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OOLAM: GAME-BASED LEARNING ON TRADITIONAL ULAM IN MALAYSIA

Nur Hanis Ariena Mohd Syaiful
College of Computing, Informatics and Mathematics, Campus Jasin, Jasin, Melaka
2022699952@student.uitm.edu.my

Norshahidatul Hasana Ishak*
College of Computing, Informatics and Mathematics, Campus Jasin, Jasin, Melaka
hasana@uitm.edu.my

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Abstract

Despite Malaysia's rich biodiversity and healthy food culture, most Malaysians eat fewer vegetables than recommended by the World Health Organization and Malaysia Dietary Guidelines. Game-based learning has the potential to change this by making vegetable consumption more interesting through engaging multimedia tools such as text, audio, picture or animation. This project aims to create a fun and educational game to teach people about the health benefits of ulam, increasing their interest and daily intake of vegetables. We chose the agile methodology for its ability to meet clear game design standards and adapt to user needs, making it ideal for small projects. Agile ensures accuracy in processes and storytelling while saving time and resources by allowing for adjustments during the design phase and effectively managing any issues that come up. The expected result obtained the user to able acknowledge the 5 well-known accessible ulam in Malaysia and its health benefits of the ulam by conducting pre-test and post-test evaluation to measure their knowledge before and after they play the game.

Keywords: traditional ulam, game-based learning, pre-test, post-test

INTRODUCTION

According to Uzbek (2019), the term "ulam" in Malay culture refers to specific plants found locally that are used as green salads on their own or in conjunction with certain herbs and fermented sauces to be eaten with rice. Ulam is one of the famous traditional vegetables used by the Malay people in Malaysia. The name ulam refers to a broader spectrum of traditional herbs and vegetables found in Southeast Asia. Some ulam is also claimed and traditionally believed to have medical benefits, which include blood cleansing, uterine cleansing, uterine contraction induction, and the prevention or

cure of ailments such as diabetes, high blood pressure, cardiovascular disease, arthritis, fever, and coughs (Abas et al., 2006).

The World Health Organization (WHO) recommends intake of fruit or vegetables at least 5 servings per day. However, the percentage of Malaysians that did not consume vegetables showed that 94.9% of respondents do not take adequate vegetable as recommended by WHO and Malaysia Dietary Guidelines (MDG). Deputy Minister of Health, Datuk Dr Noor Azmi Ghazali, said the findings were based on the National Health and Morbidity Survey (NHMS) 2019 which is conducted every four years to see the health literacy of the country's population (Institute for Public Health, 2019).

Table 1: Table of Vegetable Intake Trend in Malaysia from 2011 to 2019

	2011	2015	2019
Inadequate Vegetable Intake	92.5%	94.0%	94.9%

Source: National Health and Morbidity Survey, 2019

Problem Statement

A Lack of knowledge towards the importance of vegetable consumption among youth and adults

Even though there are several articles explaining the importance of vegetable eating, only a few individuals are concerned about its impact on their health (Mat Zin et al., 2022). When a person becomes older, they have complete control over their food consumption. The current study aims to identify the socio-demographic characteristics that influence this poor vegetable intake (Mustafa et al., 2021). Children with low-income family have less diversified meals and do not adhere to food-based dietary requirements (Kirkpatrick et al., 2012). It has also been reported that living in impoverished conditions during childhood could adversely influence adult health negatively (Olson et al., 2007).

Many studies have found that lower household income is consistently linked to poorer nutrition quality (French et al., 2019). It simply can be described that having certain knowledge

about eating healthily is one of a privilege. Hence, there was a rather awry results towards the good outcome it will be possessed. The method or approached that been using to promote this might be dysfunctional by seeing that 94.9% of Malaysians did not consuming vegetables (Institute for Public Health, 2019).

Unable to follow and maintain Malaysian Dietary Guidelines (MDG) among Malaysians that leads to poor dietary behavior.

In adolescents, the intake of vegetables may also be influenced by physical-environmental factor which is the availability of vegetables at home and school (Adzim et al., 2020). Therefore, if home and school have zero or less vegetables availability, it will definitely lead to the downfall of vegetables daily intake. Meanwhile, despite widespread recognition of the health advantages of eating fruits and vegetables, university students confront challenges in maintaining a healthy lifestyle when living away from home (Nur et al., 2020).

Young adults may have lacked experience in making healthy food choices which will lead to unhealthy lifestyles. Individuals in these categories are more likely to acquire poor eating habits as a result of low nutritional intake (Tok Chen Yun et al., 2018). As a result of this practice, which most university students have adopted in their daily lives, it leads to irregular meals, lacking breakfast, eating less vegetables, and consuming more fried foods. As a result, unhealthy eating habits acquired during adolescence can persist throughout adulthood (Maynard et al., 2005).

Objectives

1. To design a game-based learning application on traditional ulam.
2. To develop a game-based learning application on traditional ulam.
3. To evaluate the effectiveness of learning application on traditional ulam.

Research Scope

The scope of this study is to develop a game-based-learning on learning ulam for Malaysians. The target user for this project is towards at any age group Malaysian that did not consume vegetables in their daily food intake. The game-based-learning is built and designed in a 2-Dimensional (2D) environment using Construct 3 that displays interactive tools

including multimedia elements such as animation, graphics, text and audio. English as the language used in the game. The game is a desktop-based game.

LITERATURE REVIEW

"Ulam" is a general Malay word for a freshly consumed plant, and salad is the closest English equivalent. It is frequently served as a raw, fresh, crunchy, leafy, boiled, steamed, soft textured side dish or appetiser with a dip of fish sauce, chilli paste, prawn paste or a dressing of lime, salt and chilies (Normiadilah and Noriah, 2012). In Malaysia, there are about 120 species of Ulam, which range from groundcovers to shrubs to trees. Vegetable leaves, shoots, blossoms, fruits, roots, and rhizomes are consumed fresh or cooked to provide variety and taste to the diet, as well as for their beneficial health effects (Rashidi et al., 2012).

Factors that contributed to less vegetable consumption in Malaysia

According to Woon (2012), despite the acknowledged benefits of vegetable consumption, several persistent factors contribute to low vegetable intake in Malaysia. Urbanization and a rapidly changing lifestyle have been identified as key factors influencing dietary habits, with an increased reliance on processed and convenient foods that often lack sufficient vegetable content. Economic considerations also play a role, as the perceived high cost of fresh vegetables can act as a barrier to regular consumption, particularly among lower-income populations (Yusof et al., 2016).

Cultural preferences and taste preferences continue to shape dietary choices, with traditional Malaysian cuisine often being centred around meat and carbohydrates rather than vegetables (Chin et al., 2019). Additionally, a lack of awareness and education regarding the nutritional importance of vegetables contributes to the challenge, emphasizing the need for targeted nutritional education programs to promote healthier eating habits (Zakaria et al., 2021).

Selected Traditional Malaysian Ulam

Based on multiple of article readings, 5 ulam have been decided to be introduced in this game-based learning (GBL) such as, belalai gajah, bayam brazil, daun kesum, winged beans

and ulam raja. These ulam is well-known for its consumption and benefits towards health among Malaysians.

Figure 1: Selected Traditional Malaysian Ulam

According to Huda-Faujan N et al., (2015), ulam is very high in fiber but low in calories. It provides with the main source of carbohydrates, proteins, minerals, and vitamins, which are crucial for growth and health as well as mind. There are also contain phytochemicals such as phenolics, carotenoids, lignans, and lycopenes. These phytochemicals have been reported to have potential health benefits such as anti-tumour, anti-allergenic, anti-inflammatory, anti-microbial, and antithrombotic.

The importance of vegetables in our health

Traditional vegetables play a crucial role in promoting health due to their rich nutritional profiles and potential disease-preventive properties (Dreher, 2018; Ovando-Medina et al., 2018). These vegetables often deeply rooted in Malaysian culinary practices, contribute essential nutrients crucial for maintaining overall health (National Coordinating Committee on Food and Nutrition, 2017). These vegetables are rich in vitamins, minerals, antioxidants, and dietary fibres, all of which play key roles in supporting various bodily functions and preventing chronic diseases. (Dreher, 2018; Ovando-Medina et al., 2018).

Game-Based Learning

Game-based learning refers to the achievement of defined learning outcomes through game content and play and enhancing learning by involving problem-solving spaces and challenges that provide learners, who are also players, with a sense of achievement (Qian & Clark, 2016). Game-based learning intends to educate. It relies on a fully-fledged game, commonly named serious game. Beyond education and serious games are games intended for a variety of serious purposes, for example in industry, training, or stimulation (Alsawaier, 2018; Connolly et al., 2012). Even though serious games and game-based learning differ from gamification because they are full-featured games (Deterding et al., 2011), while gamification

as a broader concept only utilizes components of games and applies them to the real environment, all concepts share the idea of using positive gameful experiences for the sake of a serious purpose, for example, education or behaviour change, rather than focusing on entertainment.

Game-Based Learning Benefits

Game-based learning has various advantages that improve the quality of understanding and promote successful learning. A study by Mayer (2018) highlights the cognitive benefits of GBL for adolescents, emphasising its good influence on problem-solving skills, critical thinking, as well as knowledge retrieval. Educational games' interactive and immersive nature has proved especially beneficial in engaging adolescents, fostering a more fun and effective learning experience (Dondlinger, 2017).

Elements of Game-Based Learning

According to Hamari & Koivisto, (2017), Game-based learning (GBL) influences the fundamental engagement and motivation of games to enhance knowledge acquisition and skill development. This approach incorporates various elements, such as points, badges, and leaderboards, to create a sense of progress and accomplishment. Additionally, challenges and quests provide opportunities for problem-solving and critical thinking, while narratives and storytelling captivate learners and connect them to the learning content (Chen & Lin, 2022). Through these elements, GBL fosters a dynamic and interactive learning environment that can improve student engagement, motivation, and ultimately, learning outcomes.

Effectiveness of Game-Based Learning

According to Garris, Ahlers, and Driskell (2020), the success of game-based learning in enhancing players' knowledge and encouraging behavioral changes is closely linked to how well the game integrates motivational elements. Their research highlights that effective educational games not only engage players but also improve their understanding of the subject matter through interactive and immersive experiences. This approach is particularly useful in contexts such as promoting traditional vegetables to Malaysians, where games can make learning about these foods more appealing and memorable. By assessing improvements in

players' knowledge and their willingness to incorporate these vegetables into their diets, educators can gauge the effectiveness of such game-based interventions (Garris et al., 2020).

METHODOLOGY

Agile Methodology

When compared to traditional methodologies, agile methodology is more beneficial because of its characteristics. According to Zafar et al. (2018), whereas traditional approaches such as Waterfall cannot cope with changes, agile is one of the preferred techniques since it can deal with these changes that are required.

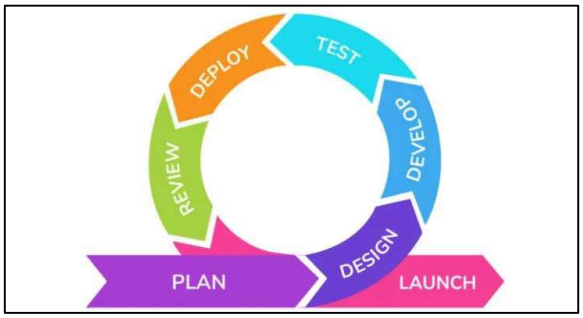

Figure 2: Agile Methodology

It has been discovered that, while adapting to changes in projects can be costly, Agile Methodology's capacity to manage and satisfy changes lowers project expenses as well as risks (Coram and Bohner, n.d.). The four main qualities that all agile approaches share is: (i) Adaptive planning, (ii) iterative and evolutionary development, (iii) quick and flexible reaction to change, and (iv) promote communication.

Requirement Phase

Hardware Requirements

The hardware requirement is where the developer determines the minimal hardware settings that will support a running game. This is done to guarantee that the game runs smoothly and without any technical concerns. Table 4.1 outlines the hardware requirements for the project's design and development phases.

Table 2: Hardware Requirements

Hardware	**Requirement**	
Personal Laptop (Brand Lenovo)	RAM	12.0 GB
	Processor	Intel(R)Core (TM) i5-8250U CPU @ 1.60GHz 1.80 GHz
	System type	64-bit operating system, x64-based processor
	Storage	1TB HDD

Software Requirements

An effective OS is vital to ensure a dependable and suitable platform for game-based learning design and development system. This developer's computer operating system, which is currently in use. Windows 11 was chosen as the operating system for this project. IbisPaint X is used as it is known to be simple to use and free when designing 2D objects. Besides, Construct 3 has been used for the application development process.

Table 3: Software Requirements

No.	**Features**	**Requirements**
1.	Operating System	Windows 11
2.	Game Engine	Construct 3
3.	Editing Designing tool	ibisPaint X and Canva

Design Phase

Flowchart

Flowcharts play a pivotal role in the game development process by planning the game's structure by providing a visual representation of the sequence of events, decision points, and interactions within the game. A flowchart for a game serve as a comprehensive roadmap for developers, illustrating the logical flow of gameplay, user interactions, and potential outcomes.

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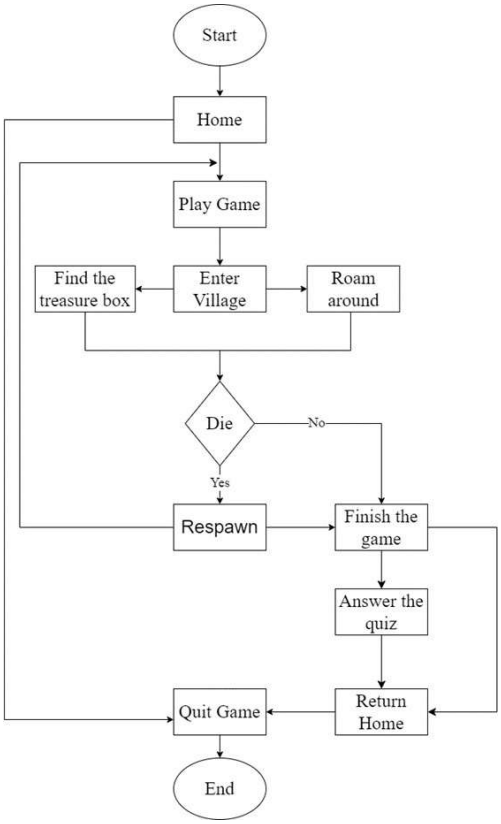

Figure 3: Flowchart of the project

Testing Phase

To receive the precise experience predicted in the previous phases, a few requirements must be met throughout the testing process. According to Edeki (2015), this part is critical in software development because it evaluates and analyses the project in order for the developer to precisely forecast the work required to execute any modifications that arise throughout the development process

Target User

Participants for this project came from various backgrounds of age, gender and employment. 20 people participated as a player in this project to measure whether it successfully achieved all the objectives based on their feedback. According to Flick (2020), studies often used smaller sample sizes (including 15-20 participants) and focus on in-depth exploration of participants' experiences.

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RESULT AND DISCUSSION

Effectiveness Evaluation

The third objective of the project was to evaluate the effectiveness of learning application on traditional ulam in Malaysia. Hence, effectiveness of game-based learning is measured by conducting a pre-test evaluation before playing the game and post-test evaluation as soon after finished the game. According to Szczesny (2023), pre-test evaluation shows for the existing knowledge and meanwhile post-test evaluation stands for acquired knowledge.

Pre-test Evaluation

The survey was created to measure the participants knowledge about traditional vegetables in Malaysia before playing the game. Participants then were required to answer questions related to the game. The survey utilized a score scale range from 1 which stands for (Strongly Disagree) to 5 that stands for (Strongly Agree) in order to measure participants knowledge about the traditional vegetables.

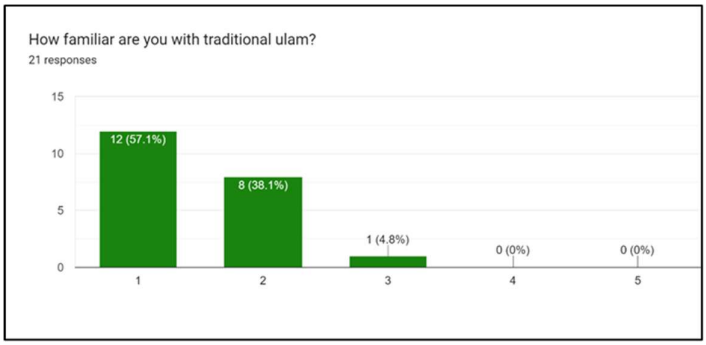

Figure 4: Pre-test evaluation on responded answer

Post-test Evaluation

Next, for the post-test evaluation, the same participants from the pre-test evaluation responded as soon after the game finished conducted. This was done to measure the acquired knowledge of the participants after playing the game and determine whether the objective was attained. Based on the result, the post-test evaluation has an increasing in percents for the correct answer related accordingly to the game.

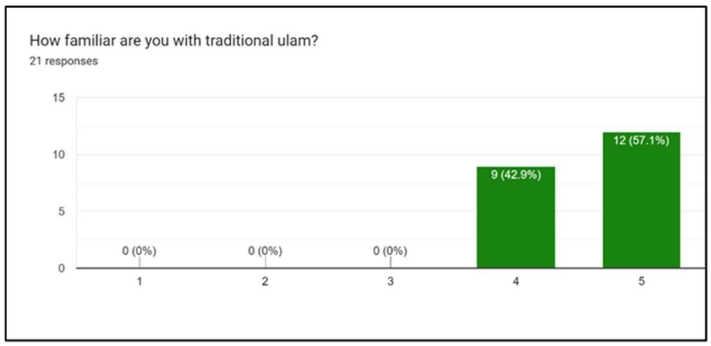

Figure 5: Post-test evaluation on responded answer

CONCLUSION (HEADING 1)

In conclusion, this project significantly developed an effective 2D game-based learning using pre-test and post-test evaluation to obtain user's current and adapted knowledge towards traditional ulam in Malaysia. Hence, completely success to achieve the objectives. Therefore, game-based learning helps in user to learn new things with interactive game for more fun input. Moreover, the game has the potential for future development by solving all the limitations. Last but not least, through these improvements, vegetables' daily consumption can be increased.

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