Using AR technology to improve children's awareness of dengue fever.

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ABSTRACT

Dengue fever is a mosquito-borne viral disease that has been spreading rapidly in recent years in all WHO regions. Dengue virus is mainly transmitted by the female Aedes aegypti mosquito but can also be transmitted by the female Aedes albopictus mosquito. These mosquitoes also transmit chikungunya, yellow fever and Zika virus. Dengue fever is widely distributed in the tropics. The level of risk varies according to rainfall, temperature, relative humidity, and rapid uncontrolled urbanization. The research was therefore carried out to develop a mobile application that would allow children to learn about the dangers of dengue fever and to identify mosquito species in general, called Mosquito Battle. This mobile application is a game based on AR technology, which allows children to observe mosquitoes more visually and vividly, and to interact with them so that they can be more interested in learning about dengue fever.

1   INTRODUCTION

In 2019, Malaysia recorded the highest number of dengue cases in four years, with more than 130,000 cases, a 61 per cent increase from 2018.

A total of 2,694 dengue cases were recorded in the last week of 2019, an increase of 2.4 per cent from the previous week. This brings the total number of dengue cases in Malaysia for 2019 to 130,101 as of 28 December, surpassing the previous historic high of 120,836 cases reported for the whole of 2015.

According to the Ministry of Health's (MOH) Crisis Preparedness Response Centre (CPRC), there were 80,615 cases for the same period in 2018. As of 28 December, last year, there were 49,486 cases, an increase of 61.4 per cent compared to the same period in 2018.

Meanwhile, six dengue-related deaths were reported between December 22 and December 28, bringing the total number of deaths so far in 2019 to 182. This compares to 147 in the same period last year. In 2015, a total of 336 deaths were recorded.

The Ministry of Health has launched many activities to educate adults about the dangers of dengue fever and how to identify different types of mosquitoes, but surprisingly there are no activities to educate school children about dengue fever and mosquito awareness.

I think it is very important to educate children properly. This will help control mosquito breeding and prevent the early spread of the disease.

This software is an augmented reality dengue awareness game. I think today's software is good if it engages the user, and this software has been developed mainly for children, so I think there is potential in this area of education and fun.

2   PROBLEM STATEMENTS

Children in Malaysia are exposed to the threat of dengue fever from an early age and parents usually tell their children about the dangers of mosquitoes and dengue fever, but as this is only done verbally by parents, it is not enough for children to form a visual picture in their minds.

There is no good way for children to learn about the dangers of dengue fever and how to identify the different types of mosquitoes, and most of the apps available just teach children about mosquitoes or show them pictures, but too much text and not enough pictures can make children so uninterested that they don't even look at them.

3   OBJECTIVES

1. To develop a mobile application using AR technology about dengue fever.
2. To test the effectiveness of the application as a tool to educate children about dengue fever.

4   METHODOLOGY

This mobile application uses the Analysis, Design, Development, Implementation and Evaluation (ADDIE) model to develop coloring augmented reality mobile applications.
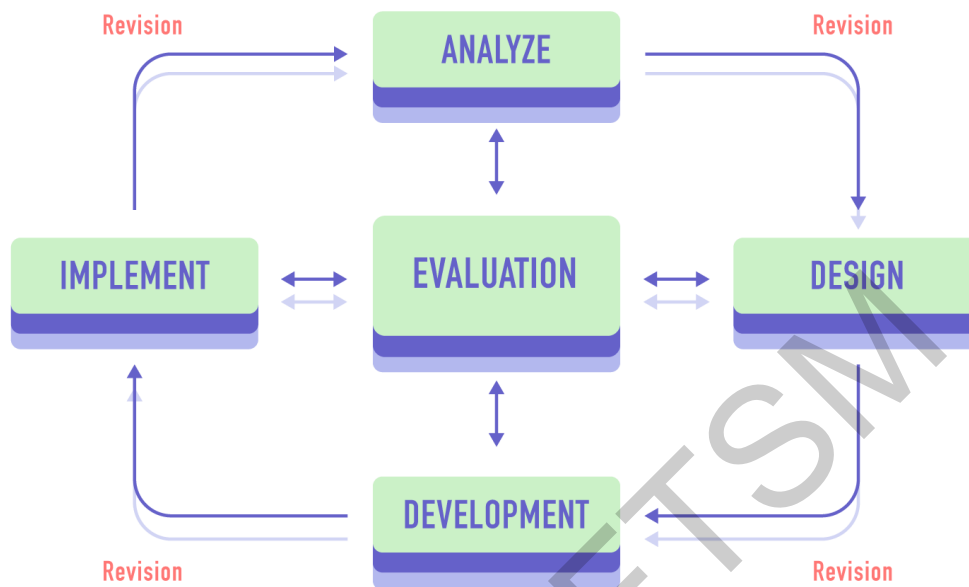
4.1 BENEFITS

It is strongly associated with good design, with clear learning objectives, carefully structured content, controlled teacher and student workloads, integrated media, relevant student activities, and assessment strongly linked to desired learning outcomes. Although these good design principles can be applied with or without the ADDIE model, ADDIE is a model that allows these design principles to be identified and implemented in a systematic and thorough way. It is also a very useful management tool that allows large numbers of courses to be designed and developed to a high standard of quality.

4.2   Development of Mosquito battle

The ADDIE model has been used to develop this application. As I researched this project, I found that most activities on dengue prevention awareness are now conducted using PPTs or simpler brochures. Practices like this are unattractive, especially for children who like to play. I think it could be made more interesting with the addition of augmented reality technology.

4.3   Architecture

All models were developed using 3D software, "3Ds Max" being the software that

allowed the researchers to model and render the content of the application. The rest of the whole is programmed in Unity, allowing the user to control and interact with the design as envisaged. All you need to do is open the application and select the function you want.
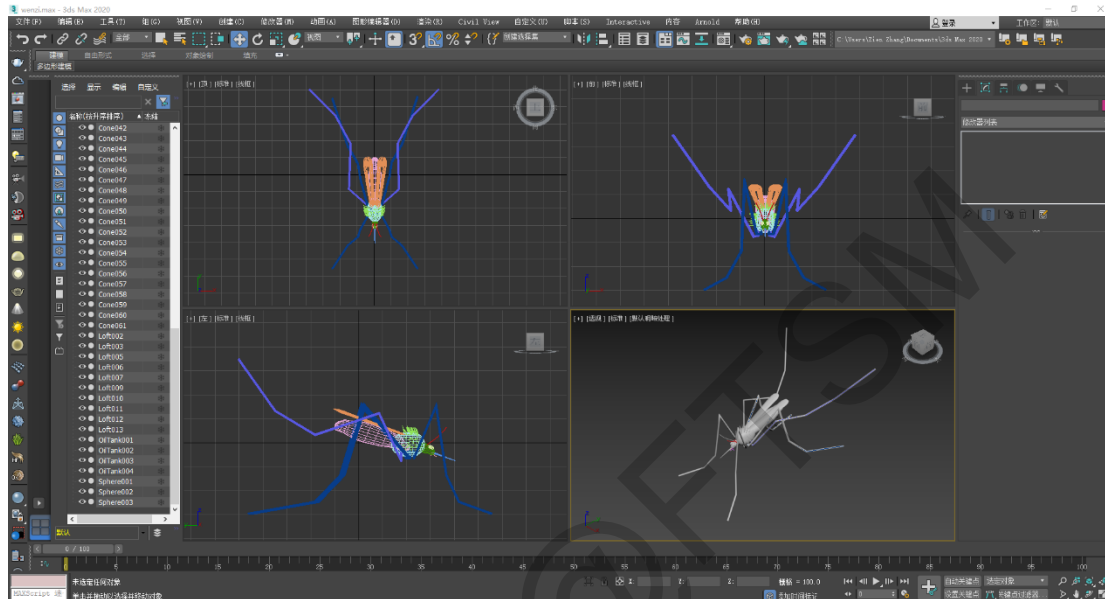
4.4   TESTING PHASE

App testing is mainly done with the help of Android emulators as well as Android devices, including functionality testing, usability testing, UI (user interface) testing, compatibility testing, and performance testing.

4.5 DESIGN

AR contents are implemented only in certain scenes requiring AR environment to generate the content. For example, AR observe. Marker tracking or marker less tracking can be implemented in scenes requiring AR. In marker tracking the target cannot be resized but in marker less tracking the target can be zoomed in and out. Of course, if the user's device is old, non-AR mode can also be enabled.

5 RESULTS

The whole project is meant to show the preparation, the process, and the results of the app development. From planning to developing an APP is a long process. Since we did

not learn about AR in the classroom, we must learn the principles of AR all by ourselves, up to the completion of the entire software development. The basic AR software can be easily done with the Vuforia engine, and Unity is also a good platform for creating apps, where you can do UI design as well as programming and software development through Android Studio. I think this APP can basically express the design idea of my whole project, but of course there are many shortcomings that need to be further improved. Here is the main page, four different buttons lead to four different functions.

The figure below is about the results obtained from the AR scan. Of course, on different pages I set different targets to scan, and the results are different.

Another scan of the target object, a photograph of a pond, has been added to this software. When the target photo is scanned using the device, an animated video explanation of dengue fever appears. This is of course also achieved by AR technology, which completely covers the entire target image but does not go beyond it.

The last function is the test system, which is designed to make the child's memory of the points more solid. In this test system, the answers can be freely selected, and the correct or incorrect answers are displayed in the middle and the percentage of correctness is shown on the right. The button at the bottom allows you to replace the question before or after and you cannot answer the same question twice.

(1) :

Why do you get dengue fever? ( )

A、 Swimming

B、Mosquito bites

C、Snacking

D、Watching TV

CHOOSE: Accuracy:0.00%

☐ A   ☐ B   ☐ C   ☐ D

LAST   jump   NEXT

The entire database of answers is kept in text, which also helps in updating and changing the questions. Of course, it is also possible to improve missing knowledge.


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1  1:Why do you get dengue fever? ( )  :A、 Swimming :B、Mosquito bites :C、Snacking :D、Watching TV :2
2  2:Which of the following pest is the transmission vector for Dengue Fever? ( )  :A、Cockroach :B、Aedes Mosquito :C、Rat :D、Cat :2
3  3:What colour is the Aedes mosquito? ( )  :A、 Black :B、Brown :C、Black and White :D、White :3
4  4:How many days does it take for the Aedes egg to develop into an adult Aedes mosquito? ( )  :A、1 - 2 days :B、3 - 5 days :C、7 - 10 days :D、15 - 20 days:3
5  5:Which of the following represents the life stages of an Aedes Mosquito? ( )  :A、Egg, Larva, Pupa, Adult Mosquito :B、Pupa, Egg, Larva, Adult Mosquito :C、Egg, Pupa, Larva, Adult Mosquito :D、Pupa,La
6  6:What are the symptons of dengue fever? ( )  :A、 Severe Headache :B、Fever :C、Nausea and Vomiting :D、All of the above:4
7  7:What are the common mosquito breeding habitats? ( )  :A、Flower vase :B、Domestic container, e.g. pail :C、Drain :D、All of the above :4
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6 CONCLUSION

The use of AR technology has a significant impact on education, and for children, interest is the best teacher. If a child finds something interesting, even if they must research and explore it themselves, it is still fun for them. There is a need to further enhance the functionality of the application and to improve the user interface. Specific recommendations are given below. This study has identified the increasing number of channels through which children can access knowledge in this highly advanced world of information technology. AR technology allows children to freely observe and place targets in their own lives through the camera, which is inherently interesting. Scanning targets for loading and flying animations without targets, moving the targets with the finger, zooming, or even moving the targets by tilting the device can better stimulate the child's attention. Learning about dengue fever is animated for children to watch, further emphasizing the fun and educational approach.

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