CHAPTER 1

INTRODUCTION

1.1 Research Background

This chapter explains the main points that are closely related to the research. It starts by presenting the important research in the context of this research, such as research background, research question, research purpose, and research objective. The research background discusses the sustainability elements in game development, followed by addressing the strategy of reducing problems in learning Tajweed. At the same time, the research objective is discussed to answer the needs of addressing issues. In the succeeding sections, the research hypothesis is presented respectively. Later, the scope, operational definition, the importance of the research, and thesis organization were expanded in the subsequent section.

Nowadays, the evolution of Information and Communication Technology (ICT) in the era of Industrial Revolution 4.0 (IR4.0) had a positive impact on the educational context that boosted greater innovation in a classroom environment (Almeida & Simoes, 2019). This resulted in the more effective use of technology, notably in the teaching and learning activities. Game-based learning (GBL) has developed as one of the existing technologies in Malaysia's contemporary educational landscape. At the same time, this advancement also affects teaching and learning Islamic education such as Tajweed. This situation forces teachers and educators to create more motivating, interesting, exciting, and attractive applications to be used in teaching and learning Islamic subjects.

In this case, teachers should put on efforts to create an interactive environment in which the technologies are well-integrated and provide full support in the teaching and learning process. Previous scholars had mentioned that GBL provides a golden chance as a tool of edutainment for education, with positive impact and outcomes (Katsaliaki & Mustafee, 2015). Furthermore, research on the use of educational games found that games can help in motivating students and inspire them to continue learning (Boyle et al., 2016). As a result, students can get relevant experience since educational games have the ability to captivate and encourage players via direct interactions with the game world (Mahardhika, 2015). This is to ensure the efficiency of the teaching and learning activities to assist students in grasping the subject.

On top of that, in supporting Malaysia Education Blueprint 2013-2025, this research is relevant in terms of leveraging ICT to scale up the quality of learning (Ministry of Education of Malaysia, 2013). Furthermore, throughout the learning process, games give the finest way for students to strengthen their problem-solving and cognitive function (Madani et al., 2017). As a result, the learning experience becomes more intensive, participatory, and purposeful. Moreover, the advantages of this technology are enjoyment that may motivate players with the intention of engagement among players (Yang et al., 2017). However, despite all these advantages, the researcher found a gap in the need to explore more in identifying sustainability elements in game design, especially for Islamic subjects.

On the other hand, learning the Quran is essential to all Muslims. For basic, it starts by learning Tajweed, which means learning how to pronounce and recite it correctly (Hamzah et al., 2016). Learning Tajweed is also affected by the advancement of technology nowadays. Before this, there were various learning support tools such as portals, digital notes, and others. However, looking at the urgent need to answer the

demand for Islamic students to accelerate the development of the technologies, teachers are put in a critical role in producing quality teaching and learning aids. Thus, quality games can be a teaching tool that possesses powerful motivators to motivate students to learn Tajweed.

The process of designing a quality game is a challenging task (Laine & Lindberg, 2020). As a result, academics suggest that a successful educational game should include solid practice, such as decent game design mixed with appropriate instruction and learning to reach the objectives (Aleem et al., 2016). Unfortunately, the existing Islamic multimedia technologies such as games have not been fully utilized. It may be due to the limited technological facilities in schools (Johnson et al., 2016). Thus, the researcher found a gap in the design and development process of current multimedia technologies research. Hence, for the context of this research, sustainability elements are being identified and implemented in the design and development game process. Game-based learning (GBL) is used as a teaching aid called "i-Tajweed game" would provide a better platform in the Tajweed learning approach and make a significant contribution not only for teachers but also for society. In addition, this research employs the design and development research (DDR) approach and ADDIE model in the methodology.

1.2 Problem Statement

In recent days, the sustainability issue has been a major subject (von Hauff, 2016). However, existing studies in sustainability are focused more on the product's environmental impact of the software engineering domain rather than sustainability elements in the development process. Sustainability elements in the game application aim to enhance the motivation and achievement of future generations.

In addition, there has been a growing debate about the influence of games in diverse sectors. Nonetheless, there is currently a scarcity of studies on game-based learning research (Snow, 2016; Greipl et al., 2020) because the scholars only focus more on the product's environmental impact on the software engineering domain (Santos-Villalba et al., 2020). Considering this statement and the process of game design itself is the crucial part and needs great effort, the goal of this research is presented. Hence, the fundamental goal of this research is to use games' motivational potential for educational reasons and lead to the development of high-quality game-based learning (GBL).

Furthermore, the growing number of commercial and educational games accessible has piqued researchers' interest in game-based learning (GBL) (Versus, 2020). Earlier research on game-based learning, on the other hand, has focused on the direct influence of software programmes and systems instead of the procedure itself (Becker et al., 2015). Thus, the researcher found a gap in the research related to sustainability elements in game design. Since game design is a crucial aspect of successfully implementing game-based learning (GBL), conceptual research on sustainability elements in game design is needed.

Academic motivation is also vital for achieving objectives at a particular level of competence at work and, as a result, achieving an improved outcome (Partovi & Razavi, 2019). However, the majority of educators struggle to maintain their students' passion, interest, and attentiveness during the lesson (Wang & Tahir, 2020). As a result, games can be used as a device in the educational procedure to improve the learning process (Trajkovik et al., 2018). Furthermore, numerous experimental research explores proof that game-based learning improves student motivation and accomplishment compared

to conventional techniques and methods (Sayan, 2015). Therefore, this is an excellent opportunity to implement games as a tool to achieve learning objectives successfully.

Digital educational games are fun to provide high-level knowledge in a teaching and learning setting. Even though digital educational games have the ability to increase motivation and student involvement in learning, they are still in their infancy in respect of development and design (Hsu & Tsai, 2013). The design of the game, especially the digital educational games, needs to emphasize the elements of the game that are relevant to the purpose of the game development (Ummu Husna et al., 2019). Research about games is also limited in design principles (DP) and game motivators that purposely improve learners' motivation and continuing engagement (Laine & Lindberg, 2020).

Originally, GBL activities were developed to encourage students to learn difficult topics. By these activities, it will increase their motivation and achievement, especially in learning Tajweed. When games are combined with sustainability elements, it may produce a quality game that provides learners with a solution to enhance their motivation and improve their achievement. Nonetheless, it is hard to assert that a sustainable game truly fits the learner's demand or anticipation owing to the unavailability of clear criteria and description of sustainability. Furthermore, instead of merely playing games, games can be effective in learning via the activity of developing the game (Mercer et al., 2017). To tackle the issue of ambiguous guidelines, this research seeks to incorporate sustainability components into the development of games as teaching methods for Tajweed.

Moreover, many studies related to sustainability have been conducted in numerous fields such as economic sustainability, environmental sustainability, and social sustainability (Dos Santos et al., 2018). These show that there is a necessity to research game design and development that concentrates on long-term sustainability. It

may discuss the processes, methods, and techniques in producing sustainable products. The goal of sustainable software engineering is to build dependable, long-lasting technology that serves the users' needs and develop an improved system that does not threaten future generations' potential (Muthu et al., 2020). To manufacture effective instruments in respect of technical and marketing requirements, top-notch elements should be considered before the developed product.

Liao et al. (2020) found that good experiences are important for motivating gamers to add value to a game. It is also supported by Zirawaga et al. (2017) who mentioned that software programmers and educators rarely exchange ideas and debate the usage of games in the classroom. As a result, it may be unclear in determining the appropriate elements in game design. Thus, this research is appropriate in terms of identifying sustainability elements that are implemented in game design.

Related to the knowledge domain of this research, the j-QAF programme was launched in 2005 with the goal of strengthening Islamic education by focusing on the teaching and learning processes in Jawi, Quran, Arabic language, and Fardhu `Ain. Teaching Tilawah (Reading) Al-Quran is a component of the present Islamic Education programme. Nevertheless, because of the great demand for ongoing supervision and a suitable number of educators in relation to the number of students, this model does not prioritize memorizing the Quran from beginning to end (Mohd Azmir & Mohd Azrani, 2015).

Table 1.1: j-QAF Percentage in Year 2019-2020 (For Standard Six)

Year / Subject	**2019**	**2020**
Jawi	95.66%	92.40%
Quran	**58.41%**	**53.60%**

Year / Subject	2019	2020
Arabic Language	96.57%	96.09%
Fardhu `Ain	99.54%	96.33%

Source: PPD Kuala Langat, (2020)

Table 1.1 shows the percentage of j-QAF subjects for Year Six. The table shows that the percentage for Quran subjects is still low compared to other subjects (2019 till 2020). This indicates an urgent need to improve students' motivation and achievement in learning Tajweed.

In conclusion, games are an exciting tool that can help further intensify the time constraint issue faced by teachers to develop and prepare alternative tools to teach, resulting in instructional strategy to be stereotyped (Milrad, 1999; Mazwati & Yusoff, 2017; Alsawaier, 2018). Games have the potential to enhance motivation and students' achievement in learning. To summarise, massive works are required to potentially design the game successfully. It is best compensated by the opportunity for students who have difficulty in regular academic settings or with particular curriculum subjects. Table 1.2 summarise the problem statement in this research.

Table 1.2: Summary of the Problem Statement and Proposed Solution

Issue	Problem Statement	Proposed solution
Sustainability: Many researches on sustainability focus more on the product's environmental impact in the software engineering domain. (Akadiri et al., 2012) (Santos-Villalba et al., 2020)	Existing studies on sustainability are discussing more the impact of the product's environment rather than sustainability elements used in the design and development process.	Proposed sustainability elements and framework in game design

Issue	Problem Statement	Proposed solution
Design and development: Digital educational games, design and development are still in their early stages (Gros, 2007) (Hsu & Tsai, 2013) (Kennedy & Lee, 2018)	The game's effect on Asian kids and classrooms is little understood. The design of digital educational games need to emphasize the elements of the game that are relevant to the purpose of the game development (Ummu Husna et al., 2019)	Implement Cognitive theory of multimedia learning (CTML) and Gagne Nine events of instruction in game design. To properly integrate instructional theory into game design.
Motivation: Teachers acknowledge there is a challenge to keep the students' motivation, engagement, and concentration over time in a lecture (Wang & Tahir, 2020)	Learning and motivation are linked since learning is an ongoing activity that necessitates intentional and purposeful commitment (Wlodkowski, 1986). Comprehensive analysis of DPs and game motivators that can improve learners' motivation and long-term involvement (Tüzün et al., 2019); (Laine & Lindberg, 2020)	Implement motivation techniques from Prophet in game design and development Game-based learning as an instructional technique to motivate elementary school students have a positive impact on attaining academic success (Choi et al., 2013; Katsaliaki & Mustafee, 2015) The game's design, particularly for digital educational games, must stress the parts of the game that are related to the game's development goal (Ummu Husna et al., 2019).

1.3 Research Gap

In this section, the researcher explains the gap and the deficiencies in previous research related to the research. Crafting games featuring sustainability components is regarded as a high-quality game that demonstrates the importance and usefulness of interactive technology in the classroom. Educational game developers can utilize the suggested game to construct games that have a good prospect for inspiring learners and enhancing their performance. Table 1.3 summarize the research gap of this research.

Table 1.3: Summary of the Research Gap

Research Gap	Detail of the Gap	References
Unclear definition of sustainability elements in game design	▪ Previous research focuses more on sustainability in a project context and higher education context. ▪ Other than that, discuss the feasibility of using gaming and simulation to introduce a new and complex concept.	(Torres & Macedo, 2000) (Rodriguez-Navas et al., 2015) (Becker et al., 2015) (Kasurinen et al., 2017) (Aarseth et al., 2017) (Mohd Zamri & Ahmad, 2017) (Abbott, 2019)
Lack of recent game design research on the implementation of the combination between instructional theory, learning theory, and motivation elements	▪ Only focus on the evaluation framework. ▪ The lack of universal evaluation and the implementation of validation procedures. ▪ Did not use repetition technique. ▪ Their practical application for game development is frequently unsuccessful. ▪ Only discuss different models, guidelines, and frameworks on the software development process without implementation. ▪ More focusing on software development rather than game development. ▪ Discuss the feasibility of the simulation. ▪ However, research in game-based learning is still limited (Turner et al., 2018)	(Torres & Macedo, 2000) (O'Hagan et al., 2014) (Kasurinen et al., 2017) (Mohd Zamri & Ahmad, 2017) (Abbott, 2019) (Laine & Lindberg, 2020) (Greipl et al., 2020)
Existing studies related to Quran application are more focusing on the translation of Al-Quran	▪ Only focus on the translation of Al-Qur`an. ▪ Not implementing sustainability elements such as reward system, motivation elements in the application. ▪ Did not use the combination between instructional design theory, learning theory, and any motivation elements. ▪ Not explain deeper in Tajweed teaching and learning. ▪ Only examine the level of competence and method of teaching Tarannum al-Quran ▪ Focus on the effectiveness of software application on software engineering and other subject domain.	(Daud et al., 2014) (Sapie et al., 2016) (Nuril Ham Al Hafizah et al., 2017) (Mohamad Khairul et al., 2020)

1.4 Research Questions

The subsequent research questions are highlighted in this research.

1. What sustainability elements should be implemented in the development of game-based learning (GBL) in learning Tajweed?
2. How was the process involved in designing and developing game-based learning (GBL) in learning Tajweed?
3. What is the effectiveness of game-based learning (GBL) towards the following statements?
    a. Students' achievement between the control and treatment groups using GBL in learning Tajweed.
    b. Relationship of motivation and students' achievement among the students using GBL in learning Tajweed.
    c. Relationship of sustainability elements and student's achievement among the students using GBL in learning Tajweed.

1.5 Research Purpose

This research aims to identify the sustainability elements in game design and development. In fact, the sustainable game design (SUSGAD) framework will be implemented in the process of design and development games itself. A game called "i-Tajweed" will be developed as a tool for motivating students in Tajweed learning and enhancing their achievement.

1.6 Research Objectives

The following list states some of the research objectives:

1. To identify sustainability elements for game-based learning (GBL) in

learning Tajweed.

2. To develop game-based learning (GBL) in Tajweed using the selected sustainability elements.
3. To evaluate the impact of game-based learning (GBL) in Tajweed learning towards the following:
    a. The differences in students' achievement between the control group and the treatment group after using GBL in learning Tajweed.
    b. The relationship between motivation and student's achievement among the students in the treatment group after using GBL in learning Tajweed.
    c. The relationship between sustainability elements and student`s achievement among the students in the treatment group after using GBL in learning Tajweed.

1.7 Hypothesis

The aforementioned problem derived the following hypotheses to support the objectives of the research:

Hypothesis 1:

There is a significant difference in students' achievement between the control group and the treatment group after using GBL in learning Tajweed.

Hypothesis 2:

There is a significant relationship between sustainability elements and students` achievement among the students in the treatment group after using GBL in learning Tajweed.

Hypothesis 3:

There is a significant relationship between students` motivation and students` achievement in the treatment group after using GBL in learning Tajweed.

1.8 Research Scope

This research focuses on the research of sustainability elements in game design and development. The objectives of serious games on sustainability, as reported by (Katsaliaki & Mustafee, 2015), can be summarised as (a) raising awareness of the obstacles related to sustainability, (b) conveying information and comprehension of sustainability, and (c) stimulating players to take steps and create strategies that are both environmentally and socioeconomically aligned. Nevertheless, the emphasis of this research is only on the adoption of sustainability aspects. Therefore, the Cognitive Theory of Multimedia Learning is the primary learning concept that guides this research (CTML).

This research looks at game-based learning (GBL) as a teaching aid that entails establishing and implementing a curriculum based on current games. GBL has been chosen as an approach due to the game's advantages that positively influences learners' emotional, behavioral, motivational cognitive, and social connections in academic areas (Alsawaier, 2018; Boyle et al., 2016).

For the context of this research, the subject content (domain) is Tajweed rules which only focus on the topic of *Hukum* ***Mim Mati*** **(*Izhar Syafawi, Ikhfa` Syafawi, Idgham Syafawi*)** and ***Hukum Mad Lazim***. These *hukums* were based on the experts` views during the interview session at need analysis phase and followed with the current syllabus highlighted in the textbook. The game design is purposely for children between the age of 10 until 12 years old. This is because playing in childhood promotes

accomplishments above age suitability or customary behaviors, according to Vygotsky (1980), who said nearly 40 years ago that assigning plays a vital part in growth (Greipl et al., 2020).

The major goal of this research is to develop sustainable games that are responsive to players by modifying key game sustainability aspects, for instance: named interactive elements, motivational elements, and multimedia elements. Although each game aspect is unique, all implementation methods have one thing in common: they all use the same module to generate a tailored experience: a simulation of the player (Cruz & Uresti, 2017). The population area involves 120 students, including two groups, the treatment and control groups. Due to the pandemic of Covid 19, MCO has been implemented, where many sectors are closed for safety purposes, including the educational sector. Hence, some of the data were collected online.

This research is also limited to digital games on the domain of Tajweed that aimed at cognitive learning outcomes that measure student's achievement. One of the core aspects that distinguishes the application of gamification in various educational phases is its impact on student motivation. Several academics have studied how the design of programs that contain problems similar to those found in video games boosts students' engagement and dedication in official learning settings (Santos-Villalba et al., 2020).

1.9 Operational Definition

The definition of operational refers to the variables used to measure the concepts applied in this research so that relevant data can be gathered. The following is the research's operational definition:

1. Game-based learning (GBL)

GBL leads to increase learner motivation and produces a better result (Alsawaier, 2018). It is defined as educational games that are interactive plays that explain regulations, objectives, engagement, and adaptation, all depicted as a storyline. GBL refers to the outcome of this research that is the i-Tajweed game.

2. Students' Achievement

Student achievement can be defined as a result of achievement that meets the standards stipulated earlier in the curriculum, which is demonstrated in their assignments, homework, or written reports (Eskelinen, 2021). The results of the pre- and post-tests are used to indicate the students' achievement in this research.

3. i-Tajweed

The output of this research is educational game-based learning called i-Tajweed. The word "i" stands for interactive and myself (me).

4. Sustainability elements

Six elements were implemented in the process of design and development of i-Tajweed as guidelines to produce a quality game. The six elements of sustainability games design are relevant content, interface design, gameplay, usability, reward, and motivational elements.

5. Motivation

Motivation is the primary key to success towards student achievement. To succeed in academics, students need to have high motivation, which energizes directs

from behaviour toward achievement (Steinmayr et al., 2019). Therefore, the positive word is used in i-Tajweed game to enhance the motivation of students to stay focused on the subject. For example, Focus (*Fokus*), Be patient *(Sabar),* Confident *(Yakin)*.

6. Sustainable game design (SUSGAD) framework

A framework that consists of an instructional design theory: Cognitive Theory of Multimedia Learning (CTML), learning theory: Gagne Nine Event of Instruction, game design lifecycle (GDLC), and sustainability elements are implemented during game development which are the primary concepts that guides this research.

1.10 Research Significance

For the context of the educational field, this research is significant in creating an interactive game for learning Tajweed. It encourages students to go further to clearly understand the topic (*Hukum Mim Mati* and *Hukum Mad Lazim*). Apart from that, it helps teachers create meaningful teaching and learning processes.

In addition, because of the accelerated advancement of technology in recent years, this paper will add to the discussion of how educational games might improve students' motivation and achievement in Tajweed learning. Despite the fact that games are primarily designed for amusement, the underpinning model contains a range of methods and approaches to attract players in gameplay. Role-play, storyline arcs, obstacles, participatory options inside the game, and player interaction, are examples of design approaches that contribute to participation based on the game genre.

Players may be needed to evaluate, synthesize, and employ critical thinking abilities to perform and implement plays, depending on the category and particular

game. Creators of video games are experts at generating circumstances and situations that gently elicit these abilities. As a result, game design is at the vanguard of developing new interactive design strategies (Dickey, 2005).

Furthermore, this research is parallel with the government's aspirations in fostering the use of technologies among teachers in Malaysia. To date, the practice of the integrated, holistic system by our government of Malaysia to strengthen Vision 2020 for the 21st-century youth preparation. It is called National Education Blueprint 2013-2025, which was launched in December 2012 (Grapragasem et al., 2014). The change of the systems to harness ICT to ramp up excellent learning across Malaysia is one of the eleven changes in this roadmap.

The researchers' research takes into account both the expanding importance of sustainability in the design and development phase, as well as the growing utilization of educational games. The goal of this research is to design an educational game that will help students and other players gain motivation and a better grasp of the subject. As a result, this research is crucial in building a learning ecosystem in which people can think and keep in mind their own knowledge while also being questioned about their individual characteristics and preconceptions as they attempt to steer the game and complete tasks centered on nationwide and Islamic individuality.

As for the conclusion, this research will be beneficial and significant:

1. For users to learn, understand, and correct their Quran knowledge, especially on Tajweed rules. Users can also utilize the gaming application to assess their comprehension level of Tajweed principles.
2. In particular, game designers should help broaden the sector for multimedia-based educational games, particularly in the Islamic education area. Multimedia developers should also be empowered to create educational

materials that are more durable, high-quality, and successful in the teaching and learning process.

3. To assist the government's goal of encouraging all Malaysian teachers to employ ICT in their teaching and learning. Thus, teachers integrate the ICT with the game-based learning (GBL) developed in their teaching and learning process.
4. A suggested approach provides the necessary methods for implementing such design methodology while also facilitating extra educational demands and simplifying the integration of game use as well as student achievement in Tajweed.
5. The i-Tajweed game can be utilized as an educational teaching resource by instructors to encourage pupils to learn Tajweed.

1.11 Research Organization

This section briefly described the overall structure of the thesis, which consists of six chapters.

Chapter 1- This chapter outlines an overview of the whole problem studied in this research. This chapter then specifies the research questions and research objectives. The research scope, research significance, hypothesis, research gap, and operational definition are then outlined to provide a clear direction of the research. Finally, this chapter ends by describing the structure of the thesis and the most significant contents of the succeeding chapters.

Chapter 2- Primarily explore and explain the literature of the research to provide evidence to justify the advantages of game-based learning (GBL) and sustainability

elements in the context provided in this research of the selected problem area. It also explains the theoretical framework.

Chapter 3- Explain the research methodology, including the research activities, research design, and research framework employed to carry out the research in order to meet the research questions and objectives. This chapter also covers the research instrument created to help with the research.

Chapter 4- Discusses the flow of game design and development process of the i-Tajweed game, storyboard, and game life cycle.

Chapter 5 - Explain the result of the experimental research, the criteria of the expert chosen, the assessment procedure, and the discussion of the findings.

Chapter 6- The thesis conclusion, which summarises the research, is addressed, preceded by a remark upon every research objective. The significance of the research will also be recognized in this part. The constraints and obstacles encountered throughout performing the research are also discussed. Finally, the chapter ends with a few recommendations for future works.

This chapter, in specific, succinctly discusses the existing situation on the problem of sustainability in the relevant sector, as well as the opportunities for resolving problems linked to the game design and development process. The research aims, projected contributions, operational description, and entire framework of this research are given based upon the fact given. The following chapter discusses the current research and provides a full description of the concepts and challenges that underlie sustainability components in game-based learning (GBL).