Learning Malaysian Musical Instrument through Interactive 2D Games

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Abstract— **Malaysia is a multiracial country with a wealth of local musical heritage and musical instruments. Nowadays, traditional musical instrument is difficult to find. Young generation are more exposed to the game based on computers and digital platform. The aim of this research is to create a 2-dimensional (2D) interactive game application by using Unity software. This research use ADDIE model as its methodology which consists of Analysis, Design, Development, Implementation, and Evaluation phase. A study on the effectiveness of interactive 2D game application on traditional musical instruments showed that respondents agreed that this application can exposed students with traditional musical instruments**.

Keywords— Interactive 2D game; Malaysian musical instruments; Malaysian heritage; heritage preservation

I. INTRODUCTION

Malaysian musical instruments are the cultural heritage of every race in Malaysia. According to [1], the rhythm of music was an entertainment for the people of old. However, moving into the modern world, this technology has been forgotten, as technology overcomes the tendency of today's generation toward more lively and catchy music.

Traditional musical instrument is important to instil a variety of emotions into a certain show or performance. People rarely use traditional instrument in show or performances and the instruments can only be found in certain events [2]. This has made the young generation less vulnerable to the Malaysian instrument, as it is difficult for them to see the instruments surround them.

According to [3], the Ministry of Education intends to maximize the use of educational technology in all schools in Malaysia. The development of this application not only helps students recognize traditional musical instruments but also support the government's efforts with the use of information technology and communication (ICT) among students in schools. Based on this statement, we have become motivated to conduct this research regarding the Malaysian traditional musical instrument and by implementing game technology in teaching the students about their precious heritage.

This paper is organized as follows: Section 2 will discuss about the overview of traditional musical instrument in Malaysia, and include the existing works on preserving music and its instruments in digital form. Section 3 will discuss about methodology and process of developing of our 2D games, named *Dunia Muzik*. Section 4 will discuss about evaluation phases and results obtained from it. Finally, Section 5 is the summarization of this research, future works and recommendation.

II. RELATED WORKS

As a multiracial country, each of the ethnic in Malaysia has their own traditional musical instruments. For example, Kompang is the most popular traditional musical instrument for the Malay community and this musical instrument are usually played during parades, feasts and other traditional ceremonies.

Chinese play traditional musical instruments as solo instruments for entertainment and are also used in orchestras to accompany Chinese operas or to accompany singing. Dholak is a North Indian musical instrument and is commonly used in the production of beats for movie songs. Traditional musical instruments played by the Indians were used to accompany singing and dance during the Indian wedding ceremony.

Fig. 1: Example of Malaysian traditional musical instruments

A. Musical instrument categories

Each of these musical instruments can be divided into four categories: (1) Chordophone, (2) Membranophone, Idiophone and Aerophone [4]. In Chordophone, the musical instrument sound is created by vibration on a rope. For example, *erh-hu, tampura, rebab, sapeh and pipa*. Meanwhile in Membranophone, all instruments produce sound through the

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skin or membrane that are tightened and hammered. For example, *gendang* and *rebana melayu.* In Idiophones category, all musical instruments can produce sound through the reaction of the echoing body like group of *gongs.* Lastly, Aerophones are musical instruments that produce sound through the air such as *serunai.*
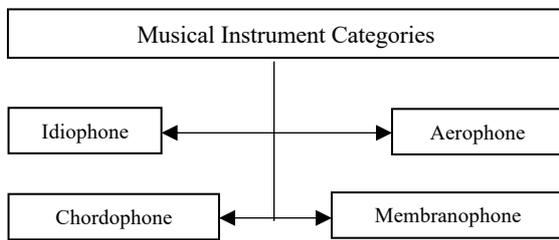

Figure 1a: Musical instrument categories

B. Musical instruments application – existing works analysis

Before this project move to design and development phase, a review has been done on the two available app and website that related to musical instruments. The first is an app named All Musical Instruments and the second one is a website named Music Band.

All musical instrument is a mobile application that teach user about Indian musical instrument. Not only learning about the instruments, it also allows user to hear the instrument sound. This can be done by clicking on the play button provided.

This website is for preschoolers. This games provides a few selection of buttons so that user can play and stop the instruments. The advantages of this website is the realistic sound and attractive animation that moves accordingly based on the played instrument audio. Despite that, the downside of this website is that not all of the button functions well.

Table 1 shows the analysis of this existing works are based on its features: (1) content, (2) learning, (3) background music and (4) information. This information retrieved will be applied in the design of *Dunia Muzik* 2D games. The summarization of the two existing works are as follows:

TABLE 1: Features of comparison

Title	Platform	Purposes	Animation	Audio	Information
All music instrument	Mobile app	Learning	Not available	Yes	Not available
Music band	Website	Games	Available	Yes	Not available
Dunia Muzik	2d games	Learning and games	Yes	Yes	Yes

III. DESIGN AND DEVELOPMENT PHASE

Dunia Muzik is an interactive 2D game for learning Malaysian traditional musical instrument and used ADDIE as the method of development. ADDIE model is used because it is the most common model used to produce educational materials [5]. ADDIE model consists of Analyze, Design, Development, Implementation, and Evaluation.

This game has been developed by using Unity 3D as the main platform. Other software such as Illustrator and Photoshop has been used for the characters' design. Finally, C# has been used as the scripting in this project.

This game is divided into two sections which are game section and revision section (Figure 2). In the games section, user is given with three levels, and the level difficulties increase from one level to another. Before the game begin, an instruction has been provided, so that user can know the objective that they need to achieve in the game. Basically, user need to find the correct musical instrument by shooting them and avoid any collision with modern instruments as it will decrease their score. Figure 3 shows an example of user interface for game section. Meanwhile, in revision section, user can learn about wide range of musical instrument. To learn about the instruments, user can click on the icon (Figure 4). From here, user will be directly go to a new section that provide the detail explanation.
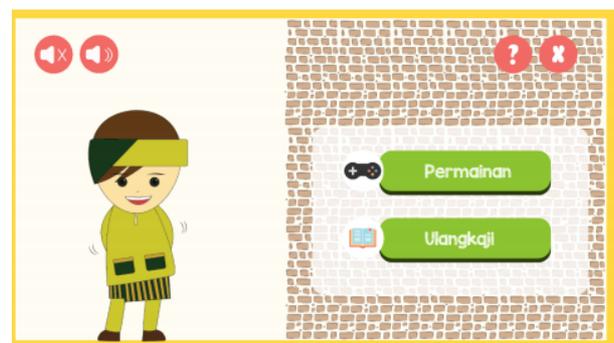

Fig. 2: Prototype main page

Fig. 3: An example of game interface

Fig. 3: Revision section

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Fig. 4: The information of Rebana

IV. EVALUATION PHASE

To evaluate the effectiveness of the application, the researcher already conducts an online survey and this questionnaire has been distributed to the intended users through online by using Google Form. A total of 16 respondents (12 females and 4 male) have been answered the questionnaire. There are 17 questions in the questionnaire form and all of the questions are divided into three sections. The first section is respondent details, second section consists a set of questions related to the current method of dispersing information on the exposure of traditional musical instruments to the users and evaluation of the effectiveness on the usability of "*Dunia Muzik*" 2D games.

A. Results on user knowledge about the traditional instruments

From the survey, it has been found that all respondents have seen the traditional musical instruments showed in the games. The places they saw these instruments are from museums followed by schools, events and exhibitions. However, 56% from the respondents know about the instruments but agreed that they have a basic knowledge about them.

B. Results on the game effectiveness

In term of the games effectiveness, all respondents agreed that this game helped them understand the topic better and majority agreed that the application could expose students to traditional musical instruments. However, only 56% would recommend this application to their friends and family members.

V. FUTURE WORKS

A few recommendation has been received from the respondent and will be considered as in the future works.

i) Familiar characters

The respondents suggested the utilization of familiar characters (such as Upin and Ipin) the main character. The utilization of familiar character can change the player's mood during the play and learning process. This can lead to increase the player's enjoyment while playing the game.

ii) Feedback and scores

In terms of feedback, a respondent suggested the used audio effects (such as 'yeay') once the user answer each of the questions. This feedback is important to keep users motivated in learning about the musical Another important element is to provide a score once they complete answering the quiz in the game.

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