CHAPTER 4

GAME DESIGN AND DEVELOPMENT

4.1 Overview

The process of design and development of any software application is very complex and needs a systematic step. From a scientific standpoint, the necessity to address a multistep procedure in order to create a long-lasting game should be combined with a range of technologies such as computer graphics, networking, instructional design, learning theory, motivational elements, and multimedia elements. These technologies will be created and utilized in a multidisciplinary, goal-oriented way that prioritizes the user's advantages. In this chapter, the i-Tajweed game's step-in development was explained in detail, including the design and development phase, learning theory embodied in the game, game component, and explanation of every stage of the life cycle of a game.

4.2 The Design and Development Process of the i-Tajweed Game

This section explains the whole process of design and development of the i-Tajweed game. To improve the instructional effectiveness of computer games in the teaching and learning setting, it is vital to include all stakeholders, particularly researchers, users, and educators, when creating, building, and implementing sustainable and effective learning aids.

4.2.1 The Design Phase

Particularly, the process of designing any product or game is very convoluted and needs detailed planning. The design phase is the part that is very important and should

be conducted carefully by those multimedia developers. It is because the better process will get a better result or outcome. In the context of this research, the purpose of developing a game is to implement sustainability elements in game design that may help in enhancing students` motivation and their achievement in learning Tajweed. Students utilize a finished gaming software application to research a subject through the game-based learning approach (Aslan & Balci, 2015).

Educational games are intended to teach players about specific subjects, hone their abilities, and broaden their understanding. In this research, the domain knowledge employed in the game is Tajweed. Digital equipment and gadgets, for instance, controllers and digital screens, are required for the development phase. Far beyond amusing players, educational games emphasize cognitive growth and learning objectives. Nevertheless, choosing and implementing suitable techniques and concepts for creating and assessing such systems, as well as properly combining the 'fun' aspect with the information to be transmitted, is currently a research topic in progress (Gardeli et al., 2017).

As Prensky (2003) points out that game-based learning should appoint these four criteria's: a) suits the demands and learning preferences of today's and coming generations of learners; b) is inspiring because it is enjoyable; c) is incredibly versatile, applicable to nearly any topic, knowledge, or ability to be acquired; and d) is beneficial when applied appropriately. For the context of this research, all these criteria were implemented in the process of designing and developing the game. Examining game design via the lens of generic design models may reveal opportunities to improve game design approaches. As a result, game design necessitates systematic activity comparable to every other design discipline, with the exception that the nature and extent are unique to the game design environment.

4.2.1.1 Need Analysis

In the first step in the part of the design, input activities or content of the game are created. The students' demands are determined at the outset utilizing needs assessment. A needs assessment is a methodical investigation into how matters are and should be. Needs assessment, is the act of recognizing the issue and then choosing a suitable solution (Grant, 2014). Additionally, needs analysis is a process of determining what items should be included in a course based on an objective consideration (Betti, 2021). Thus, a way of finding voids in outcomes will depend on the cause of meeting the need and choosing the most critical for achieving the objective.

The purpose of a needs assessment is to determine the needs that are relevant to the specific task, such as motivational issues, to recognize critical needs, such as important financial, safety, or other consequences, to plan concerns for choosing an action, and to offer baseline data for assessing the efficacy of guidance. The planning of the units begins when the students' needs are identified. Next, students' requirements are used to organize the units. The learners' prerequisites are examined initially, and afterwards, the lessons are grouped by level. The units should not be more difficult than their level, and the goals should be set with the parameters in mind once the goals have been presented. By taking into account the students' traits, the teacher employs his or her personal teaching approach.

4.2.2 Learning Theories Embodied in the i-Tajweed Game

In developing an effective and sustainable game for learning, a set of principles and theory need to embody at the same time for developing good learning games (Jääskä et al., 2021). To begin, these concepts emphasized that, via co-design and customization, players should be in charge of their acts and learning in the game

environment. Furthermore, they say that the player must be able to immerse themselves in their in-game identity and tinker freely with the gaming world. As a result, the key purpose of incorporating CTML into the game design in this research is to determine whether types of potential cognitive outcomes in playing computer games can help students become more motivated and successful in learning Tajweed when cognitive abilities are affected by the nature of computer game played.

The findings of the cognitive outcomes research have significance for the computer games selection that has favorable effects on educationally important abilities beyond the game ecosystem. Several new research on the cognitive impacts of first-person shooter games has found profound impacts on perceptual focus (Green & Seitz, 2015). It promotes system thinking in order to comprehend how the game elements accommodate together and employ the player's perspectives inside the game to express meaning and significance. This also includes providing interpretation as an action image by having them utilize their understanding and abilities as techniques in the appropriate perspective to achieve a specified aim. As a result, the participants can get more engaged in the content to be learned and increase their grasp of it (Mayer, 2019).

4.2.2.1 Applying Gagne's 9 Events of Instruction in i-Tajweed Game

In 1965, Gagne published The Conditions of Learning, which proposed that knowledge absorption and retention require the existence of particular mental conditions. He also talked about the 9 Events of Instruction, founded on the internal and external cognitive variables that influence learning. For example, the learner's past knowledge is an internal element, whereas external stimuli, like the type of instruction, are external stimuli. These 9 Events of Instruction can be used by professionals to create

memorable learning experiences that allow online learners to participate in every stage of the learning process.

1. Begin with an attention-grabbing statement.

   Capturing the interest (Tajweed domain) of each and every learner in the most crucial act. Among the most successful methods to accomplish this is to write a captivating opening that hooks them immediately. Begin with a narrative that will tug at their emotions or a query that will amuse or startle them.

2. Explain the learning course's goals to the learner.

   This suggests that the learning course's objectives must be stated explicitly. Before users ever access the first online module or activity, they must understand why they must be fully involved in the learning course. Make the learning course's goals explicit and connect them to real-world applications and advantages.

3. Promote the recollection of previous understanding.

   Recounting and implementing formerly learned knowledge allow online learners to put it into long-term memory instead of discarding it seconds after reading it. Ensure the learners know what knowledge or skills they will be putting into the work before beginning each learning activity and how the topic relates to the information they have already in their existing knowledge.

4. Develop learning content that is goal-oriented.

   Every single learning activity, online exercise, and learning content piece should be closely related to the aims and purposes. In reality, depending on the precise purpose, it is ideal for bundling facts and thoughts collectively. A single primary aim should be the center of an online lesson or module,

allowing the learner to grasp that subject prior to actually proceeding onto another.

5. Offer online guidance.

   When it comes to acquiring a new set of skills and acquiring new knowledge, even the most skilled online learners may require assistance. Consequently, they may grow disheartened or irritated, eventually abandoning the learning experience. Instead, they should receive the necessary training in order to build positive online learning practices.

6. Practice makes perfect.

   The repetition of Tajweed rules in the i-Tajweed game maintains the student`s understanding, new information, and skills. As a result, the students have many chances to put what they've learned thus far into practice and test out behaviors that will aid them in actual life.

7. Provide prompt feedback.

   The learners can enhance their learning behaviors and recognize their faults and abilities by receiving prompt and effective feedback. Provide individual advice instead of generic acclaim or criticism to the rest of the crowd so that each learner understands what measures they need to take to achieve their objectives.

8. Evaluate frequently and promptly.

   Evaluating the learners not only allows researcher to track their achievement but also allows researcher to uncover flaws in your learning approach. If the preponderance of the learners is having trouble with one specific online module, for instance, you may want to reconsider its online material and exercises. Moreover, learning evaluations also allow the researcher to

discover the information gap or the difference between something they already understand and what they still have to learn in order to meet the learning course's learning objectives.

9. Improve knowledge transfer by connecting it to actual life scenarios and implementations.

   The learners should always be mindful of how they can put what they've learned into practice once they leave the virtual classroom.

4.2.3 Employing Game Component in i-Tajweed

This section explains the component involved in game design and development that follow guidelines by Katsaliaki and Mustafee (2015).

1. Content design

The i-Tajweed game will be focusing on teaching students from the age of 10 to 12 about tajweed. The game will cover the topics within two big topics, which are *Mim Sakinah* and *Mad Lazim***,** with their own subtopics, respectively. The game will be entirely 2D and will consist of two (2) levels according to the main topic. Both levels will have the same core gameplay, which is described as an endless running game where the player will continuously run until they choose the wrong path/answer for the game to end.

The core gameplay can be simplified as running and connecting or collecting objects. This game has to fulfill the required rule of Tajweed based on the current topic and subtopic, where more detailed core gameplay will be explained later. The topics and subtopics that will be covered are as follows:

1. **Mim Sakinah**

    a. *Idgham Mutamasilain*

    b. *Ikhfa' Shafawi*

    c. *Izhar Shafawi*

2. **Mad Lazim**

    a. *Mad Lazim Kalimi Muthaqqal*

    b. *Mad Lazim Kalimi Mukhaffaf*

    c. *Mad Lazim Harfi Muthaqqal*

    d. *Mad Lazim Harfi Mukhaffaf*

2. Game Theme and Genre

- Islamic Value
- Arabic Letters
- The background theme will be referring an Egyptian-ish (Arabic place) look and feel
- Main characters and colors will be pleasing and engaging to children's eyes
- The main objective is for students to learn Tajweed's rules using the game as a learning platform

3. Targeted Users

- Upper Primary School Students (10 – 12 age years old)

4. Targeted Platforms

- Windows (PC/ Dekstop)

5. Game Design

Every academic, gamer, and developer has their personal set of opinions, and it's improbable that a singular standpoint will emerge very shortly.

6. Play and Fun

Objectives or rules, or both, place some structure degree on the engagement in games that enable players or learners to enrich the performances and achieve the course learning outcome (Priyaadharshini et al., 2020).

7. Reward

Offer valuable rewards for valuable achievement among players. The bigger the payoff, the more crucial the decision is. A reward is a type of language that game designers employ to explain and educate the player about the game's universe's comparative values of right from wrong.

4.2.3.2 Gameplay Mechanics

1. Core Gameplay

- The gameplay will show the main character holding something to represent the *harf* for the *Mim Sakinah* level and represent either *Muthaqqal* or *Mukhaffaf* for *Mad Lazim* level.
- A subtopic will be shown in the upper middle screen to inform the play what they will be connecting in that run and will randomly change every time the player gets the correct answer.

- The player then will have around 3-4 lanes to switch and make sure they're in the correct lane to catch the incoming object, for example, a bubble that contains the harf to be connected or verses from the Qur'an that has the hukm of mad lazim.

a. Mim Sakinah Level

- For a clearer picture, as an example in the *Mim Sakinah* Level, the subtopic will be *Ikhfa' Shafawi***.** Thus, the main character will be holding something with a *Mim* and trying to choose the correct connection, which will be the *harf Ba.*
- The *Mim Sakinah* Level will have three (3) subtopics that will randomly change in the middle-upper screen, which are:

1. Idgham Mutamasilain

   The condition for *Idgham Mutamasilain* will be as follows:

   a. The player will be holding a Harf from a selected harf, and the player will need to catch the same *harf* as they are currently holding. This is due to the *hukm* of *Idgham Mutamasilain* is when two similar harf meet and thus need to be combined into one single harf.

   b. If the player connects the wrong harf as the one they are holding, they will lose the game and be prompted by a pop-up of notes regarding *Idgham Mutamasilain* as a reminder and guidance of what mistake they made.

2. Ikhfa' Shafawi

   The condition for *Ikhfa' Shafawi* will be as follows:

a. The player will be holding the harf Mim and then need to catch the oncoming bubble or objects containing the *harf Ba*.

b. If the player connects any *harf* other than *Ba*, they'll lose the game and will be prompted by a pop-up of notes regarding *Ikhfa' Shafawi* as a reminder and guidance of what mistake they made.

3. Izhar Shafawi

The condition for *Izhar Shafawi* will be as follows:

a. The player will be holding the *harf Mim* and then need to catch the oncoming bubble or objects containing any out of the 26 harf except for *Ba* and *Mim.*

b. If the player connects with either *Mim* or *Ba*, they'll lose the game and will be prompted by a pop-up of notes regarding *Ikhfa' Shafawi* as a reminder and guidance of what mistake they made.

b. Mad Lazim Level

- For a clearer picture, as an example in the *Mad Lazim* Level, the subtopic will be *Mad Lazim Kalimi***.** Thus, the main character will be holding something with the word *Muthaqqal* and trying to choose the correct example of the Tajweed hukm, for example: وَلَا الضَّآلِّيْنَ
- There will be a bank answer which consists of up to 30-40 examples of the tajweed hukm distributed among all four sub-sub topics (estimation of more than five, less than ten examples for each sub-sub topics).
- Subtopics (*Mad Lazim Kalimi* and *Mad Lazim Harfi*) will be the ones to randomly generated at the upper middle screen. Meanwhile, the sub-subtopic

(*Muthaqqal* and *Mukhaffaf*) will be randomly changed as the object the players are carrying. These will change randomly every correct sequence.

- Mad Lazim part will have two (subtopics) that will have two types of their own that will randomly change in the middle-upper screen, which are:

1) Mad Lazim Kalimi Muthaqqal
2) Mad Lazim Kalimi Muhoffaf

A. Mad Lazim Kalimi Muthaqqal

- The condition for *Mad Lazim Kalimi Muthaqqal* will be as follow:

a. The player will have to be in the correct lane and catch the correct example according to the tajweed given, for example: وَلَا الضَّآلِّيْنَ

B. Mad Lazim Kalimi Mukhaffaf

- The condition for *Mad Lazim Kalimi Mukhaffaf* will be as follow:

a. The player will have to be in the correct lane and catch the correct example according to the Tajweed given, for example: ءَآلْـَٰٔنَ

3) Mad Lazim Harfi

A. Mad Lazim Harfi Muthaqqal

-. The condition for *Mad Lazim Harfi Muthaqqal* will be as follow:

a. The player will have to be in the correct lane and catch the correct example according to the Tajweed given, for example: الٓمٓ

B. Mad Lazim Harfi Mukhaffaf

- The condition for *Mad Lazim Harfi MuKhaffaf* will be as follows:

a. The player will have to be in the correct lane and catch the correct example according to the Tajweed given, for example: الٓمٓ

4.2.4 Designing Game Development Document (GDD)

In this research, the researcher will use software called Unity 3D (Unity 2017.3) to design the background and layout. The decision to employ Unity 3D in the creation of i-Tajweed was motivated by the fact that it is a relatively new game development technology that aims to make game creators' lives easier and simpler. Unity is a game engine or game authoring tool that allows creative individuals to create a variety of video games. In addition, unity accelerates and simplifies the process of creating video games.

Besides that, the researcher also uses Adobe Photoshop CS to design the interface, icon, and graphics. This phase is an essential part because the researcher needs to ensure the content of the courseware meets the course objective. Thus, it requires testing the programming to make sure the courseware does not have any mistakes or errors and can run smoothly. Unity Technologies has created a multiplatform game engine called Unity3D. In 2005, the very first Unity game engine was created. Unity 4, which came out in 2012, was a big step forward for the company, with sophisticated functions like the Mechanism animation system. Since then, it has grown in popularity among game creators and is now the industry's leading game engine. In addition, it offers its very

own asset shop where game creators may sell and buy game-related items such as extensions, plugins, models, environments, and animations, among other things.

4.2.4.1 Design Project Timeline

This section explains the design project timeline of the game as describes in Table 4.1.

Table 4.1: Gantt Chart of Game Development

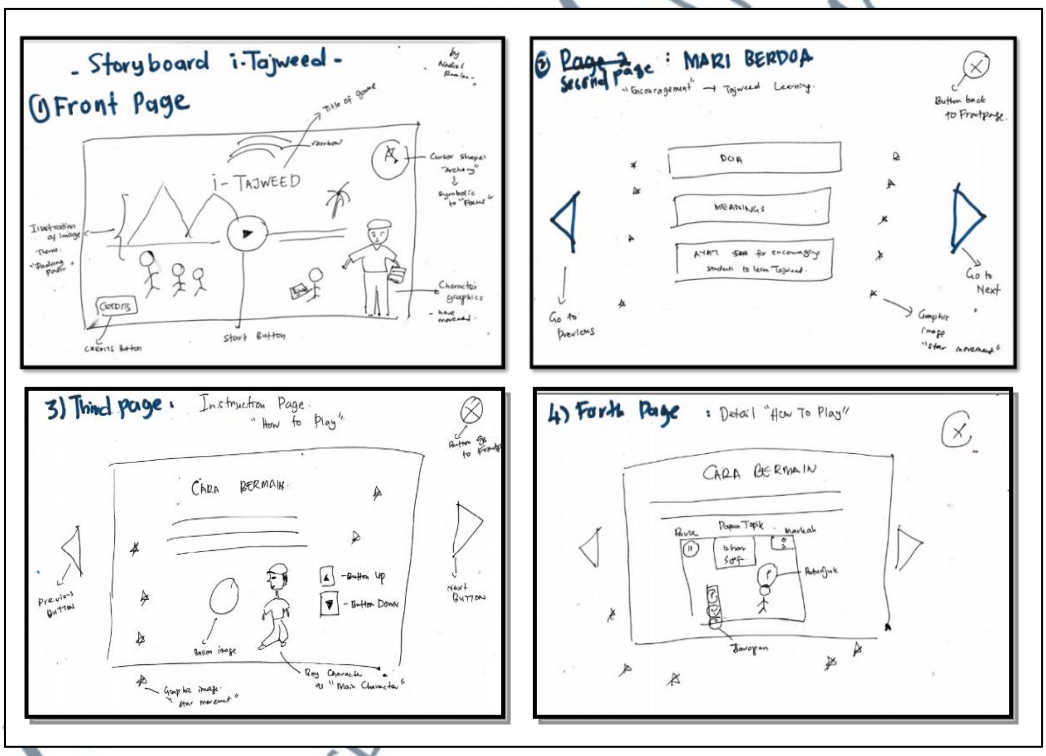
	First Month					Second month					
	W1	**W2**	**W3**	**W4**		**W1**	**W2**		**W3**	**W4**	
Programming					First Deliverable			Second Deliverable			Final Deliverable
2D Art											
GUI/Textures											
Level/Map Design											
Compiling											
Testing											
Polishing											

1. **Prototype Alpha Stage –** In this stage, we will be focusing on developing the foundation of the app, which is the basic core engine of the system. Most of the media assets such as buttons, icons, background maps, characters, and props will be created as well as the programming side to develop a prototype.
2. **Prototype Beta Stage –** In this stage, we will let the user test the app and add interesting parts and feedback to polish the system.
3. **Ready App & Publishing** – After the app undergoes rigorous testing, final touch-ups and game polishing will take place. Once the client is satisfied with the project deliverables, we will publish the game to the intended platform, followed by a project sign-off.

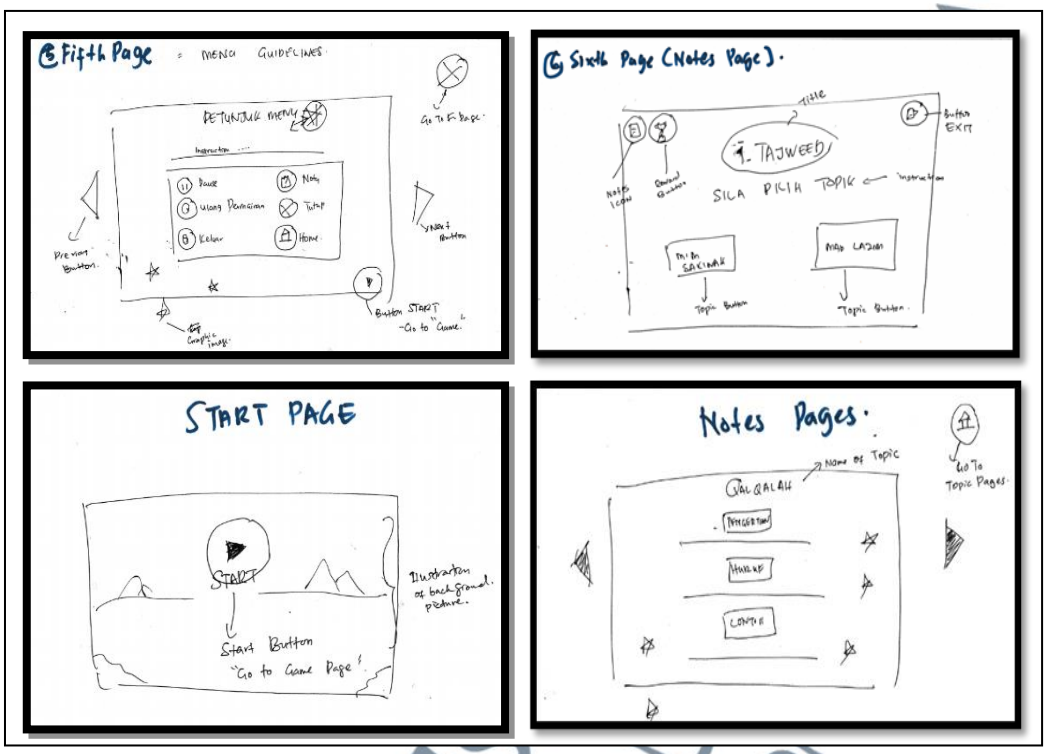
4.2.4.2 Designing the Canvas of Storyboard of i-Tajweed Game

Storyline: Color and shape are the only two components of the game. When researchers observe and interview students in Islamic boarding schools, they receive this request from the teacher. The content chosen has never been presented in a classroom setting previously. Material and color are the two major menus of each color and shape menu. In addition, material for educational gameplay can be found in the material menu. From the simplest to the most challenging levels are available on the game's menu. Material and gaming concepts used in the color and shape menu are similar. The example of a storyboard of the game is shown as follows:

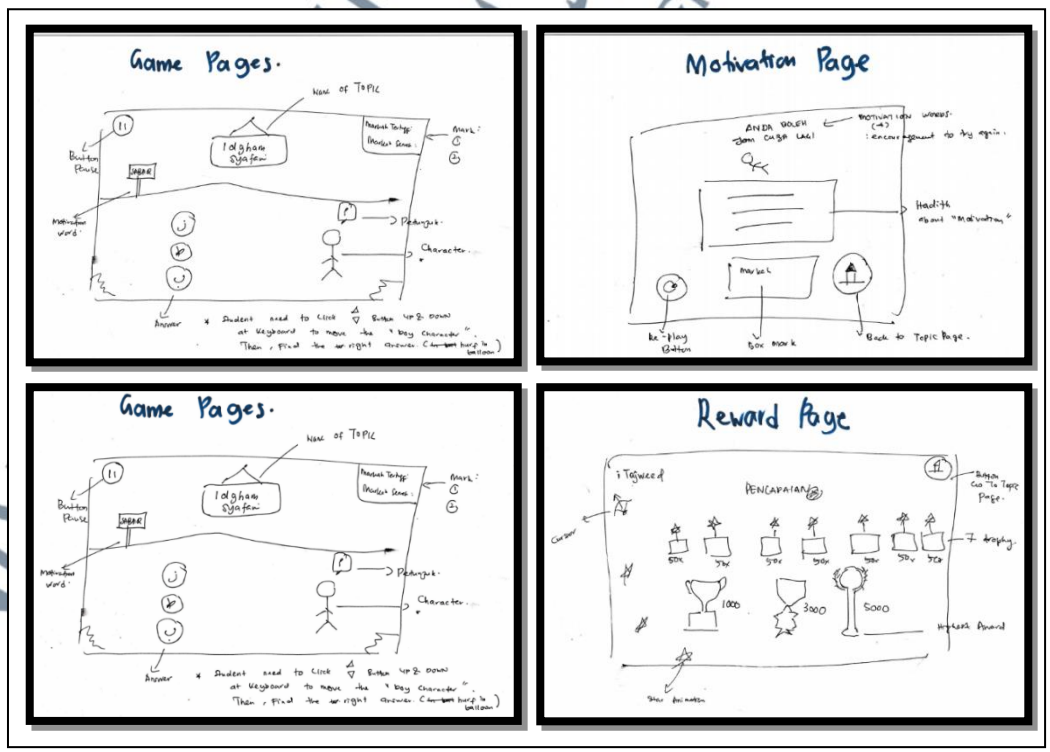
1. **Canvas 1**



2. **Canvas 2**



3. **Canvas** 3



4.2.4.3 Design Principles (DP)

Design principles include content, instructional and learning theory, sustainability elements and Graphical User Interface (GUI) design. Examples of these i-Tajweed elements are presented here.

1. Content design

The content of the courseware focuses on four main rules, which are *Mim Mati* and *Mad Lazim.* Each rule will be introduced with its textual definition and followed by a presentation of audio-visual elements to simulate the correct manner of understanding the topic. Various explanation about the topic, are also introduced to help the students in the introduction and retention process.

2. Sustainability elements implemented in i-Tajweed

This section explains the implementation of sustainability elements in i-Tajweed.

Table 4.2: Implementation of Sustainability Elements in Game Design

Element	Description	Attributes
Relevant content	Domain knowledge implemented in game design (Tajweed)	Interactive, relevant.
Interface design	Elements that attract players' physical attention	Sensory stimuli (graphics, animation, video, text, and audio
Gameplay	Elements that trigger players' sense of enjoyment and excitement	Challenges (goals, feedback, and control), play, premise/ fantasy, immersion, story/ narration, characters, objects, and mystery
Usability	Elements that provide players with opportunities for participation and involvement in gaming activities	Procedures, role-play, resources (multiple objects, multiple media, and people), and conflicts (e.g., dilemmas and obstacles)
Motivational elements	Elements that influence players' thoughts, actions, and reactions regarding	Objectives (e.g., race, escape, construct, explore, and solution), rules, choices, progress, boundaries, outcomes (e.g.,

Element	Description	Attributes
	meaningful gameplay and learning	win/lose, ranking, and reward), and adaptation

Table 4.2 explain how the sustainability elements are implemented in game design.

4.3 Development Phase of the i-Tajweed Game

The development phase is the stage in which a researcher considers how to create lesson plans and resources. Throughout this step, the researcher will create the guidance, as well as any accompanying material and all content like text, pictures, audio, and video that will be utilized in the commands. This could comprise both software (computer-based instruction, for example) and hardware (simulation equipment, for instance).

4.3.1 Pre-Production Stage

In this stage, the researcher comes out with the early idea of the i-Tajweed game design. It all begins with game prototypes, which include establishing game genres, characters, challenges, gameplay, plots, fun elements, rewards, motivational elements, multimedia elements, interactive elements, technical aspects, and documenting all elements in the Game Design Document (GDD).

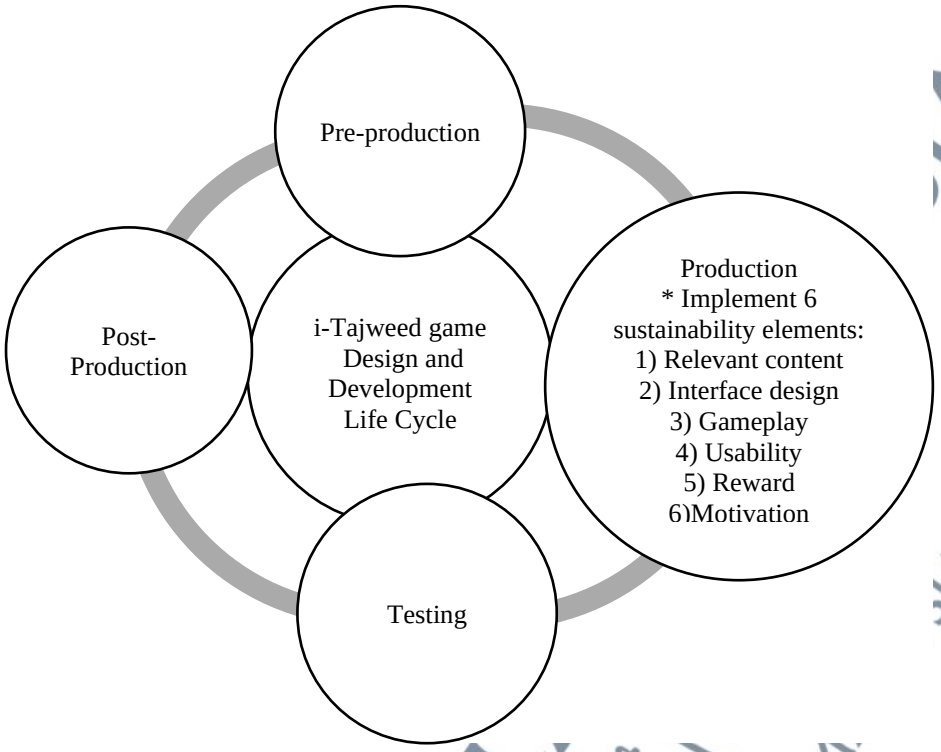


Figure 4.1: Heather Chandler GDLC

Figure 4.1 explains how the design and development life cycle of the i-Tajweed game. Four stages are involved: pre-production, production, testing, and post-production. In the production stages, six sustainability elements were implemented in game design. After that, the game will be tested by the researcher and evaluated by the expert to see any bugs or deficiencies.

4.3.1.1 Main Development Tools Used in Designing i-Tajweed Game

Here's the game general specification shared by the game above:

1. The main development tool is Unity3D to develop most of the interactive content.

2. The tutorial system will appear at the start of the user's interaction (in the form of dialogue tips and animation)
3. Graphic design tools that we use include Adobe Photoshop & Illustrator

Aside from sourcing some generic sound effects from royalty-free sources, we will use Audacity software to create and edit music and sound effects.

a. Game Assets

i 2D

- Title Logo
- Player sprites
- Background scenery
- Scene props (trees, buildings, and others.)
- Game Icon
- Pop-up screens
- Transition animation
- Main menu screen
- Particle Effects
- Achievement Logo
- All Harf within an object/bubble
- Examples of tajweed hukm (around 30-40 examples)

ii GUI

- and Tips Overlay

- Du’a Overlay Animations

  a) Player Animations

    - Running
    - Jump
    - Lose

iii Sounds/Music

- Menu Background Music
- Gameplay Background Music
- Running SFX
- Lose SFX
- Correct answer SFX

4.3.2 Production Stage

The production phase enriches the pre-production stage by putting the Game Design Document (GDD)’s thoughts, designs, and plans into action. This stage also includes asset production, programming, and asset and source code integration. Construct 2 software was used to construct the application, while the asset game was created with Adobe Photoshop CS6 and Adobe Illustrator 2019. Finally, the display home application, material menu, and gaming menu are all used to create an application.

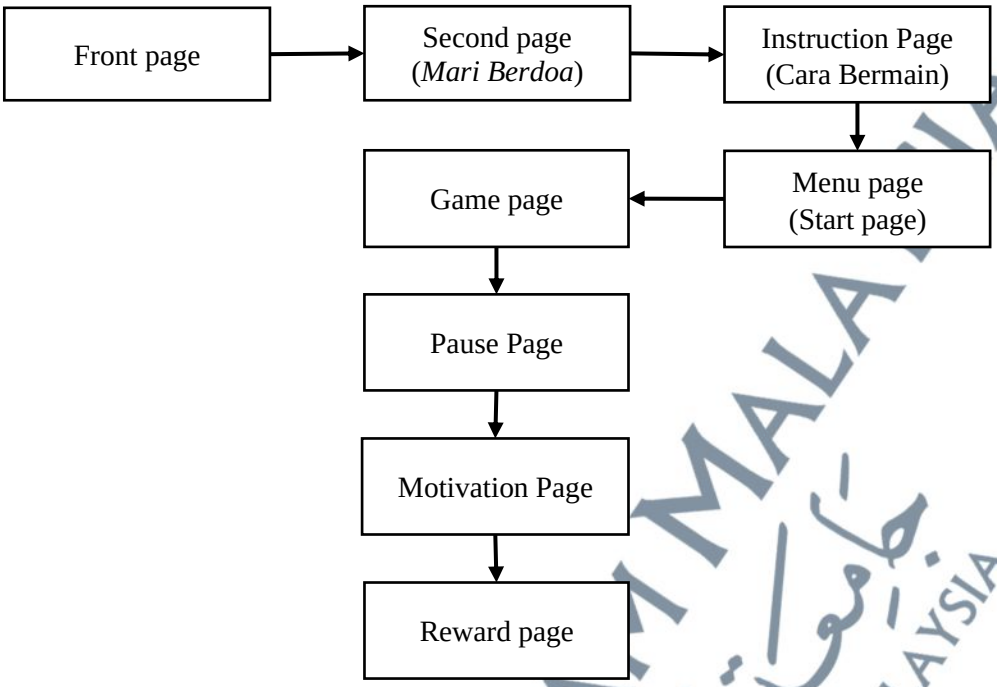


Figure 4.2: The Flowchart of Game Design

Figure 4.2 shows the flow of i-Tajweed game design. The frontpage was designed using the concepts from Arabic place that make users enjoy and easier to understand the topic. The level begins at the simplest and most general level (*Hukum Mim Mati*) and progresses to the hardest level (*Mad Lazim*). Then the second page about *Mari Berdoa* will be appear next. The game starts with the cartoon graphics (a boy) running, with a moving background and answering bubbles. The player needs to collide with the right bubble based on the given instruction. The player will be directed to the main menu screen with two selections of topics that are Min Sakinah and Mad Lazim. After that, the game page, pause game, motivation page, and reward page were designed.

The gaming application runs in the background while the researcher gives instructions. The researcher goes over the game's function buttons before going over the information under the material menu. Since game instructions are included in every educational game, the researcher just needs to clarify what is already known. The

students then begin playing the instructional game's questions, working their way up from the basic to the most complex. Interactive learning takes place as students work on difficulties in this game. In this game, students compete to conquer all of the stages. When students run into problems while working, the teacher steps in as a facilitator. Thus, students will not be distracted in class if learning is useful, efficient, and enjoyable in such circumstances.

Post-production includes post-mortem and archival planning. Following the completion of the game's testing, maintenance is performed to address any errors or bugs that may arise, ensuring that they are addressed as soon as possible.

For the purpose of this research, the researcher will focus on instructional design, user interface, and screen design. The activities involved in this phase are designing a conceptual framework, diagram, flowchart, and storyboarding. Other than that, the researcher also considers the sequence, activities, and timing during the design process so that the audiences can comprehend and catch up with the objectives.

Instrument evaluation, subject matter and content analysis, lesson planning, and media selection are all included. In addition, identifying objectives, establishing how they will be fulfilled, the instructional strategies that will be used to attain the objectives, and the multimedia and techniques that will be most successful in producing the goals are all part of the lesson planning process (Tracey, 2009). The next section explains the overall gameplay in the i-Tajweed game.

4.3.2.1 i-Tajweed Gameplay with the Explanation

TITLE	**CONTROL METHOD**: Cursor (Mouse), Enter Key
	Display game title screen with one 'start' button.

MAIN MENU	**CONTROL METHOD**: Cursor (Mouse)
	The player will be directed to the main menu screen with two selections of topics. Min Sakinah Mad Lazim

PRE-GAMEPLAY TIPS (GAME TUTORIAL)	**CONTROL METHOD**: Cursor (Mouse), Enter Key
	When the player chooses one of the topics, they will be directed to a pre-gameplay screen that contains a gameplay tutorial.

PRE-GAMEPLAY TIPS (SELECTED DU'A)	**CONTROL METHOD**: Cursor (Mouse), Enter Key
	Players may proceed to the next tips by clicking on the next button or pressing enter key.

GAMEPLAY (RIGHT ANSWER)

GAMEPLAY	**CONTROL METHOD**: arrow button (up and down)
	The game starts with the protagonist running, with a moving background and answering bubbles. Then, the player needs to collide with the right bubble based on the given instruction.

GAMEPLAY	**CONTROL METHOD**: arrow button (up and down)
	Once the player collides with the right bubble, the bubble will pop, and the player gets the score.

GAMEPLAY	CONTROL METHOD: arrow button (up and down)
	The game continues with new instructions and a new set of answers.

GAMEPLAY (PAUSE SCREEN)	CONTROL METHOD: Cursor (Mouse), 'esc' key
	Players may push 'esc' key on the keyboard or click on the icon at the upper left of the screen to pause the game. Pause UI will pop up with random tips. And also a few buttons: Exit Retry Close pause screen (Continue)

GAMEPLAY (WRONG ANSWER)

GAMEPLAY	CONTROL METHOD: arrow button (up and down)
	The game starts with the protagonist running, with moving background and answering bubbles. The player needs to collide with the right

GAMEPLAY	**CONTROL METHOD**: arrow button (up and down)
	Once the player collides with the wrong bubble, the bubble will pop and trigger tripped animation.

4.4 Implementation Phase

This phase requires a researcher to make sure that the audiences achieve the learning objectives. So, a researcher will observe the learners identify whether the materials and instructions are used appropriate way in order to meet the audience's expectations. Next, a researcher will help the students' comprehension of goals and increase their grasp of the topic so that they may impart core understanding. Finally, the multimedia presentation's design can help steer and assist the choice of acceptable content for cognitive processing. As a result, when developing instruction, Mayer recommends three guidelines for regulating critical processing.

To ensure the students` mastery of the objective, the researcher will provide a test or assessment that met the course objective. Thus, the researcher can get feedback and be able to identify any weakness of the application and then make sure the game requires additional development about a specific topic.

4.5 Evaluation Phase:

This phase focus on phase three (evaluation phase) in the DDR approach. It assesses the efficiency and effectiveness of the courseware's instruction. During this phase, an evaluation of i-Tajweed's content appropriateness and the usability of the application in teaching Tajweed for children in range 10 until 12-year-old will be investigated. Evaluation should typically take place all across the instructional design process, including within phases, between phases, and post-implementation. Formative and Summative Evaluations are both possible options. Formative Evaluation can be defined as an ongoing assessment state that happens throughout as well as between phases. Conversely, Summative Evaluation normally takes place after the final lesson has been completed.

In this phase, the quasi-experimental design was chosen that involved pre and post-test. Originally, the opinions were focused solely on the gameplay (what the players may have performed differently or how the game could have been adjusted to help the others score highest marks). On the other hand, some participants believed that if given more time, the amount of scoring would be increased. This emphasizes the value of contemplation in maximizing learning results. The students are put in suitable circumstances and challenged to cooperate together to achieve the objective and get highest score. As a result, most of participants enjoy playing the game and get fruitful experience of what they had learned and the significance of what had happened in the actual world.

4.6 The output of i-Tajweed game

4.6.1 Opening Screen

When end-users launch the game, the opening screen is the first screen that they will see, which includes an animated montage that introduces the game as well as an induction set. Users can advance to the next screen by clicking on the 'In' button or skip the montage by clicking on the 'Skip' button.

4.6.2 Main Menu Screen

Main menu screen displays the interface of i-Tajweed game. Button start and credits are on the main menu screen. When students click on the Start button, they can continue to the next page of the game about the instruction as well as *hukum Tajwid*, such as Mim Mati and Mad Lazim. If they wish to learn more, they can use the Notes menu. In addition, help and exit buttons are presented on the screen as navigation buttons. The main menu screen is shown in Figure 4.3.

Figure 4.3: Main Menu Screen

Figure 4.3 is the front page or main menu screen of the game. The front page shows the scenery of Arabic place with a colorful background, characters (boy and girl), start button, and credit button showing the page / URL, or images. This is the outlook of the front page of i-Tajweed game. The screen displays an interactive interface of the game so that students can motivate to complete the lesson.

Figure 4.4: Gameplay Screen

4.6.3 Gameplay Screen

Figure 4.4 explains the step on how to play and start the i-Tajweed game. There are also have close buttons, next, and previous buttons, and buttons to get to every menu on this screen. In addition, the gameplay screen shows the step or instruction on how to play and start the i-Tajweed game. The topic board of 'Izhar Syafawi" will appear and students should find the right answer accordingly. A character that represents "a boy" will appear at the same time and students need to match the correct answer based on the topic board. The next and previous buttons, as well as the main menu button, are available on the screen as navigation buttons.

Figure 4.5: Pause Screen

4.6.4 Pause Screen

Students can use the pause screen to check their comprehension after they have completed the session. The quizzes are centered on the earlier screen. If they select the accurate option, positive reinforcement phrases such as "Congratulations" will be shown. In contrast, if they pick the incorrect response, motivational words will surface to motivate pupils to attempt again. A Pause screen is shown in Figure 4.5.

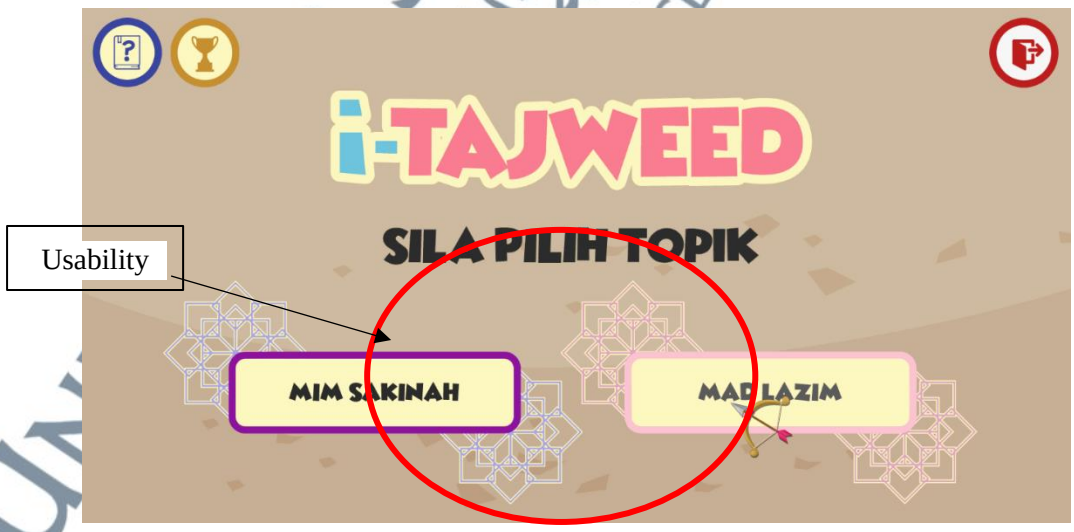


Figure 4.6: Main Topic Screen

4.6.5 Main Topic Screen

The screen displays the main topic of Tajweed, such as *Mad Lazim* and *Mim Mati*. Students must first choose one topic that they like, then the detailed description of the Tajweed rules will appear. This will aid students in gaining a thorough understanding of the topic. A main topic screen is shown in Figure 4.6. Next to the main topic, the subtopic screen will appear that display the division in the main topic as illustrated in Figure 4.6. Then, Figure 4.7 shows the example of Mad Lazim screen and also have positive word to motivate the student.

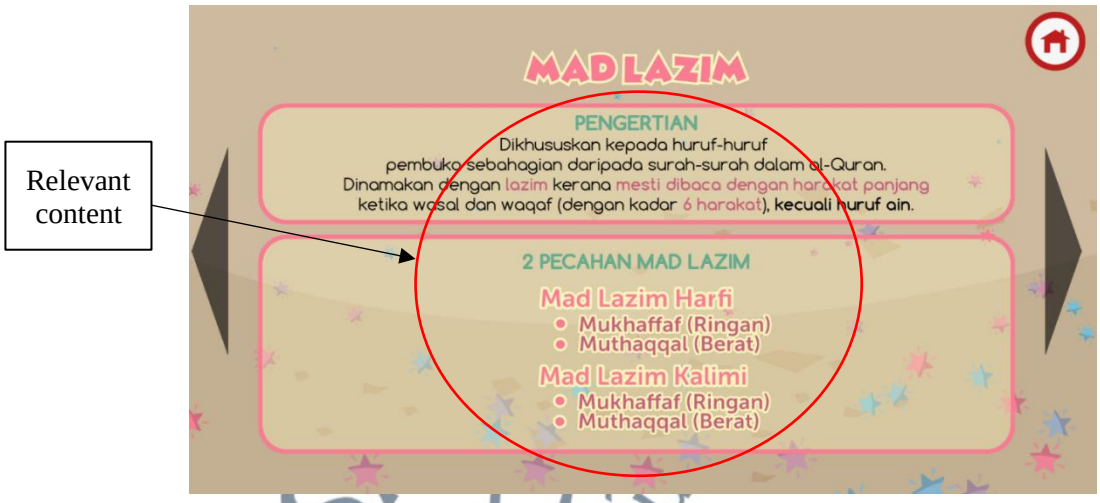


Figure 4.6: Sub Topic Screen

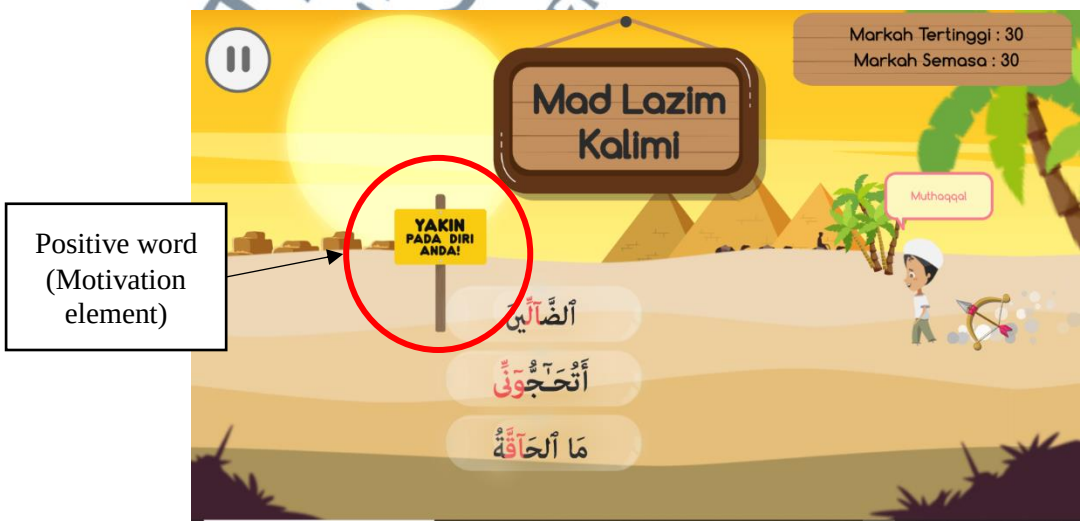


Figure 4.7: Mad Lazim Screen

Figure 4.8: Motivation Screen

4.6.6 Motivation Screen

While, Figure 4.8 describes the example of the motivation element (positive word) used in game design. This element is provided to make sure students are motivated during all the session. In this screen, there will also appear a mark board and positive word.

Figure 4.9: Reward Screen

4.6.7 Reward Screen

Figure 4.9 describes the reward system using trophies. This platform is provided to motivate students to score the highest marks. The highest marks are presented with (1000 marks, 3000 marks, and 5000 marks).

4.7 Evaluation of Sustainability Elements in Game Design

The output of the i-Tajweed game was evaluated by the experts. First, the evaluation form of the output of the game was developed. Then, the findings of research on the sustainability elements used in i-Tajweed to motivate Tajweed learning among primary school students was developed. It is critical to understand how to recreate a bug continuously, regardless of what it is. Given the appropriate situations, almost all problems will arise. Thus, it is up to researcher to figure out what those situations are. The researcher can proceed to the following stage and start gathering relevant information after you are certain of the events that caused the bug to exist. The following section explains the step to manage the bug.

1. Replicate the issue constantly: Regardless of the bug, it is critical to determine how to replicate it continuously. Given the correct conditions, most problems will arise. Thus, it is up to researcher to figure out what those situations are. You can proceed to the following stage and start gathering relevant information after you are certain of the situation that led the bug to exist.
2. Gather clues: Once the researcher has figured out how to dependably get the problem to happen, it is time to put on your detective hat and start gathering information. Each indication provides an opportunity to strike out a likely

reason and restrict the suspect list. Additional investigation reveals that the pointer should be pointing towards the character that fired the arrow.

3. Highlight the error: When the researcher considers the gathered sufficient evidence, it is essential to narrow down your search and locate the error. Again, there are two options: 1) Come up with a hypothesis regarding what's triggering the bug and attempt to prove or deny it. 2) The divide-and-conquer method is a deliberate approach.
4. Fix the issue: After determining the actual reason for the bug, a solution must be recommended and developed.
5. Validate the solution: After the solution has been developed, it must be checked to determine that the bug has been fixed. The researcher must play the game for a decent timeframe to check that the fix has not harmed anything else.

4.8 Summary

This section elaborates how the suggested game, i-Tajweed, was designed and developed. A systematic process and suitable theory implemented in the design and development process were proposed. The i-Tajweed game was developed through detailed processes and adapted Cognitive theory of Multimedia Learning and Gagne 9 Events of Instruction. Considering games as a teaching tool that users can attract to the best combination of sustainability elements and motivation technique is extremely important to enhance motivation and performance among users. To determine the validity of the i-Tajweed game, experts 'compromise in expert in game development, content, and instrument was performed. In the next chapter, the findings and results of the data analysis are presented.