m-Dental Assistant: A Mobile Application

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ABSTRACT

This capstone project is a mobile learning application that specializes at giving information about dental learnings which consists of four categories such as Dental Model, Dental Instruments, Dental Surgeries and Dental Problems. This study aspires to have an unconventional and alternative source of delivering information to the users. It aims to provide a 3D dental surgery videos, 3D tooth anatomy models each with description, dental tools description and dental problems studies specifically designed for dentistry students and patients. Android Studio and BioDigital for 3D Modelling are the programs that the researchers used in the development of the said application.

The use of this application is easy; the user just needs to tap on the button of choice and it will lead the user to their designated choice. Most of the people nowadays own a smartphone, so that's why a mobile application will be essential for the designated users. As the result is done, the researchers have created the application that excels in showing learnings in various ways, providing visuals that is appealing to the users and showcasing a simple and easy to understand application.

Keywords: *dental learning, m-learning, mobile application, mobile learning*

1.0 INTRODUCTION

Nowadays, the use of mobile phones is critical in this modern era. [1] Most of the people own a smartphone from around the world. [2] It has been one of the greatest technological gadgets that change the present and the future.[3] Smartphones offer numerous functionality and vast use in many sectors of the society and distinct community. [4]

By using the mobile phones as a way of learning, they come up a way of doing so. [5] It is to creating a simple m-learning application for the students and patients who want to learn studies from the dental industry. [6] The traditional

way of learning information like reading books, articles and etc. is not appealing to people nowadays.

As the technology progresses, more and more people get attached to it. The vast majority of people use social media, games and other entertainment platform. [7] The developers aim for this application to attract the learners with pleasing and interesting way of learning. By providing a quick and easy visual summary, the learners will cope to study the dental learnings.

The developers aim to develop an application that will teach dental students and patients to do the basic fundamentals of working as a dentist. They want to help dental students and patients to learn the easy way. They want to make the application look simple for the people to learn more. [8]

Objectives of the Study

1. To develop an m-Dental Assistant: A Mobile Application for students and patients;
2. To provide a 3D dental surgery videos, 3D tooth anatomy model each with description, Dental tools description and Dental problems studies; and
3. To use BioDigital for creating 3D tooth anatomy and use Android Studio in the development of m-Dental Assistant.

2.0 LITERATURE REVIEW

E-Learning and Smartphone Applications Use in Medical Education

This project by Aisha Ahmad AA Yusuf, MD aims to expanding volume of medical knowledge and the increasing complexity of the health care system are imposing more challenges on the teacher and learner in medicine. Therefore, emerging new teaching methods that incorporate technologies in education have been implemented. [9]

The uptake of electronic/mobile technologies in dental education at the University of Birmingham

This project by Binish Khatoon aims to gain a better understanding of the uptake of new mobile technologies and how they are utilized by staff and students in dental education.

It is apparent that smartphones are more convenient for students to learn and as a resource to advice patients on their clinic. [10]

Introduction to Photoshop 3D tool

This project by Juri Jablokov aims to familiarize the reader with the new 3D-tools in Adobe Photoshop CS6 and CC, show a basic, efficient workflow of texturing two different kinds of 3D objects and compare the tools with alternative software solutions. This guide is mainly for people who already have some knowledge of texturing, Photoshop, layers, brushes, colour theory and qualities of 3D objects. In the past, unless one had some expensive 3D sculpting/texturing painting software, he had to render out a grid of the UV coordinates, take it into image editing software and as painting the texture he had to constantly save it and refresh the map in the 3d software's material editor. Such workflow can be time consuming and

unreliable at times. Now, it is possible to do it all directly with Photoshop. [11]

Mobile application development to enhance higher education lectures

This project by Konstantinos Semertzidis aims to study the benefits of m-learning, to provide an analysis of principles and patterns of mobile interface design, to provide tactics that solve common mobile development problems and to develop a mobile application for the Android platform that will provide functions which support distance learning and offer direct communication between students and their teachers through the internet. [12]

Three-dimensional simulation of human teeth and its application

This project by Maryam Koopaie and Sajad Kolahdouz aims for communication between CT-Scan images and the finite element and training software through which modeling and simulation of the teeth were performed. In this study, cross-sectional images were used for modeling. [13]

3D Graphics Technologies for Web Applications

This project by Mikael Waerner aims to explore and evaluate the technologies for 3D graphics that can be used in web applications, with the final goal of using one of them in a prototype application. This prototype will serve as a foundation for an application to be included in a commercial product. The evaluation is performed using general criteria so as to be useful for other applications as well, with one part presenting the available technologies and another part evaluating the three most promising technologies more in-depth using test programs. [14]

Believe: A Motion Graphic Animation Brings Positive Power to Life

This project by Yu-Hsin Chang was made by using motion graphics design concepts and experimenting with current computer graphics integration technologies. The final delivery is a one minute and 30 seconds world of imagination motion graphic. [15]

3.0 METHODS

Creating a capstone project is not an easy task for a student. [16] Capstone project invests so much time to create. [17] So these step by step methods will help future researchers to accomplish capstone projects and help them prepare for the task.

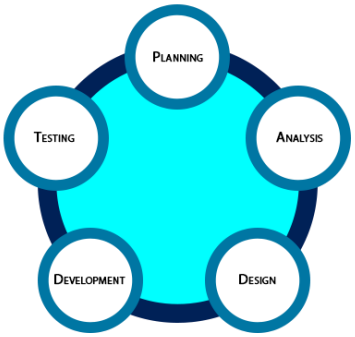

Figure 1. MDLC Graph

Planning

Planning phase is the most crucial step in creating a successful application. [19] This phase will make sure that the idea of the application development works smoothly. [20] The primary plan for this is to make a simple and interesting application.

Analysis

Analysis phase required the knowledge on planning phase to be structured and discussed. [21] Therefore, each detail being researched is important to understand. It is required to determine the expectations for the application, and how it will perform. [22]

Design

Designing phase's objective is to create a design that satisfies the user. [23] In this phase, the thoughts from the analysis phase will be constructed. [24] The design elements had to be described quite clearly in order to be appealing. [25]

Development

Development phase is what comes after a complete understanding of application ideas. [26] It is the actual construction process after having a complete and illustrated design for the application. [27] The coding and animation is the main part of the development. This phase is one of the hardest parts because it will invest a lot of time and patience to finish this phase. [28]

Testing

Testing phase is where the application will be tested. While the error can be detected in this stage, it is a good way to know how this project will be done successfully and the application also can be improved. [29] This application will be tested first by the developer to ensure their coding run successfully. The application will be tested gradually to improve the maintenance of the application. [30]

4.0 DISCUSSIONS

Flowchart

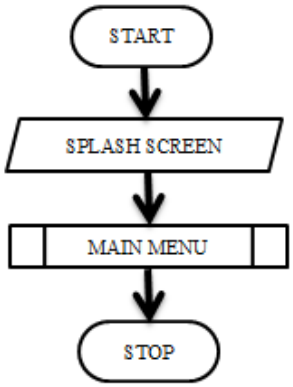

Figure 2. Loading Screen

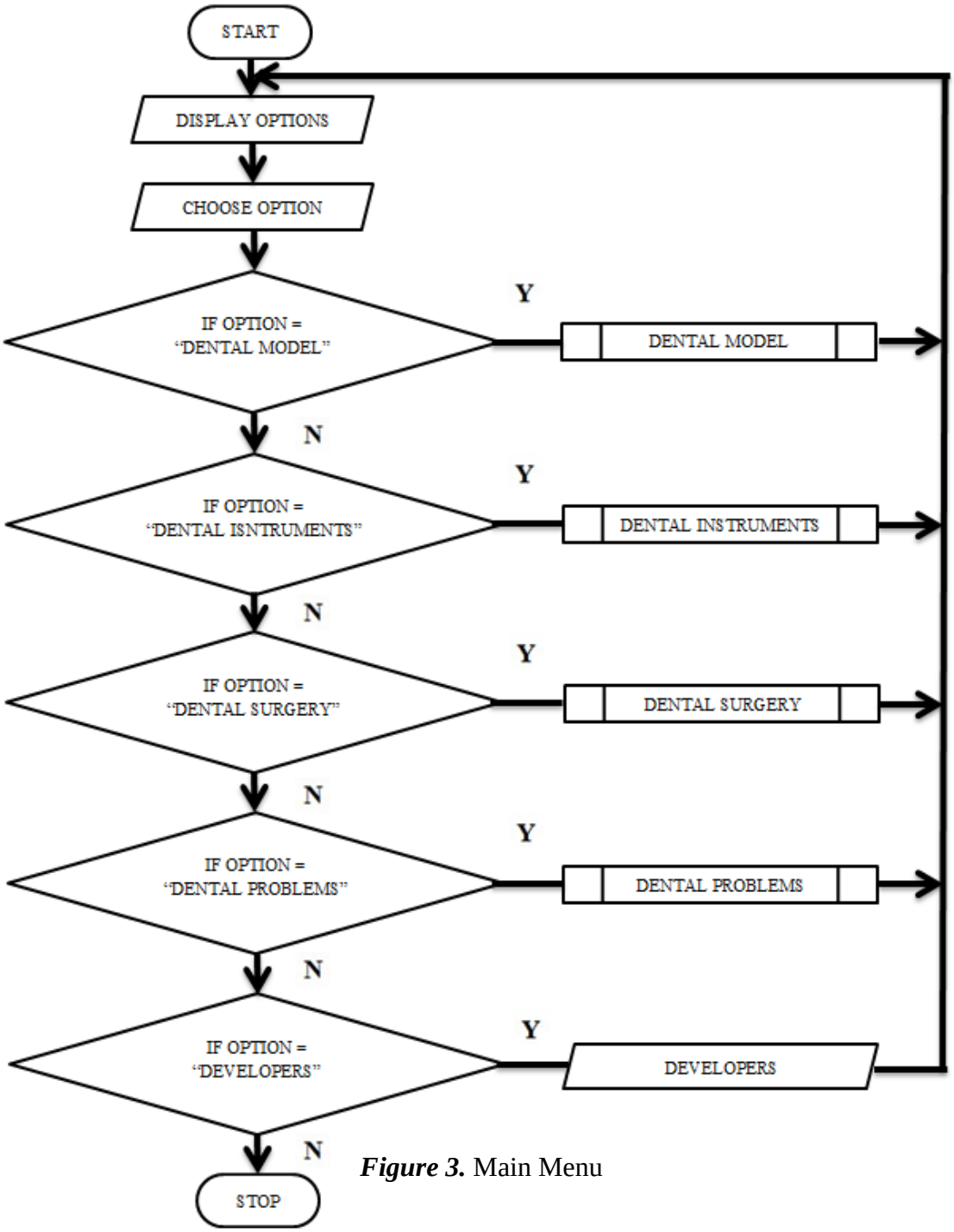

Figure 3. Main Menu

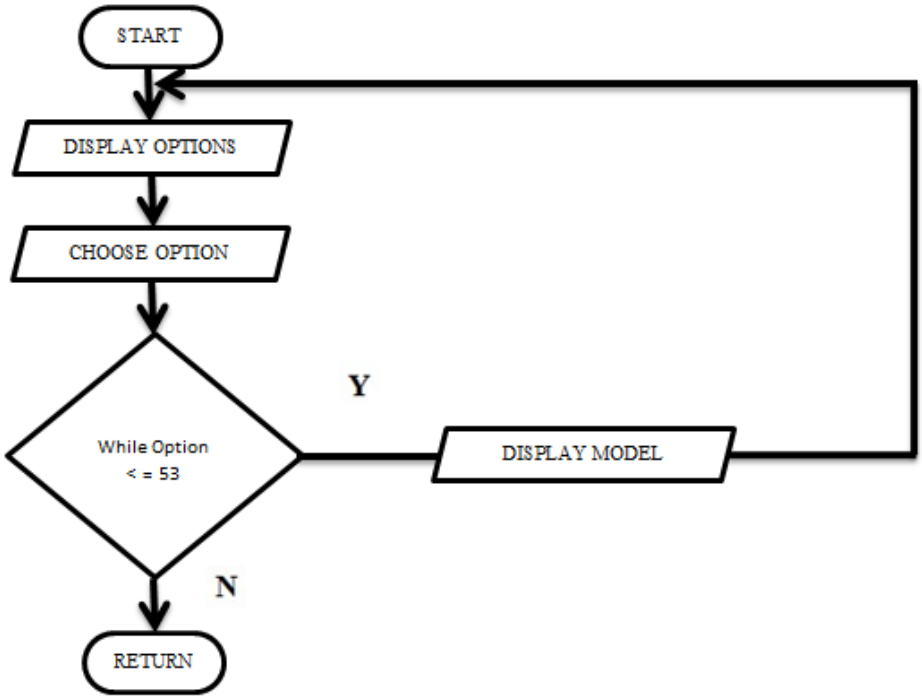

Figure 4. Dental Model

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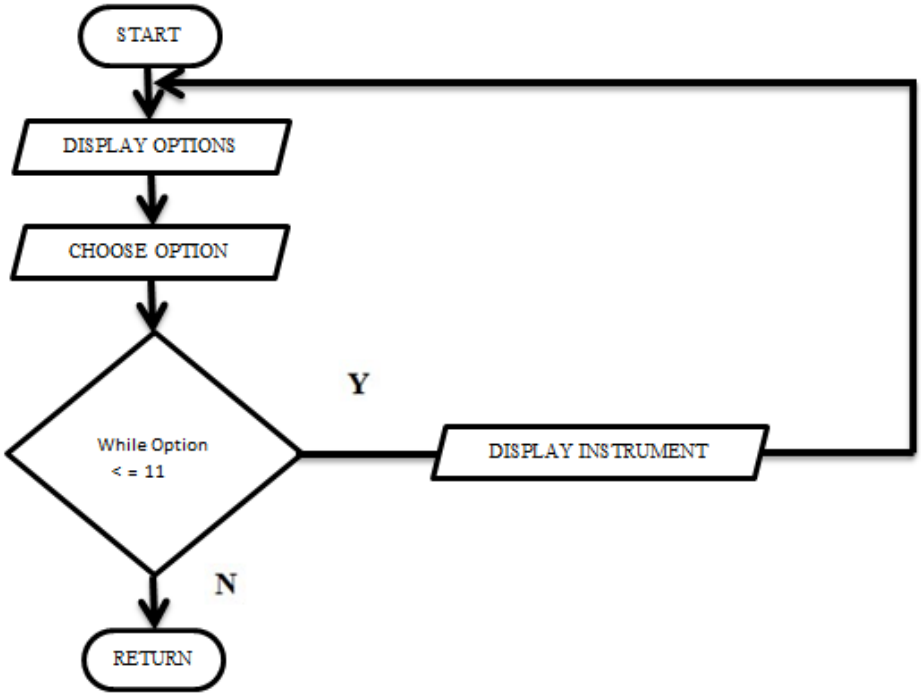

Figure 5. Dental Instruments

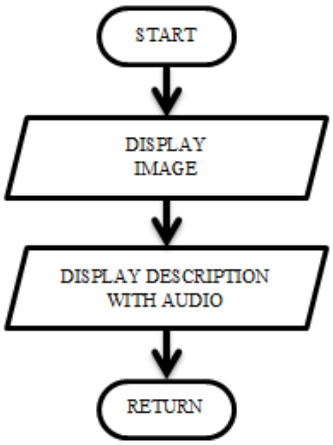

Figure 6. Dental Instruments Tab

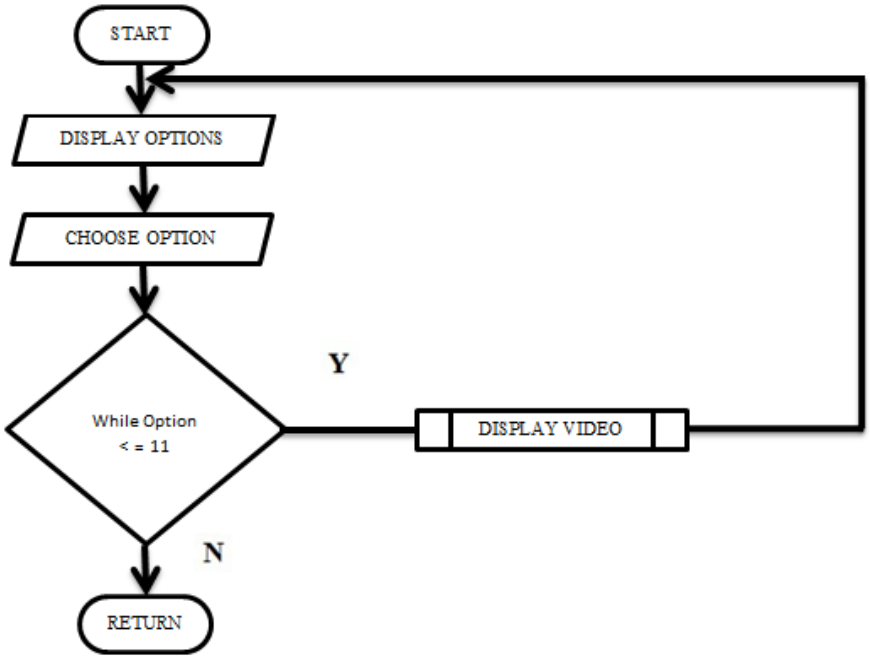

Figure 7. Dental Surgery

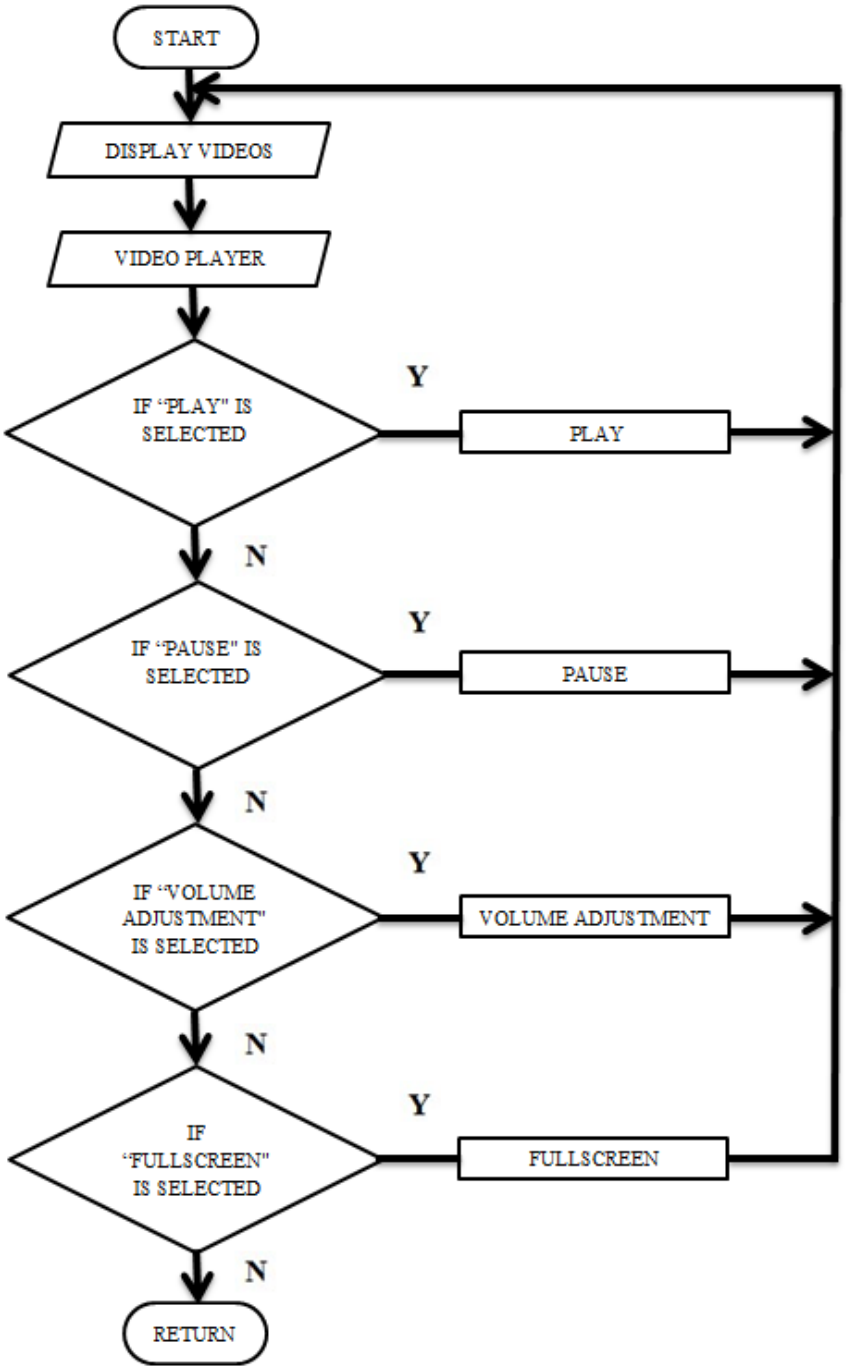

Figure 8. Dental Surgery Tab

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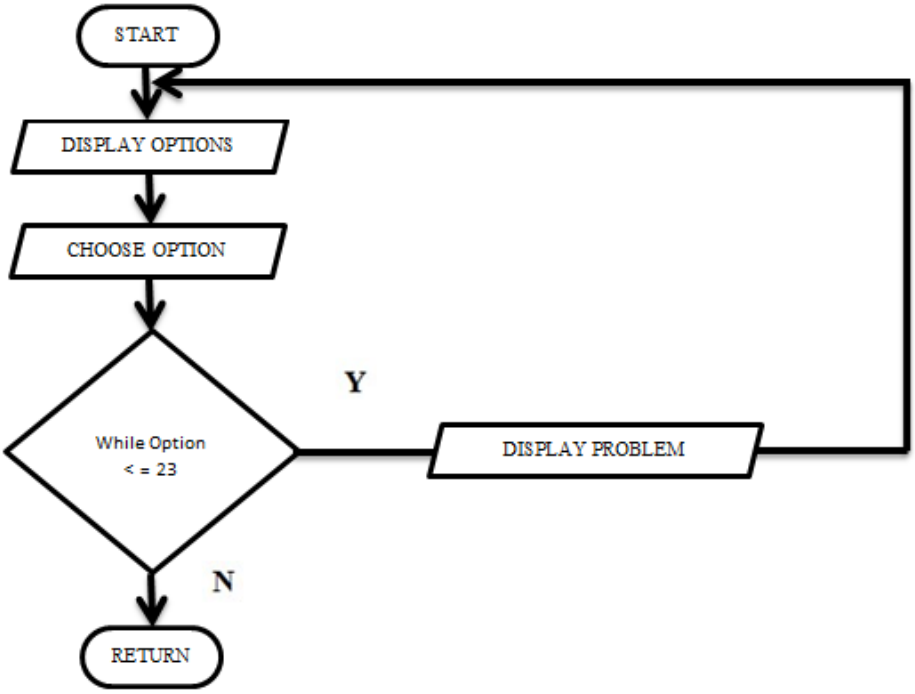

Figure 9. Dental Problems

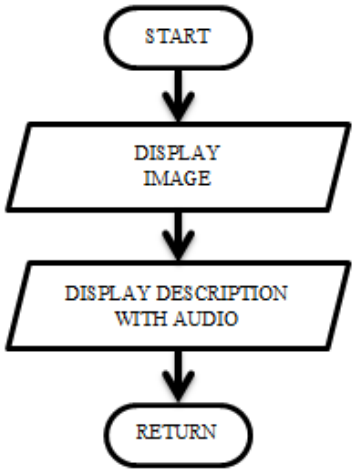

Figure 10. Dental Problems Tab

Screen Layout

Figure 11. Logo

The book shape underneath the tooth is a symbol of m-learning. The silver tooth shaped symbolizes artificial equipment for the tooth, and the red part of the tooth symbolizes toothpaste.

Figure 12. Loading Screen

While waiting for the main menu, there will be a loading bar until the loading is finished.

Figure 13. Main Menu

The main menu contains Dental Model, Dental Instruments, Dental Surgery and Dental Problems. Each button will lead the user to the perspective tabs

Figure 14. Dental Model

After the user pressed Dental Model, 3D Teeth Anatomy will appear. The user will tap on a specific part of teeth anatomy and after tapping on the place, it will show the name of the part.

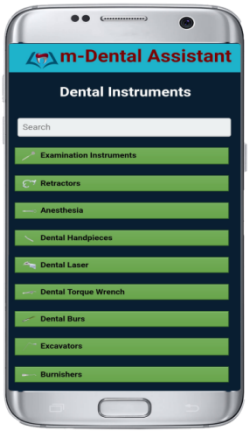

Figure 15. Dental Instruments

After the user pressed Dental Instruments, the user will pick one option and a picture with description will appear at the user. The user can also search for a specific item in the search bar.

Figure 16. Dental Instruments Tab

After choosing one tab in Dental Instruments, it will display the picture of the certain instrument and it displays description with audio.

Figure 17. Dental Surgery

After the user pressed Dental Surgery, the user will choose a video and a video playback will appear at the user. The user can pause and play the video and the user can also use full screen. It consists of 3D animated surgeries.

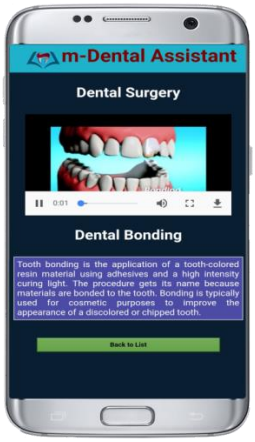

Figure 18. Dental Surgery Tab

After choosing one tab in Dental Surgery, it will display a video playback with audio. It also indicates what type of surgery it is and its description.

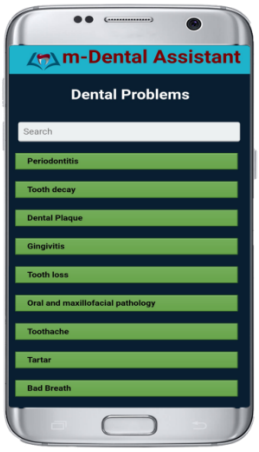

Figure 19. Dental Problems

After the user pressed Dental Problems, the user will choose a button and a description will appear at the user. The user can also search for specific problems in the search bar.

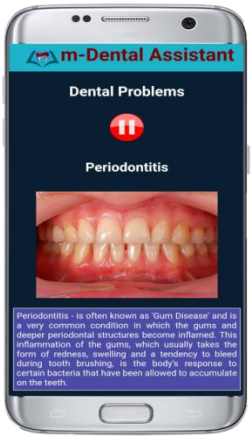

Figure 20. Dental Problems Tab

After choosing one tab in Dental Problems, it will display the picture of the certain problem and it displays description with audio.

Figure 21. Developers

After the user pressed Developers, it will display a description about the application and who developed the application.

5.0 SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Summary

This capstone project is a mobile learning application that can be used to provide an efficient way to work on dental procedures. It is focused on patient education and demonstration. This application should be installed in any devices mostly in smartphones. Patients can download the app for free. The application allows to demonstrate the effects of dental problems and conditions such as decay, bad breath, periodontal disease, oral cancer and other conditions. The dental instrument currently features over 11 demonstrations. This is designed to make things easier and quicker assisting the dentistry students and patients with general communication, educational materials and outcome expectations. M-dental applications are suited for the smartphone. It is built to demonstrate including 3-D video and photos that can help for consultation with colleagues and patient education. It is a finest quality of Image and video resolution. This application establishes and classifies model images willingly and is also utterly compatible with dentistry student. The application provides an interactive experience and pleasing graphical user interface to the user. Though the application contains several features, it is easy to understand how the application works. It shows "A picture and video are worth assistance. With high quality images & video, this application assist dentists to illustrate the medication practice to their patients very well. It also guides patients to catch on what are the methods they will acquire, not only by paying attention, but also by inspecting. Dental assistant app is a rendition of an anatomical relating tool that can also be used to instruct patients and students, as well as being an effective reference model. It is also a unique satisfaction for documentation without disruption to the clinical step being executing, sharing and accessing the discernible information.

Conclusions

Based on the capstone research, the researchers had come up with the following conclusions:

1. Upon the development of m-Dental Assistant, the researchers were able to develop an easy to use m-learning application about dental studies for students and patients.
2. The researchers have provided an application that consists of 3D dental surgery videos, 3D tooth anatomy model each with descriptions, Dental tools with description and Dental problems studies.
3. The use of BioDigital enables the researchers to create a 3D model of tooth anatomy and create an application using Android Studio.

Recommendations

The mobile application is recommended to all android OS users who want to know the basic dental hygiene especially to dentistry students and patients. The mobile app will cover the dental preventive strategies that could be applied to prevent dental diseases and problems not only that the application

also has animation videos and demonstrations about the basic dental surgery procedures which users can watch and could serve as their guide. The application also has a dental model which users may explore to learn about the whole tooth anatomy. Future researchers who have the same or related project may further enhance this application by adding a new feature which is the Dental Quiz in which the user may validate what they've learned in the application. Further, an IOS version of the mobile application is also recommended.

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