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Preface

This e-book describes the research papers presented at the International Conference on Emerging Computational Technologies (ICECoT 2021), organised by Faculty of Computer and Mathematical Sciences (FSKM), UiTM Cawangan Melaka. The main discussions of the conference is on the technological advances that help shape the skills that are required to cope with the Fourth Industrial Revolution (IR 4.0). Considering that this is our first attempt at organising a conference, we are therefore greatly honoured that the Universitas Negeri Semarang (UNNES), Indonesia, Mahasarakham University (MSU), Thailand and University of Hail (UoH), Saudi Arabia have all agreed to become our partners by contributing several reseach papers as well as providing reviewers to assess the quality of the papers.

Out of the numerous research works that had been submitted and reviewed, the Editorial Board have selected 22 papers to be published in the e-book. The discussions of these papers pertain to the use of technologies within the broad spectrum of Computer Science, Computer Networking, Multimedia, Information Systems Engineering, Mathematical Sciences and Educational Technology. It is hoped that the research findings that are shared in this e-book can benefit those who are interested in the various areas of computational technologies; such as graduate students, researchers, academicians and the industrial players, to name a few.

As the Project Manager, I would like to thank all of the committee members from the bottom of my heart for their tireless efforts in ensuring the success of ICECoT 2021. Without their continual support and excellent teamwork, this conference would not have come to fruition. In fact, holding this major event has been a good learning experience for us all, and I sincerely believe that our future conferences will become more outstanding if the same spirit is maintained.

Dr. Noor Aishikin Adam

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Game Based Approach in Learning Malay Proverbs

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Abstract— Proverbs are a basic component in Bahasa Melayu and are one of the important elements in completing Bahasa Melayu skills for primary school. Using proverbs effectively in writing contributes to good writing. However, from the preliminary study conducted at a primary school, the findings showed that students find it difficult to understand the Malay proverbs and its meaning. In addition, the learning environment is not interesting. Thus, this research has developed a game named Bijak Peribahasa Game to give users an enjoyable learning experience to learn the Malay proverbs. The game is developed using the Game Development Life Cycle Model (GDLC). The enjoyment level of the game is evaluated by using an adaptation of the EGameFlow Model including concentration, goal clarity, feedback, challenge, autonomy, immersion and knowledge improvement. Findings of enjoyment evaluation showed that the game receives 95% level of agreeability by the game users. Future work for this game includes developing on mobile platforms, providing high scores for players, improving by adding multi-player and enhancing the contents of the game.

Keywords—*proverbs, enjoyment, game-based learning*

I. INTRODUCTION

In Bahasa Melayu, [1] defines proverbs (peribahasa) as bidalan, pepatah, verses or group of fixed words and have a particular significance. It is popular among old folks as a traditional saying constructed based on common sense and experience. Proverbs are wonderful components to softly convey advice and moral qualities. Today, proverbs have become popular again among primary school students as it is taught and designed for their Bahasa Melayu syllabus. Based on [2], proverbs like simpulan bahasa, perumpamaan, bidalan and pepatah are required to be taught in Bahasa Melayu [3].

However, from a preliminary study, the findings showed that students encountered difficulty understanding Malay proverbs and its meaning. Some students do not even know the meaning of the Malay proverbs although they have heard them before [4]. It is raising a serious concern to make sure the young generation understand the beauty of Malay proverbs and protect its cultural heritage [5]. Based on an interview conducted with a Bahasa Melayu teacher in Sekolah Kebangsaan Jasin, she also stated that many of her students lack knowledge about the meaning of the proverb. As a result, students always get the wrong meaning of the

proverb and find it difficult to use it in their essay when they sit for exams. It becomes worse when the study of proverbs is stressed only for examination purposes. As a result, students turn easily to forget about proverbs right after the examination ends and have no motivation to understand and memorize again the abstract phrase or meaning of proverbs. There is also a responsibility of educators to ensure Malay proverbs are always in mind among students at school level and beyond [5].

Traditional teaching environment causes students to be less interested in learning and difficult to understand the knowledge [6]. This is supported by a survey conducted to 30 primary students related to the level of satisfaction in learning Malay proverbs. Based on this survey 70% of students had agreed about the learning proverb via game-based. This shows that students prefer fun and enjoyable learning processes. The strategies and techniques used in learning proverbs are an important factor in cultivating the excitement and the curiosity of the students in order to trigger interest in the proverbs [7].

Various past investigations have revealed that learning inspiration and efficiency can be improved through game-based learning [8]. The combination of game into learning process is frequently more practical than conventional way showing techniques in improving learning inspiration, dynamic interest and focus among understudies likewise diversions can improve the social aptitudes of understudies [8].

Based on the problems mentioned above, there is a necessity to improve the Malay proverb learning. This paper is to present an enjoyment game-based learning application for primary school students to learn Malay Proverbs and as an additional supportive teaching and learning tool.

II. LITERATURE REVIEW

Bahasa Melayu is a language rich with idiomatic phrases or also known as pepatah, peribahasa, kata perbilangan, kiasan and simpulan bahasa used to describe things or events [9]. All of these are a way of communicating something in an explicit or implied way and making Bahasa Melayu a unique and beautiful language. By using proverbs or in a rhythmic language, it is possible to make a verse or word even more beautifully heard although there are some phrases that contain

satire or teaching that are hard to be expressed in ordinary language [9].

Proverbs have existed in the life of society and its way of delivery is consistent and delicate to symbolize and impart certain meanings implicitly [10]. Malay proverbs that include *simpulan bahasa*, *perumpamaan*, *pepatah*, *bidalan*, *perbilangan* and *kata-kata hikmat* should be taught in Bahasa Melayu and the proverbial selection should prioritize the philosophy, personality, and moral values of a multi-racial Malaysian society [2].

A. Game-Based Learning (GBL)

Nowadays, the use of games for education purposes is seen as viable because it can offer potential learning benefits. GBL simply includes games in the educational process. GBL is utilized from elementary to higher education and to the public in general. For example, GBL for teaching programming courses in higher education is being developed [11]. Learning hurricane safety using game-based learning shows a promising result [12].

B. Enjoyment Experience in Game-based Learning

GBL can increase the enjoyment level in the learning process even if it is for a subject that is seen to be difficult and dry. GBL increases a sense of enjoyment to users in learning Mathematics through drill activities [13]. The increase in enjoyment level can be seen to contribute to better learning outcomes. When users experience enjoyment in the game, they are likely to achieve better [14]. The learning outcome is slightly better when using computer games [15]. The computer educational game showed higher scores on academic achievement and motivation of elementary students [16].

Most of the studies looking at the effect of computer games on student inspiration and commitment discovered positive outcomes [17]. The studies discovered that games can affect emphatically on critical thinking abilities, more extensive learning securing inspiration and commitment [17]. GBL has been suggested as a tool to increase students' natural inspiration and enthusiasm for learning [18].

C. Game Development Life Cycle

Game development life cycle (GDLC) is a guideline to assist game developers to design and build games successfully. [19] proposed a new GDLC which consists of six phases: Initiation, Pre-production, Production, Testing, Beta, and Release. In the initiation phase, analysis of similar games, idea generation, hardware and software requirements are generated [20]. Pre-production phase is the phase where the game design, game concept and game design document is made [19].

Next, the production will divide into parts which produce the game, which are game assets and programming and proceed with testing phase, where the evaluation of the prototype is conducted and for beta phase will test the game by third party people or the player [20]. Lastly is the release phase in which the game is completely refined which means all the errors are removed.

D. E-Game Flow Model

This study implements the adapted E GameFlow Model to evaluate the users learning cognition of enjoyment while playing the game. The model consists of eight elements which are concentration, challenge, skills, control, clear

goals, feedback, immersion and social interaction [21]. EGameFlow consists of a checklist to evaluate all factors, primarily to assess the player's level of play and thus to improve the application and design of the game [21].

Furthermore, this project will provide the player a storyline with a proper instruction so that it will be easier for them to play the games. The language that will be used in this game is Bahasa Melayu because the syllabus itself uses that language. This game will use the desktop as a platform. Lastly, the game genre for this game is an adventure game. Adventure games are the most commonly used genre of educational games, as it is more storytelling and problem-solving skills that are highly valued by educators [22].

III. METHODOLOGY

The game's development is guided by the proposed GDLC model that involves initiation phase, pre-production phase, production phase, testing phase and beta phase.

A. Initiation

In the initiation phase, a preliminary study has been done to gain information regarding the lack of enjoyment in learning Malay proverbs among the primary school students. Questionnaires have been distributed to thirty standard 6 primary school students and an interview is conducted to obtain data from an experienced Bahasa Melayu teacher.

From the preliminary study, students choose games to learn proverbs to overcome the problem as game applications can give them fun while learning.

B. Pre-production Phase

In the pre-production phase, the game design includes outlining storyline, mission, challenge and reward, and designing storyboard. The game content is created according to the Bahasa Melayu subject syllabus for primary school.

Fig. 1 shows the game flow of the project. When the player launches the application, the main menu is displayed with three choices: start, learn, sound setting and exit. When players click the start button, there will be a storyline about the game before they enter into game levels. There will be three levels which they need to complete before the next level. On the learning page, users can learn Malay Proverbs and its meaning through animation images which can make it easier to remember.

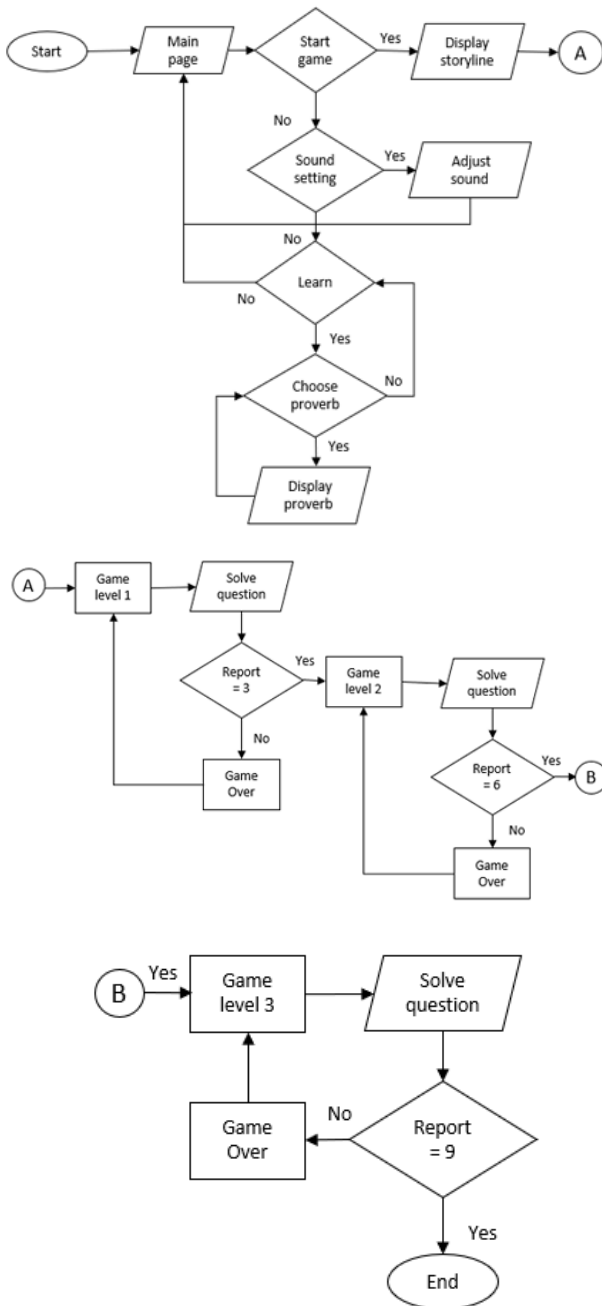


Fig. 1. Flow of the game

1) *Storyline:*

Player as a police officer needs to collect all reports to be promoted. Throughout the way the police officer will encounter Malay proverb questions which must be answered all correctly. Players need to avoid collisions with other cars to prevent heart reduction. There are three hearts, which means three chances. If all the chances are used, the player needs to replay the game from the start. It is the same with fuel, the player needs to replay as well if the police car ran out of fuel. To avoid the car from running out of fuel, the police officer needs to collect all the fuel along the way. There will be three levels in this game which need to be completed each level to proceed to another level. The police officer will be promoted if he can collect all the 9 reports.

2) *Mission:*

Collect all reports in order to get promoted

3) *Challenge:*

The challenge in this game is that players need to get rid of collisions with other cars and need to answer the Malay proverb questions correctly in order to get the report.

4) *Reward:*

The player as a police officer can be promoted if he manages to collect all the reports.

C. *Production*

In the production phase, game assets are created and merged together. For programming language, C# is chosen since it is pure Object Oriented Language likewise it can easily create GUI in the game, for modelling planning and altering structuring by utilizing 3Ds Max, Blender and Adobe Photoshop CS6. Unity is where the game engine was constructed. It integrates all designs made from the above software into one game and users have the ability to add sound and animation to the scene and add interactivity and functionality to the game objects.

The project implementation involved the elements of the E-Game Flow model to enhance the enjoyment of users while playing the game. All the elements are highlighted and explained in detail in Table 1.

D. *Testing*







This phase is about alpha testing. It is used as internal testing to check the usability and functionality of the project, whether the game is functioning well or playable.






E. *Beta*

Beta testing is evaluated by the end-user, to check and evaluate whether this Malay proverb game does give enjoyment to the students. The testing is conducted with 15 primary school students from standard 3 to 5 of Sekolah Kebangsaan Jasin, Melaka to test the game. They are required to play the game on a personal computer and then they are given a set of questionnaires to evaluate the feel of the game.

The questionnaire will be based on the EGameFlow model. Seven dimensions used in the evaluation are concentration, goal clarity, feedback, challenge, autonomy, immersion and knowledge improvement. The game is an offline game; hence, social interaction dimension is omitted. The respondents need to give marks according to Likert scales ranging from 1 (strongly disagree) to 5 (strongly agree). Findings from the questionnaire for each dimension will be totaled up to obtain the mean value.

TABLE I. GAME ELEMENT IN MALAY PROVERB ADAPTED FROM EGAME FLOW MODEL

Concentration	
The game itself needs to be put in complete concentration to win in the game. For reports accumulation, the player as a police officer needs to pay close attention to answer all the questions correctly to collect all reports to get promoted.	
	
Goal clarity	
Before the game starts, clear missions are presented to alert the player to the main goal of the game. For this game, the aim of the game is to accumulate the reports.	
	
Feedback	
When the player reaches the question station, the question boxes will pop up immediately and the player needs to answer the given question. If the player answers the question correctly, then the correct popup will appear immediately. But if the player answers the question wrong, then the wrong popup will appear immediately.	
	
Challenge	
Player needs to avoid collision with another car to reach the end of each level successfully. The player is required to answer all questions correctly. If a player got a wrong answer, the player needed to play the game from beginning until got all the correct answers to complete the level.	
	
Autonomy	
Buttons provide interactivity for different functions such as buttons for start, resume, play or quit the game. Player can interact with the character by controlling the character to left and right.	

	
Immersion	
The immersion of the 3D game is added such as moving cars in the lively road environment.	
	
Knowledge Improvement	
	The knowledge improvement is when the question pops up. Players need to hit the correct answer. If the answer is incorrect, the player needs to start that level again. On the main menu too, the player has the option to learn a Malay proverb before starting the game.

IV. RESULT AND DISCUSSION

The enjoyment testing is analysed based on the adapted seven dimensions of the EGameFlow model. Table II is the summary of analyzed information from the testing on the mean value for each dimension and overall mean of the seven dimensions.

TABLE II. MEAN FOR EACH ELEMENTS AND OVERALL MEAN VALUE

Game Dimension	Total Mean
Concentration	4.73
Goal Clarity	4.77
Feedback	4.80
Challenge	4.73
Autonomy	4.80
Immersion	4.93
Knowledge improvement	4.53
Overall Mean	4.76
Percentage of overall mean	95.1%

In concentration dimension, the total mean is 4.73. This shows that participants strongly agree that they can remain focused on the game. The total mean for goal clarity dimension is 4.77. Most of the participants strongly agree that they are clear with the game goals. The feedback dimension in this project is achieved with the total mean 4.8. Most of the participants strongly agree that they receive feedback while playing the game. Next, the participants strongly agree with the challenge dimension in this game with the mean value is 4.73. The autonomy dimension is 4.80 which means most of the participants strongly agree that the game provides a sense of control over the game. The mean for immersion dimension is 4.93. The mean for knowledge improvement is 4.53. Participants strongly agree that they were focused, did not feel tired and forgot the time when playing this game. The overall average of the dimensions is 4.76 or 95%, which shows the participants strongly agree that the game is enjoyable.

V. CONCLUSION

Game-based learning can be used to create an enjoyable learning experience and more exciting environment. Learning through the Bijak Peribahasa game has been successfully designed and developed to help students get enjoyment while learning Malay Proverbs. The game helps students to have an enjoyable and interesting learning experience. Players can learn the Malay proverbs through the game contents. The game can be used as an alternative teaching tool. However, the project is developed for personal computers and windows platforms only, one player can interact at one time and no highest score is provided to show progress achievement. As a future work, it is highly recommended that enhancement to mobile platforms, multiple players, include scores to motivate players to learn more and enhance the game content according to school syllabus.

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