum.

IV. SYSTEM TESTING

a) Features to be tested

1. The user signup.
2. User sign in.

b) Test Cases

TABLE 2: THE USER SIGNUP

Test case number.	1
Test case name	User Registration.
Purpose	Create a Private account.
Input	E-mail, Password, Confirm Password.
Expected Output	The account done after validation.
Test Result	The user can login.

TABLE 3: USER SIGN IN

Test case number.	2
Test case name	User login.
Purpose	The user can participate in the Application.
Input	E-mail, Password.
Expected Output	The User login the Application.
Test Result	The user can obtain knowledge, benefit and enjoyment.

Figure 7 shows the step to confirm the account via text message sending to the user mobile phone.

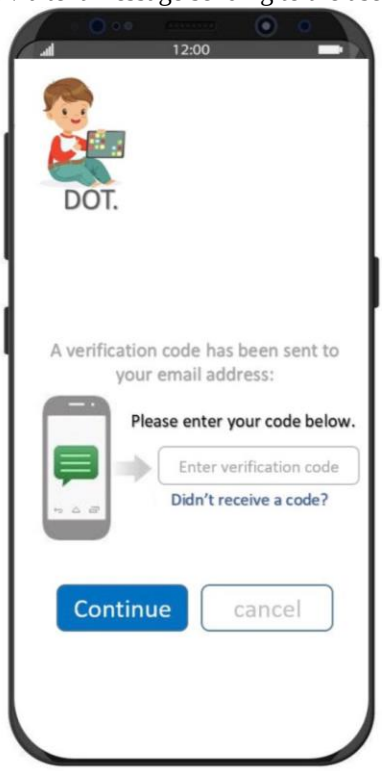

Figure 7: phone number verification

After account confirmation, the user can select the level or section as shown in figure 8.

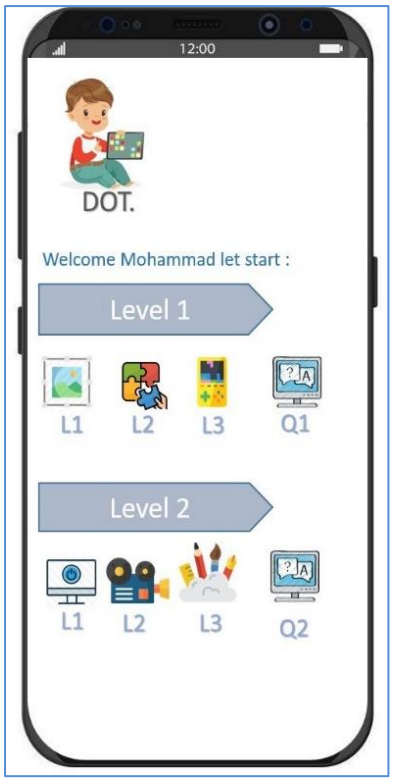

Figure 8: levels selection

The application contains many short lessons that the user can choose randomly or sequentially, some of them uploaded into YouTube in order to reduce the size of the application, as shown in figure 9.

Figure 9: lessons menu

The application contains many simple questions in order to ensure that the user understood the previous lesson, figure 10 shown question about computer parts depending on the pictures

Figure 10: simple test

Figure 11 shown a multiple-choice question about paint program

Figure 11: multiple-choice question

V. CONCLUSIONS

Because Mobile education has become very important, in this paper, the researchers discussed some points that helped to implement the simple smartphone application. The proposed solution provides an e-learning application to teach some computer concepts to the children, through short videos, pictures, and questions. In different ways, we started with a brief summary of the main problem of the research topic and then the way to solve this problem followed by the introduced. For future work, the objective is to extend the application functionality by involving three more levels about the internet, programming, and games.

REFERENCES

[1] J. S. a. B. Z. Jenny S. Radesky, "Mobile and Interactive Media Use by Young Children: The Good, the Bad, and the Unknown," *American Academy of Pediatrics,* vol. 135, no. 1, 2015.

[2] N. C. &. D. I. Raghad Baker Sadiq, "Mobile application based on CCI standards to help children learn English as a foreign language," *Interactive Learning Environments,* vol. 27, no. 2, 2019.

[3] D. S. Yanghee Kim, "Pedagogical and technological augmentation of mobile learning for young children interactive learning environments," *Interactive Learning Environments,* vol. 25, no. 1, pp. 4-16, 2017.

[4] J. M. Z. R. M. 3. J. H. G. M. B. R. a. K. Kathy Hirsh-Pasek, "Putting Education in "Educational" Apps: Lessons From the Science of Learning," *Psychological Science in the Public Interest,* vol. 16, no. 1, pp. 3-34, 2015.

[5] R. K. H. L. &. C. K. Etta, "Preschoolers' learning from children's books: effects of platform and interactivity," in *biennial meeting of the Society for Research in child development*, Austin, TX, 2017.

[6] R. L. Alexis R.Lauricella, "Parent–child interactions during traditional and computer storybook reading for children's comprehension: Implications for electronic storybook design☆," *International Journal of Child-Computer Interaction,* vol. 2, no. 1, pp. 17-25, 2014.

[7] S. 2. P. Volume 62, "Measuring with Murray: Touchscreen technology and preschoolers' STEM learning," *Computers in Human Behavior,* vol. 62, pp. 433-441, 2016.

[8] V. C. S. L. J. H. J Clandinin, Engaging in narrative inquiries with children and youth, new york: routle taylor and francis group , 2016.

[9] S. M. K. H. &. A. D. Fisch, "AndersonTransfer of learning in informal education," in *The case of television*, greenwich, information age, 2005, pp. 371-393.

[10] A. Alsumait, "Usability Heuristics Evaluation for Child E-learning Applications," *Proceedings of the 11th International Conference on Information Integration and Web-based Applications & Services journal,* vol. 5, no. 6, p. 654–661, 2010.

[11] J. C. P. M. N. P. J. P. H. a. A. N. A. Read, "Child–computer interaction," *International Journal of Child-Computer Interaction*, no. 1, pp. 2-5, 2013.

[12] M. U. B. M. H. Manal Umar, "Mapping HCI Principals to Evaluate the Usability of Learning Applications for CCI User," *International Journal of Computer Science and Telecommunications,* vol. 11, no. 2, 2020.

