CARDIAC ANATOMY: MYOCARDIAL INFARCTION

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ABSTRACT

3D Interactive courseware for Medical education (Cardiac Anatomy: myocardial Infarction) is an educational courseware that will provide information about myocardial infarction, how it occurs and the complication that might cause to the organ and health tips to prevent cardiac related diseases in an interactive way. This could help the user to gain knowledge on cardiac related topics and help them to seek preventions. The aim of this courseware is to provide information on coronary heart disease through high quality three dimensional models and allow users to interact to obtain information included into this educational courseware. The objectives of this project to educate users on myocardial infarction with a details 3D models, is possible when 3D interactive courseware can utilized for lessons, to implement the use of 3D interactive courseware widely to make the knowledge reach everyone. This could create medical awareness among Malaysian regarding health issues since it’s been developed as an interactive 3D courseware that provides the concepts appropriately for cardiac anatomy learners. The scope of the project are medical students, lecturers, pre-medical students, nursing students, patients or anyone who is looking for a basic Anatomy review to learn about anatomical details on their computers. The courseware could provide an accurate look at the anatomy of the most important organ in human body, Heart and specifically artery where the heart attack occurs. 3D Interactive courseware for Medical education would be an outstanding experience of learning for users. Quiz included in the courseware could be attempted by users to evaluate their understanding on coronary heart disease.
ABSTRAK

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1.1 Introduction

Growing technology has contributed significantly to sedentary lifestyles and has made huge changes on simplifying people's life. The contribution has continues to expand the horizons to various fields gradually. Healthcare is one of the field where technology used by professionals to transform the field into an innovative field.

According to a recent online article published in Forbes magazine dated 24th January 2013, there are five ways technology in transforming health care identified. The first way is crunching data to offer a better diagnosis and treatment with the use of super computers to help physicians make better diagnoses and recommend treatments. The second way is helping doctors to communicate with their patients using mobile applications. The next way mentioned in this article is linking doctors to other doctors in order to share knowledge on medical practice or patient details. Similarly the forth way is connecting doctors and patients potentially to provide medical advices and to share medical condition of the patient frequently.

Eventually, the last way identified in the article published in Forbes magazine is helping patients to stay healthy by implementing applications where patients can get information about healthy living style.
The article inspired a lot and has become the reason why the 3D Interactive courseware for cardiac anatomy: myocardial infarction is proposed and developed. Out of the five ways compiled in the article, the forth way and fifth way are selected for the development of the 3D courseware. The courseware could be a needed technological upgrade to the Malaysian medical education and healthcare and help Malaysians to live a healthier life when a platform that linking world of medicine and common people created via Interactive courseware such as the proposed 3D interactive courseware.
1.2 Problem Statement

The Awareness about coronary heart disease among Malaysian is not at a satisfying level even it is declared as the leading killer by WHO (World Health Organization) and agreed by Ministry of health which added that in year 2009 through a statistic conducted; one in four deaths in Malaysia government hospitals was attributed to either heart attacks or strokes.

Secondly, the 3D interactive courseware could help medical or pre-medical students to access it anytime anywhere and obtain information in far more interesting way than usual. Uninteresting lecture session can be transform into an interesting period when lesson delivered in 3D interactive courseware. This could help the students to explore and experience anatomy studies in a different view and improve teaching and learning environment.

Cardiac patients and their family members often explained by the physician using models and posters to deliver patient’s diagnosis report to make them understand about the organs complications.

Educational environment is already starting to associate with positive intellectual and technological outcomes for students nowadays. In accordance to that, medical courseware also needs to be changed to Interactive courseware that will support aesthetic interfaces for the users. This would be a pleasing and satisfying learning process compared to notes, books and slides. Thus, as an evolving field, graphic and multimedia could contribute significantly in illustrating the disease related organ and vessels such as artery and vein as well as the occurrences in 3D models for better understanding. User could easily understand about the risk factors and able to safe themselves from becoming the victim of this killer disease. In order to achieve the aforementioned solutions, this courseware could educate user about myocardial infarction, the root cause of the occurrence and way to prevent this disease.
1.3 Aims

i. To develop an educational courseware that will be explored by users to educate themselves about myocardial infarction which is also known as heart attack.

ii. To be one of the learning materials to teach and at the same time to create awareness amongst Malaysians regarding the importance of concerning their health issues.

iii. To help users to reconstruct their lifestyle and to prevent from becoming victim of coronary heart disease.

iv. To reduce the number of death among Malaysian who died because of coronary heart disease.
1.4 Objectives

i. To collect coronary heart disease related information and develop 3D interactive courseware which will educate users on aforementioned disease.

ii. To support green computing by reducing consumption of papers and increase efficiency in teaching and learning. This is possible when 3D interactive courseware used for lessons and creates medical awareness among people.

iii. To develop an interactive 3D courseware that provides the concepts appropriately for Malaysian on coronary heart diseases, specifically on myocardial infarction.
1.5 **Scope and Limitations**

i. The target users for 3D interactive courseware are medical students, lecturers, pre-medical students, nursing students, patients and adult Malaysians who are looking for a courseware to learn about coronary heart disease. The 3D models and montage with animation would help viewers to understand about myocardial infarction. A quiz is included in this courseware to be attempted by users to evaluate their understanding on cardiac anatomy studies.

ii. This courseware is a Windows based (stand-alone) application.

The courseware is developed as a Windows based application to allow it to be used by all without any restrictions as windows have become the world's leading operating system. It is classified as a standalone application because it does not require any special software other than the operating system itself to run.

iii. This courseware will be in fully English

English language is chosen for this courseware to allow users to have accurate information about the medical terms related to myocardial infarction.

However, there are some limitations of this application which are stated as follows;

i. The application only focuses on the specific disease which is myocardial infarction. The 3D models, information and video included only focus on the educating users on heart attack instead of covering all the coronary heart diseases.

ii. The courseware users will not be notified if there is any latest version available. Since this is a stand alone courseware which never connects to internet; the users could never be informed if the content of the courseware is being updated.
1.6 Literature Review

1.6.1. Cardiovascular system – heart anatomy by J. Crimando Ph.D

The Heart Anatomy provided by Dr. J. Crimando is a web-based application that allows users to interact with the application to identify the parts of heart such as Artery and pulmonary trunk.

The heart structure is has been illustrated in a 2D image and line drawing image. User can move the cursor above the regions to instruct the system to display the area selected and they can click to make the region name appear inside the text box included above the picture.

a. Advantages

i. This simple application can be a user friendly since not much instructions needed to guide the users to know how to use the system.

ii. Contains light graphic and database that allows fast loading of the side.

Figure 1.1: Heart Anatomy
iii. Test included for this anatomy application also as simple as the lesson included where the user need to click the regions in heart to identify the name of the particular area.

b. Limitations

i. No 3D model of heart included to make the application look more effective.

ii. Users cannot conduct more interactivity with the application such as rotating the model to have more detailed view of the organ.
Anatomy of the Heart is an application provided by Google Play for Android phone users. This lecture on the Heart and Pericardium application is available at www.instantanatomy.net and Android users can add it to their Google play account and download it directly to their phone. Anatomy of heart is can be play with relevant diagrams related to cardiac anatomy and provided with audios. Users can interact with the mobile application along the session by zoom in on the images with the pinch gesture as the audio plays.

This application is aimed at anyone who is studying human anatomy specifically cardiac anatomy. The application are believed to be the ideal for medical or nursing students,
biological studies students and physiotherapists or doctors looking to refresh their knowledge.

a. Advantages

i. Based on users review, this application is provides easy to understand lecture with excellent explanations, diagrams, descriptions, clear images and audios.

ii. It is a free application provided for android users with attractive 2D images and diagrams.

iii. The voice guidance included along the session from the beginning until the end. It helps the user to understand more about the cardiac anatomy as attending an as actual lecture.

b. Limitations

i. No test or quiz included on this application for the user to test their understanding on the lecture given.

ii. Less interactivity for the users to interact with the application such as zooms in and navigates to next page.
Pocket heart is an attractive mobile application developed for iPhone and iPad that provides 3D models where users can experience the real time heartbeat and more.

According to the developer the Pocket heart application is developed based on the cooperation, they built with healthcare professionals, educators and patients to design meaningful and beautiful mobile medical education software and to become a premium medical education mobile reference tool.

a. Advantages

i. Pocket Heart application is a novel way to visualize, hear and understand how the human heart works, in 3D.

ii. There are anatomical content resides in the application, thus no need for Wi-Fi or 3G.
iii. Approximately 20,000 words of detailed learning content included in this application.

iv. Application comes with Intuitive navigation therefore the users don’t have to scroll through long menus. The application also contains interactive engaging multimedia content.

v. In order to succeed the objective of this application; multiple quizzes included in enabling self-paced learning for the users.

b. Limitations

i. Expensive; even though it is a free application provided for the user, it can be utilized by people who are affordable to own iPhone or iPad.

ii. The application contains heavy graphics that requires amount of time in loading the application.
1.6.4 3D Heart Anatomy – by J.M.B. Melara for Apple.

The 3D Heart Anatomy is described as a great basic Encyclopedia of the heart in 3D that allows the user to see clearly the anatomy of the heart, and basic information in colorful charts. This is a mobile application which is also can be utilized on website provided by the developer.

This application is a paid service that can be downloaded for USD 0.99 or equivalent to RM 3.03. The application enable the users to interact with the application by using haptic technology and the information, pictures and information works great horizontally and vertically position.
a. Advantages

i. The 3D heart anatomy contains attractive multilayer 3D digital heart models, which can instantly grasp user's attention.

ii. Comes with both mobile and web based platforms where user can access the application from their mobile devices and computers.

iii. Good interactivity established between the user and application.

b. Limitations

i. According to the user's review, the application only shows an outer view of the heart and does not include any major cardiac veins/arteries as it supposed to be included for a better and clear understanding.

ii. The applications also does not include the ligamentum, arteriosum and the separate parts view to shows the pulmonary veins and left atrium as one part.

iii. Only allows the user to view and learn about the outer part of the heart which is can be consider not an effective or complete cardiac anatomy application.