









TADON: THE DEVELOPMENT OF AR BOARD GAME IN LEARNING CULTURAL HERITAGE HISTORY

DELL OXFORD VALENTINE











FAKULTI SENI, KOMPUTERAN & INDUSTRI KREATIF UNIVERSITI PENDIDIKAN SULTAN IDRIS

2023





















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(Ahmad Nurzid bin Rosli)















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ABSTRAK

Laporan ini membincangkan topik kajian yang dipilih, pendidikan sejarah warisan budaya yang menggunakan pendekatan berasaskan permainan dengan Augmented Reality sebagai cara penyampaian maklumat. Mempelajari sejarah warisan budaya boleh menjadi cabaran untuk dipelajari oleh generasi muda. Nunuk Ragang misalnya merupakan monumen bersejarah budaya Kadazandusun dan juga tapak warisan yang sering terlepas pandang di Sabah, Malaysia. Tambahan pula, ia terletak di tapak yang kurang didedahkan oleh pelancong kerana monumen itu berada jauh dari bandar menjadikannya kurang mudah diakses. Oleh itu, kami mencadangkan aplikasi yang dikenali sebagai Papan Permainan Realiti Diperkukuh "Tadon" (Asal). Tadon dibangunkan untuk membolehkan pelancong dan pelawat dapat mengakses monumen Nunuk Ragang menggunakan teknologi AR. Ia juga akan membolehkan mereka meneroka maklumat yang berkaitan dengan monumen dengan lebih mudah menggunakan papan permainan yang menyediakan cara interaktif dan menyeronokkan untuk belajar yang memberi tumpuan terutamanya untuk menarik pengunjung dan anak-anak muda..





















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TADON: THE DEVELOPMENT OF AR BOARD GAME IN LEARNING **CULTURAL HERITAGE HISTORY**

ABSTRACT

Learning cultural heritage history can be challenging for the younger generation to learn. Nunuk Ragang for example is a historical monument for Kadazandusun culture and also a heritage site that often gets overlooked in Sabah, Malaysia. Furthermore, it is located at a site with less exposure by tourists due to the monument being further from the city making it less accessible. Hence, we proposed an application known as "Tadon" (Origin) Augmented Reality Game Board. Tadon is developed to allow tourists and visitors able to access the Nunuk Ragang monument using AR technology. It is also will allow them to explore the information related to the monument easier using the game board which provides an interactive and fun way to learn that mainly focus to attract visitor and youngsters.































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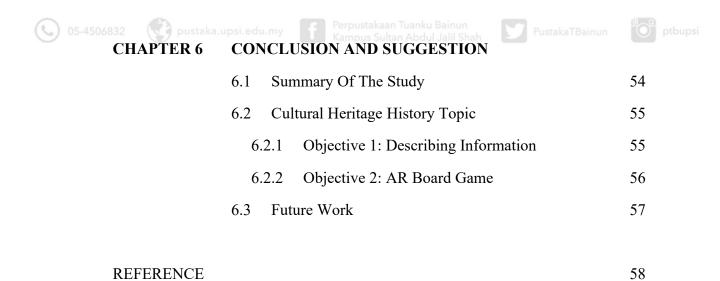








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LIST OF ABBREVIATIONS

AR Augmented Reality

TnL Teaching and Learning

CHCultural Heritage

UI User Interface

UX User Experience

Application Programming Interface API

SDK Software Development Kit

3D Three-Dimensional

Vuforia A software development kit for creating AR experience

Unity A game engine used for developing application

C# Programming language used for Unity































CHAPTER 1

INTRODUCTION









Sabah is rich with traditions and culturally diverse, with more than 30 different ethnics living together as a homogeneous community whiles still retains ones culture, tradition, art, customs, and festivals. Kadazandusun tribe which is the largest ethnic category in sabah (Fam, Syed Annuar, Lai, & Ingko, 2020) with around 40 subethnics are spread over Sabah as for instance, Tatana Dusun in Kuala Penyu, Tobilung Dusun in Kota Marudu, and Rungus Dusun in Kudat to name a few. The existence of diverse sub-ethnics results in different dialect the effect of pronunciation, vocabulary, and grammar (Juanis, Saleh, Ghazali, Mahat, Hashim, Nayan, & Kurnia, 2022). Based on oral tradition that has been passed down through generation on the migration that results in this diverse sub-ethnic, tells that Kadazandusun originate somewhere in





















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Tampias, settlement near sungai Liwagu and sungai Gelibangan where the Nunuk Ragang monument was built.

Moginakan is celebrated here to commemorate the rich history and origin, ever since the Nunuk Ragang monument was built in 2004 with the aim that communities will remember where they came from and why we belong to the same stock of people (Rozelle, 2021). However, recent pandemic caused the site to be unused since big event with huge crowds are not allowed. Furthermore, issues like maintenance and site location made it less familiar to outsiders. That being the case, development of application is to be conduct for better preservation and presentation.









With the rapid development of technology, it become more apparent that tools that were once limited for certain organization only are now more accessible for the masses, augmented reality is one example. Augmented reality or AR is when a multimedia material being superimposed as a virtual object in the real world which enables student to interact with (Morimoto, Kobayashi, Hirata, Otani, Sugimoto, & Mawatari, 2021). This creates a more appealing visual and ease to Tsukamoto, get hands on experience. Further AR has been implemented in education for quite some time, going forward into Education 5.0, to improve Teaching and Learning (TnL) outcome as it is great in retaining student attention and keep them motivated throughout the session (Hao & Lee, 2021). Game based learning along with this emerging technology like serious games, board game for instance, has brought















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benefits including increase in involvement in projects and skills, and the application in a real context. Similarly, it have allowed the emergence of distance learning and fostered greater innovation in teaching methods inside and outside the classroom (Almeida & Simoes, 2019).

In general, board games implementation in presenting information especially a story-driven based serve as a great way to tie the content together, making it more meaningful for the general public. It is easier for anyone to get immersed and experience which is significant in learning perspective with cultural heritage (Malegiannaki, Daradoumis & Retalis, 2021).









We are moving forward to a digital information world where everything is at your fingertips and technology is helping to advance education. That being the case, it is noticeable that utilization of these kind of tools for preserving the historical cultural knowledge as well as a media to introduce to foreign people to attract tourist to the site as being utilize to help less exposed areas (DaCosta & Kinsel, 2022). Similarly, Nunuk Ragang has a similar situation, with the site being further inland and less exposed area. These includes;

a) Nunuk Ragang monument isn't a well know name despite its connection to Kadazandusun heritage













b) Current method on passing on the knowledge is monotonous

First, Nunuk Ragang monument is about one hour drive from Ranau, through the Ranau-Sandakan highway, sited near a village named Tampias. After reaching KM54, there will be Liwogu Bridge followed with Nunuk Ragang sign board to turn right for another 0.7KM. It is a fairly long journey to visit a place that you only get a change to view from the outside since there are fences, and only open during festive celebration, Moginakan, since it's not guarded by anyone. Traveling package often doesn't include a visit to the monument due to this reasons. Additionally, those who travel long distance might be less aware of the cultural heritage in distance region (Xue & Zhang, 2020) thus tourists often overlook the site as one of the place that they can visit. As a result, Nunuk Ragang Monument often unoccupied. Therefore, application help to present the site, in an educational way to help preserve the knowledge.

Secondly, Nunuk Ragang Monument was built as a memorial near Tampias, on account of the site traditionally considered as the origin of Kadazandusun ancestors. Early history of Kadazandusun settlement is identified in the tale of Nunuk Ragang (Bayan Red Fig Tree), which is believed to have been located near sungai Liwagu and Sungai Gelibangan (IHN, 2007; Luping, 2009; tangit, 2018, as cited in VBP, 2021). The tale have been passed down to younger generations via oral tradition, as a way to preserve the information about the myth. The Moginakan festival are celebrated on the first weekend of July every year here, at Nunuk Ragang to honour ancestor and beginnings, as in the myth of the Kadazandusun originate. Aside from a reunion













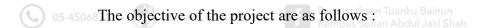






festival, it also serve a great opportunity on sharing and passing on the traditional knowledge to people visiting there, as it not limited to only Kadazandusun. This is great for those who could visit Nunuk Ragang Monument sometimes in July, when the Moginakan is celebrated and watch the rituals and other traditional activity. On the contrary, the other option left are blogs, articles, and Youtube slides to learn about the site, where mostly only tell about the tale with no visual artifact that can be seen present in the monument. Therefore, with serious game form wish to package the information as a whole so people get to learn about the site better.

1.4 Research Objective







- a) To describe the information on the cultural heritage site.
- b) To develop AR environment with sets of activities and question to be added into the board game.

1.5 **Project Significance**

Through a deeper study on Nunuk Ragang monument, with better understanding on its significance, the proposed application will bring a finer and more robust presentation of the information that is not only limited to the Kadazandusun people but also others that might be interested in learning more about the Kadazandusun mythical story that have been passed down through oral tradition and the culture. Moreover, it will also





















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bring new light to the site so that more people would know its existence therefore opening more opportunity for further development.

a) Historical knowledge learning

Nunuk Ragang holds some artifact and acts as a tribal mini-museum where people can visit and explore the cultural heritage. This application will bring the knowledge so people able to gain more understanding on the cultural heritage site without having to travel far. Additionally, the game-based approach will help gain student motivation in learning.



() 05-4506832 () pustaka.upsi.edu.my b) Tourism and attraction







With the recent pandemic, it is noticeable that tourist count decrease, going from roughly around 567,000 to 30,000 in February of 2021 (Rechard, Kadir & Mukhtar, 2021). This project will provide new light to the place that tourist can visit as a result of the introduction that the application provide.

1.6 **Project Scope**

The scope of study for this project includes the previously discussed problem statement on the Nunuk Ragang monument and the significant behind the monument, with regard on the stated objective. The scope of the project development:











- The Augmented Reality (AR) application is build on a Unity game engine along with Vuforia for the marker-based tracking, where several different marker being used for the elements on the game board and player marker. This application will work on any android smartphone with Android 8 and above.
- The 3D model are low poly for easier loading time, viewing, and editing. This will be done on Unity. Game board will be drawn with the marker on IbisPaint X.
- The admin capabilities on updating content are to be done on Firebase Realtime Database. This is to enable any changes if required.
- As for the application functions, it will be divided into several module with each store different multimedia type which are:
 - i. Recognition module for the marker feature, this is to scan any any visible marker that has been specified to the computer structure in the application to the back camera
 - ii. Multimedia module for the necessary video, audio, and 3d structure to support the learning material.
 - iii. Text module where mainly further reading on specified structure is being display.









