




# Enhancing Children Understanding about Mosquito Through Let's Learn About Mosquito Using Augmented Reality Mobile Application (LLaMUAR)


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**Abstract:** Mosquitoes and the mosquito-borne illnesses are the biggest contribution to human vector-borne disease burden, with over 80% of the global population are at risk of the diseases from these tiny creatures. Given the fact that, currently there is no permanent or effective vaccine or medication available to treat and protect against these vector-borne illnesses, early detection and prevention are important and essential. Previous existing study that conducted in Guyana has asserted that individual behavior, particularly preventive decisions, plays a crucial act in infection transmission of mosquitoes -borne diseases. It is important to spread the exposure of knowledge of mosquito-borne diseases such as the symptoms, treatment, and prevention to the community since early ages. The emerging of Augmented Reality in education has recently attracted the research attention due to its ability to people to create the connection between the real world and the virtual world. Taking the benefits of the Augmented Reality technology that able to facilitate greater use of prior knowledge, more meaningful learning and deeper understanding, the project aims to implement the technology in the mobile application development to expose the knowledge and awareness regarding mosquito and mosquito diseases to the children with more effective, interesting, and meaningful experiences. Usability testing conducted among male and female respondents to test the performance, usefulness, learnability and accuracy of the application gives median score of five.

**Keywords:** Mosquitoes, Mosquito- borne illnesses, Dengue, Awareness, Knowledge, Mobile Application Development, Augmented Reality, Education, Children.



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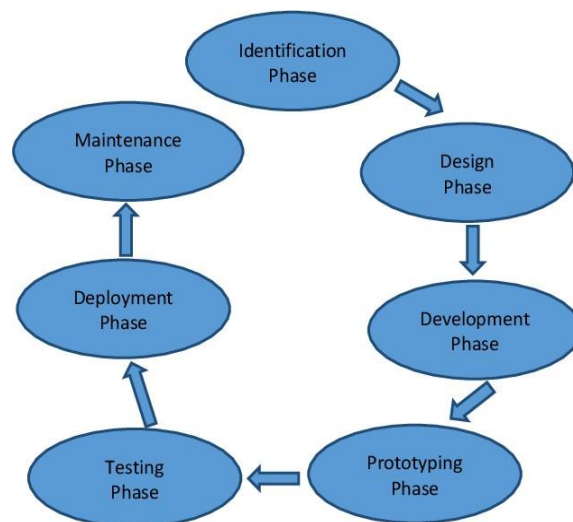
## 1. INTRODUCTION

According to the (World Health Organization, 2020), every year, approximately more than 700,000 people die from mosquito-borne diseases across the globe, and hundreds of millions more experience misery and suffering from infectious that transmitted by mosquitoes. In fact, there have been research claiming that those tiny creatures are the deadliest animal in the world, causing more human death than sharks and snakes (Pflanzer, 2022). Diseases transmitted by mosquito bites are one of the major infectious disease contributors to the worldwide burden. The Mosquito-borne diseases

including zika, malaria, chikungunya and haemorrhagic fevers like dengue and yellow fever are becoming serious health concern in many regions of the earth's especially in tropical and subtropical regions with local variations in risk influenced by rainfall, relative humidity, temperature and rapid uncontrolled urbanisation (World Health Organization, 2020). As highlighted by (Franklinos et al., 2019), the cases number of mosquito-borne diseases has reportedly grown dramatically around the world in recent decades including malaria (about 212 million cases per year), dengue fever (approximately 96 million cases per year), chikungunya (approximately 693000 cases per year), and Zika virus infection (approximately 500000 cases per year).

## 2. METHOD & MATERIAL

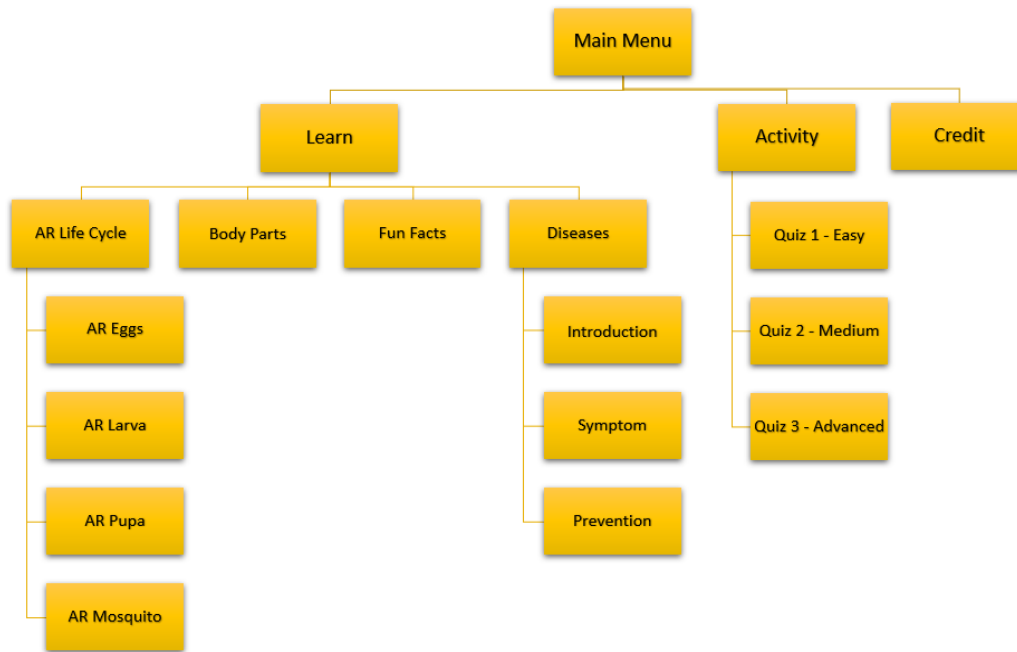
The process of developing and design a complex project requires a proper level of planning. The Mobile Application Development Lifecycle (MADLC) is one of the most suitable frameworks for creating a mobile application. This model helps to assist the progress of project to run smoothly and allows for an organized action throughout the development process (Darus et al., 2017).



**Figure 1:** Mobile Application Development Lifecycle Model (MADLC)

The identification phase is the early and initial stage in this mobile application. In this phase, the project's background, problem statement, expected outcome, scope, user requirements and significance were determined through conducting a research through articles and journals.

The next stage in the mobile application development life cycle is the design phase. The design phase is responsible for creating the mobile application's basic design. In this phase the navigation map and storyboards are also defined as shown below.

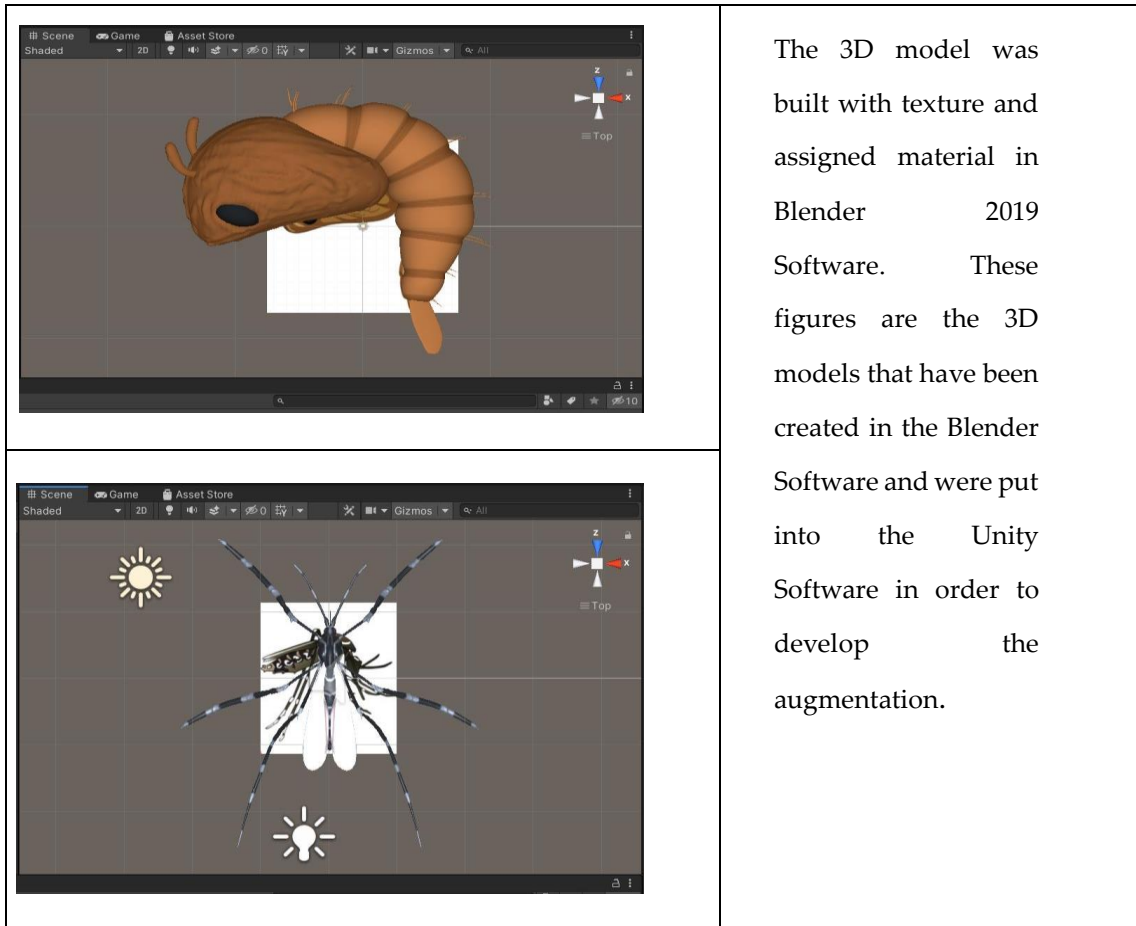


**Figure 2:** Navigation Map Let's Learn About Mosquito Mobile Application



**Figure 3:** Storyboard of Let's Learn About Mosquito Mobile Application

The development phase will take part where the proposed mobile application had been coded accordingly to the design. During this phase, all the anticipated features and functions will be implemented in the process of development. The AR objects also developed in this stage.



The 3D model was built with texture and assigned material in Blender 2019 Software. These figures are the 3D models that have been created in the Blender Software and were put into the Unity Software in order to develop the augmentation.

Figure 4: The AR and modelling of objects

### 3. IMPLEMENTATION AND FINDINGS

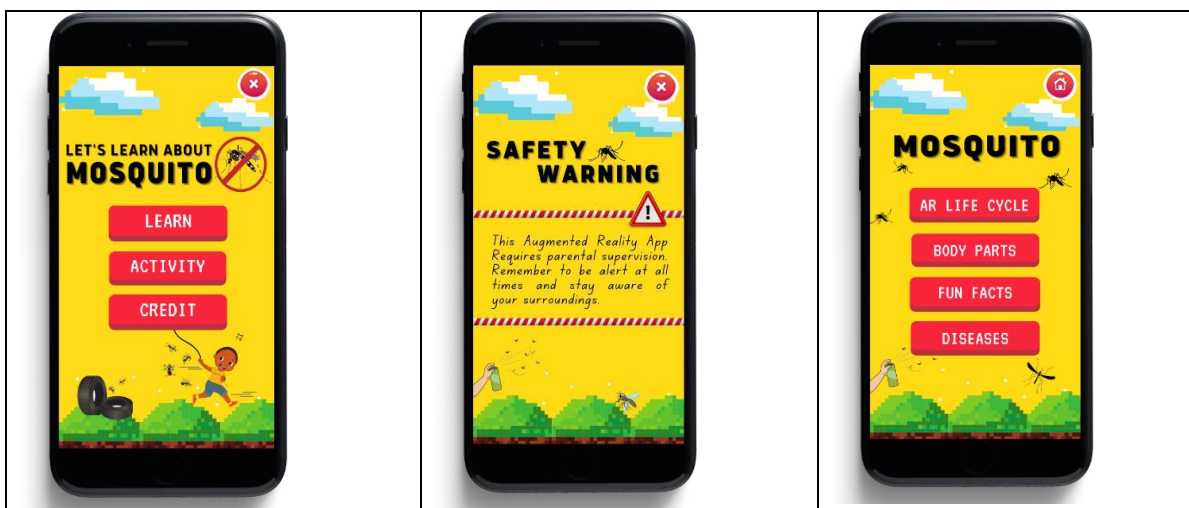


Figure 5: Main Menu, Learn Menu, And Safety Warning Page of LLaMUAR

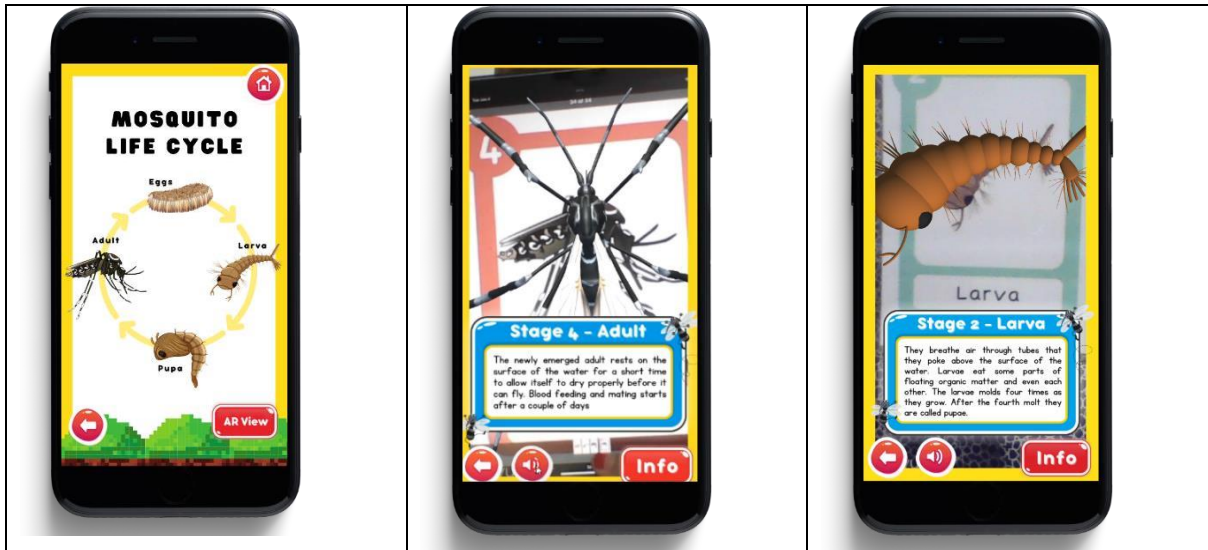


Figure 6: The Mosquito Lifecycle, AR Mosquito Menu and AR Mosquito Egg Menu

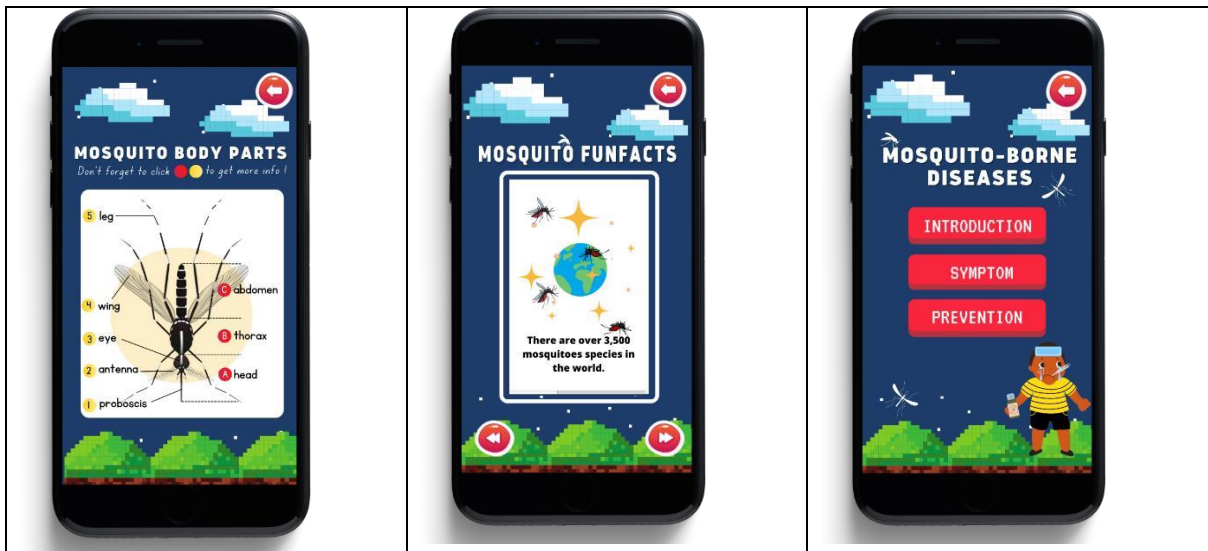


Figure 7: The Mosquito Body Part, Mosquito Fun facts and Mosquito-Borne Diseases

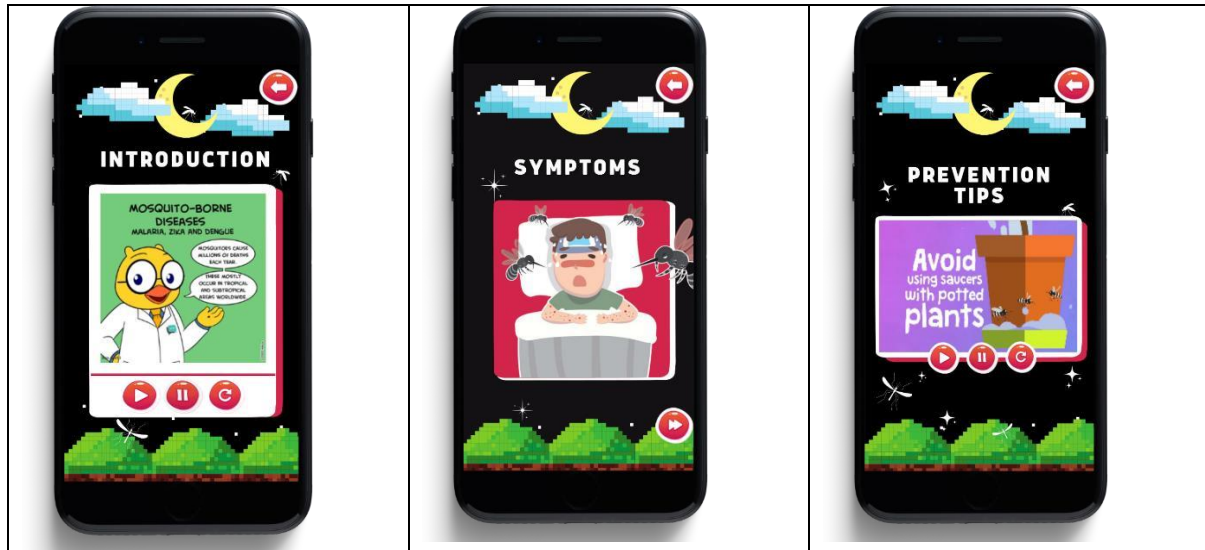


Figure 8: The Introduction Menu, Symptoms and Prevention Tips

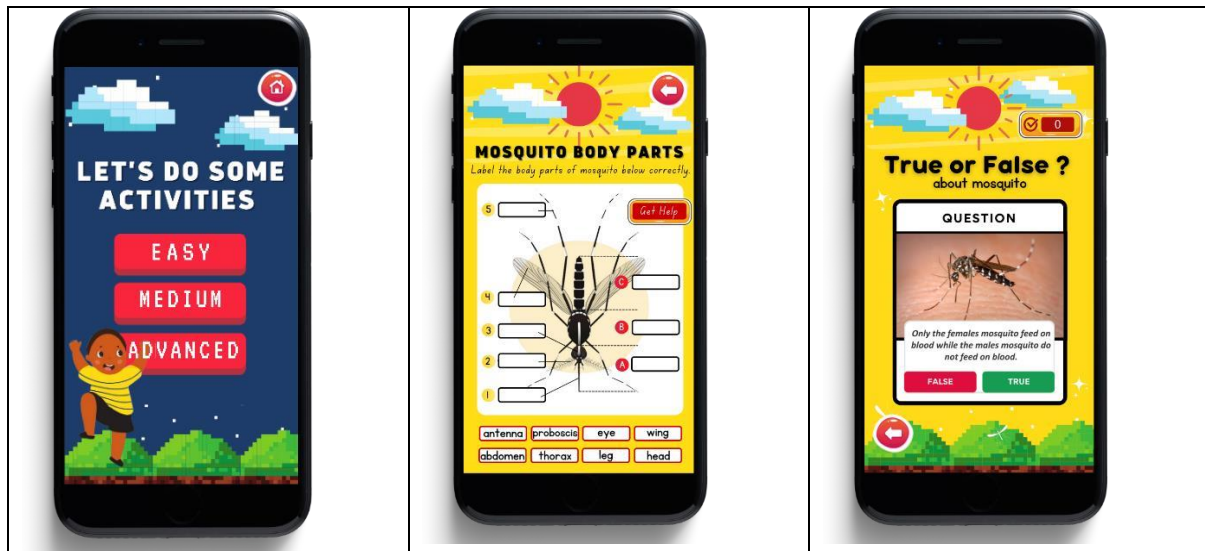


Figure 9: LLaMUAR Quizzes

User background, performance, usefulness, learnability, accuracy, and feedback are the components that have been mentioned in this questionnaire. 4 out of 6 of these components were deemed critical in evaluating the performance of the mobile augmented reality application, Let's Learn About Mosquito in conveying information. The criteria for evaluating the application were performance, utility, learnability, and accuracy which were analysed using the quantitative approach which is in Likert scale.

**Table 1:** Median score evaluation on the effectiveness of Let’s Learn About Mosquito

<b>Criteria</b>	<b>Median Score</b>
<b>Performance</b>	
Let’s Learn About Mosquito works well when using it	<b>5</b>
<b>Usefulness</b>	
Helps in understanding mosquito and mosquito borne diseases	<b>5</b>
Let’s Learn About Mosquito helps in raising awareness	<b>5</b>
Let’s Learn About Mosquito is a better platform to promote the significance about mosquito knowledge to the community member since early ages	<b>5</b>
<b>Learnability</b>	
Let’s Learn About Mosquito is easy to use	<b>5</b>
Let’s Learn About Mosquito is fun and enjoy to use	<b>5</b>
Let’s Learn About Mosquito is interactive to use	<b>5</b>
<b>Accuracy</b>	
Accuracy of information Let’s Learn About Mosquito	<b>5</b>
<b>Overall</b>	
	<b>5</b>

#### 4. DISCUSSION

The description of the let's learn about mosquito mobile application is built corresponds to the review of the requirements. Surveys performed on the public shall be used to collect the relevant criteria for this project. The results of further review of the specifications led to the design phase of this project, which began from the storyboard until they were translated into a real functional model.

#### 5. CONCLUSION

Mosquito-borne diseases are one of the world's most serious public health problems, and these vector-illnesses can be found across the world, including Malaysia. Furthermore, what is becoming worse that our community is becoming less conscious and awareness towards the risk of mosquito-borne infection. Less exposure to mosquitos from an early age can increases the chances of bad consequences to be occur in the future. To address this problem, the project of Let’s Learn About Mosquito Using Augmented Reality mobile application has been developed. This final year project not only includes the interactive edutainment and multimediaelement into mobile application but it also embeds the futuristic element which is AugmentedReality (AR) technology in order to expose the significance of mosquito knowledge and increase the awareness regarding the mosquito diseases with more engaging, attractive and effective especially to younger community in Malaysia. However, the augmented reality features of this mobile application still require some improvement to make it more precise andlook exactly mimicking the real-world process.

## References

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