

**A WEB SITE FOR KIDS TO DEVELOP EDUCATION GAME IN HTML 5 AND  
JAVASCRIPT**

**BY**

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**A REPORT  
SUBMITTED TO**

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## **ABSTRACTS**

This project is an education system for sharing JavaScript knowledge. Nowadays, education game become a mainstream, but most of the people don't have knowledge about how to create a game, they don't know the game function back-end code. Therefore, this project will develop a webpage target for kids around twelve to seventeen year old, for them to learning how to using JavaScript create education game in web. The website have provide sample game and code explanation, separate to five level teaching, allow user create game online and provide quiz for user to testing their knowledge. In this project have research several existing system in market, after discuss and compare the system it found out that each system have their own limitation. Due to avoid mistake during the system development process, this project is use phased development process to complete all the task. During all research, it have found out all the necessary tools to develop this system such as game engine, database and other. The main tools will used in this project which is Phaser game engine, SQL Server database and visual studio. Game engine is for develop game purpose and visual studio is for webpage design purpose. Besides that, it also have list out all the diagram and system design for how the user interaction with the system. Since the target audience is kids, therefore the system flow will design in simple way for them easy to access and will provide several game to attract their interests.

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## CHAPTER 1 INTRODUCTION

### 1-1 Introduction

This project is create a website provide tutorial, test and example education game for kids around twelve to seventeen year old to learning how JavaScript code create game. In this webpage is separate to two part, one is for learning purpose, next is testing purpose. From the learning part is focus on provide game example and code explanation for kids to understanding and separate to different level teaching from basic until complex. On the other hand, testing part is provide quiz such as multiple choice question to test user knowledge and allow user try to create game online and download code file. Create game online is mean user can enter JavaScript code to webpage, webpage will detect the code and generate the output.

Educational game is a game design for teaching human with education purpose, or is share the experience in real life for human to learn. This type of game may be used in an educational environment. Educational game is a game that are design to help human to understand about certain subjects such as mathematical or science, problem solving, expand concepts, and historical event or culture. Nowadays, this type of game has become mainstream. However, most of the people not have knowledge about how to create a game, they don't know the game back-end code such as function, movement, and act. JavaScript is one technology language can be create webpage and game, but only less of the people know how JavaScript function. Therefore, this project is develop a website target for kids around twelve to seventeen year old to learning JavaScript, and using JavaScript to development an educational game. In the website have provide the sample of JavaScript to guide kids to understanding each process and learning real life experience.

In this project, user need register to webpage, when user login to system, database will detect the user information. User can create project in website and save in to database, user also can download the project source code to their computer. Bisesdes that, this system have separate to five level, first is create an object, secand is the object can movement, third is condition detection such as multiple object interaction, fourth is calculation function and last is audio insert. User also can take test if their want to testing their own knowledge, system will calculate the test scoring for them to knowledge pass or fail.

## **1-2 Problem Statement**

1. Most of the system is design for adult to access, the explanation is difficult for kids to understand, lack of user friendly interface for them. Such as Cordova website, this website is design for adult to learn, the webpage lack of user friendly interface, it always need to download the software to install. But this is very difficult for kids to access, the explanation is too hard for kids to understand.
2. Poor of teaching method, no have enough tutorial, sample and information about JavaScript for user to learn. For example, code 9leap website is the best system for user to create game by using HTML 5 and JavaScript, but the website no provide enough tutorial and sample for user. Besides that, the code explanation is limited and no focus on English. All of system is just provide sample, but no guide user step by step learning. This is no efficiency for user to learning, because the user will not know which part need to create first (first stage), and this part will not change and influence when adding other function.
3. According to research, the system have provide the game development is not focus on education game, it only teaching the basic animation for user to learn. Therefore, this type of game is not sharing the knowledge of real life experience for kids.
4. No provide quiz for user to testing their own knowledge, this is because all system no focus on step by step teaching, therefore is difficult to design that quiz that can guide user. However, this is very importance stage for user, because user need to know which part is their weakness and which part need to be improve. Therefore, all system is not efficiency web for user to learning.
5. None of the system have provide user to download the game source of their developed online. User just can enjoy create game online but avoid for download it and cannot share with friends or import to their own website.

### **1-3 Project Objective**

1. To design a users' friendly interface webpage to help kids simple to access the website, provide interesting image and game to attract kid's interest to open the webpage and simple explanation. For example, design the animation or game show in home page for kids to choose and using simple English to do the coding explanation.
2. To improve game teaching method in step by step, sample and code explanation. Develop a function in web allow users trying create game online, this can guide them to more understand the code process during their testing because the output screen can direct tell kids what is the functionality of the code. Separate the tutorial to different level from starting stage until last of the stage. And provide each level sample and give code explanation.
3. To focus on education game for kids to learning, not only can learn the coding but also learn real life education purpose. Such as provide mathematical and science game, teach kids the basic real life education and the basic calculation.
4. To design the system that have provide quiz in each level. User can just go through the quiz will know about their skill, which level is their weakness and need improvement. This is efficiency way for user to make improvement of their skill based on the result of the quiz.
5. Allow users download the game source file, when user create game online, the code is save to JS File. User can download the file to their computer and website will guide them how to import to their own webpage. Therefore, users can share the game to friends and get other recommendation to improvement.

**1-4 Expected Innovation**

1. To improve the user friendly design to attract user interest to access the website and explanation the code to solve problem #1 and fulfill objective #1. Provide the system just access online, no need to download and install in computer. The is simple way for kids to access.
2. To improve teaching method, tutorial and sample game for user to practise and trying development game online to solve problem #2 and fulfill objective #2. For example, separate to different level teaching and provide each level sample. Also will teaching whole game development not only small part.
3. To focus on develop the education game for kids sharing read life knowledge to solve problem #3 and fulfill objective #3. Provide the real life education game for kids to have the knowlaedge of real life experience such as science and methemetic game.
4. To add quiz for user to taking test, this is in order to allow user improve their skills to solve problem #4 and fulfill objective #4. Provide each level quiz for user to know thier weakness.
5. To save game code to JS File and connect with database, this connection is because need to be allow users to download the game file for import to own website or share to friends. This function is to be solve problem #5 and fulfill objective #5.

## **CHAPTER 2 LITERATURE REVIEW**

### **2-1 Literature Review**

Education game mean that use of the real life experience, certain subject or other to design a game for teaching purpose. Education game are software that design to guide people to learn about reinforce development, problem solving, historical or culture, certain subject or real life experience.

According to research “The educational benefit of videogames” videogame have great positive potential when games are design to solve a specific problem and teach certain skill (Griffiths, 2002). Besides that, it is important to assess the extent that videogame technology had an impact on childhood education (Griffiths, 2002). Due game have capacity to engage children in learning experiences. Children prefer this type of approach to learning, because it can refer and understand the message sharing by game character. Videogame can attract children to setting goals, ensuring goal rehearsal and feedback. Furthermore, videogame bring a lot of benefit to people such as Cognitive, Motivation, Emotional and Social (Isabela, Adam, & Rutger, 2014).

During research game provide immersive and engaging learning environment which is different with traditional learning environment (Hyungsung, 2012). Game design in learning environment is powerful pedagogic that allow player for operate and practice in safe environment. Combination game with education is the most efficiency and effectively for user to practice (Maria, George, & Konstantinos, 2005). Due to a lot of teaching environment is difficult practice in a real life situation, therefore game is a suitable way to share information for people such as physical game, scourge, flight training and etc.

## 2-2 Existing System

HTML 5 and JavaScript is great performance tool that compare will other, it can add graphics, animation, sound, video, and other. HTML5 and JavaScript is over with other Rich Internet Application (RIA) tools, this is because HTML5 and JavaScript is natively support by any web browser, this can without install any "player" or software to render the content this is the most advantage of using HTML and JavaScript. This means that HTML5 and JavaScript can access in all computer. The disadvantage of using Flash is the user needs to install Adobe Flash Player in computer in order to run SWF file, this will triggers series of limitation. HTML 5 is far better than Adobe Flash (Glickman, 2013). According through the research from every relevant website and software. There was limited application on the market now and all of those application also perform different function.

### 2-2-1 Crafty JS Website

Crafty JS is JavaScript based HTML 5 game engine, this game engine is design to for user make a 2D graphic game in website and provide the teaching material for user to learning development game.

**CraftyJS** Home Getting started Documentation API Forum Components Download

### Getting started - Building your first Game [Edit on Github](#)

This is a very quick guide to using Crafty.

For a more thorough but somewhat out-dated guide, check out [Darren Torpey's tutorial](#). (As of 0.6.3. In addition to the changes Darren mentions at the end, you'll need to change the signature of `Crafty.load`.)

#### Setup

First let's setup our HTML file. We're trying to get you up and running quickly, so we'll just directly link to the latest release version. (Of course you can also install it locally)

```
<html>
<head></head>
<body>
  <div id="game"></div>
  <script type="text/javascript" src="https://raw.githubusercontent.com/craftyjs/Crafty/release/dist/crafty-min.js"></script>
  <script>
    Crafty.init(500,350, document.getElementById('game'));
  </script>
</body>
</html>
```

A Crafty.js game is build up of entities -- the player character, enemies, and obstacles are all represented this way.

Lets start by creating a simple colored square:

```
Crafty.e('2D, DOM, Color').attr({x: 0, y: 0, w: 100, h: 100}).color('#F00');
```

There are a few things going on here:

- We first call `Crafty.e` with a list of components to add to the entity. Components provide basic building blocks of functionality. In this case, we add `2D`, `DOM`, and `Color`. You can learn more about those later!
- We then call two methods of our newly created entity: `attr()` and `color()`. The `attr` method is one of [many](#) that all entities share, but `color()` is (unsurprisingly) provided by the "Color" component. Most methods you call on an entity will return the entity itself, allowing method chaining as in the above example.

**Figure 2-2-F1: Crafty JS Website**

## Chapter 2 Literature Review

```
<div id='game'></div>
```

```
Crafty.init(300,300, document.getElementById('game'));  
Crafty.e('Floor, 2D, Canvas, Color')  
.attr({x: 0, y: 250, w: 250, h: 10})  
.color('green');  
Crafty.e('2D, Canvas, Color, Twoway, Gravity')  
.attr({x: 0, y: 0, w: 50, h: 50})  
.color('black')  
.twoway(200)  
.gravity('Floor');
```

**Figure 2-2-F2: Crafty JS Code Testing**

Crafty JS is a website that teaching user how to use HTML and JavaScript to build game, it can help users to run game in short period of time because Crafty is lightweight in term of file size is just around hundred kbps. The file is very small size that won't delay the game start up and running time. This type of system is useful for user to learning, because the system can allow user to testing build game online and make the code in paragraph explanation. But limitation of this website is no catch the error for user, so the user don't kwon the error when they do the mistake, and no provide any quiz to testing user knowledge.

### 2-2-2 Code 9leap Website

Besides that, code 9leap website is one useful webpage for people to learning and design game, it provide the example game coding to user, and have perform the display result function for user. The code 9leap system show in Figure 2-2-F3.



**Figure 2-2-F3: Code 9leap System**

Therefore, user can learn it game code easily because have the output show to them. It have separate to English and Japanese language tutorial for user to learning. Furthermore, this website can allow user to create their own project such as design a game and can save it. But the weakness of this website is limited code explanation for user and most of the explanation is using Japanese language, this is very difficult for the user without Japanese language knowledge to understand. Moreover the English tutorial is too limited game sample for user to learn, so this not useful for without Japanese language user to learn. Other than that, the system only provide the limited part of the game of user, such as the start function, and game over function. User should have strong coding knowledge only can access the system. This is impossible for kids to access it, because no have the basic tutorial provide, no have explanation for each coding, it is based on adult with strong knowledge core technology markup language to design.

### **2-2-3 Game Dev Academy Website**

After research from every relevant website and software, found out Game Dev Academy website also have related to create education game by using HTML 5 and JavaScript. This website is focus on create mobile education game with HTML5 and JavaScript. The strength of the system provide a lot of explanation for the whole game coding, it separate the code to different part and step by step explain by using paragraph. This can allow the user more understand, because the explanation is clear to present. However, the weakness of this system is don't have provide the user testing, it don't allow user to enter code and show the output. Therefore, the user only can read of the code and explanation, this will cause the user reduce their interest and lack of testing process.

Creating these json files manually is ok for a small game. There is also an [online tool](#) you can use that makes the process easier. In addition, Quintus supports the tmx format from the [Tiled map editor](#).

Let's add the following code after our Q object definition to load these assets:

```
Q.load("sprites.png, sprites.json, level_collision.json, level_background.json, tiles.png", function() {
  Q.sheet("tiles", "tiles.png", { tilew: 32, tileh: 32 });
  Q.compileSheets("sprites.png", "sprites.json");

  //stage our scene here
});
```

By doing this our game will really start only after the assets have been loaded. This is a cool feature lacking in most game frameworks.

Regarding the actual json files:

- **sprites.json:** keeps the info on the sprites present in sprites.png, including the main player, the enemies and the girl. See how the coordinates of each sprite are defined here.
- **level\_collision.json:** the collision layer based off the tiles in tiles.png. Tiles count from zero on from left to right. The cells with zero won't display any tile and won't collide with anything. See how this is only including the ground and grass tiles.
- **level\_background.json:** just a background based off the tiles in tiles.png. Tiles count from zero on from left to right. The cells with zero won't display any tiles. See how this includes the sky and cloud tiles.

By using Q.sheet we are loading the asset tiles.png , which we can use later on for our collision layer and background.

### **Figure 2-2-F4: Game Dev Academy Website Code Explanation**

### 2-2-4 William Malone Website

Last of the relate website is William Malone, this website is teaching the basic game development with provide sample game and the whole coding for user to learning. It have explain clearly coding detail for user to understanding, such as how to make a code to turning. This is a better way to attract user, because have provide analysis for user and have game output. If no provide game output for user, user not have the idea how the game run, therefore not clear for user about the code function, and no provide any quiz to testing user knowledge.

The key to creating sprites from one image is that the context's `drawImage` method allows us to render a cropped section of the source image to the canvas.

```
context.drawImage(img, sx, sy, sw, sh, dx, dy, dw, dh)
```

<code>img</code>	Source image object	Sprite sheet
<code>sx</code>	Source x	Frame index times frame width
<code>sy</code>	Source y	o
<code>sw</code>	Source width	Frame width
<code>sh</code>	Source height	Frame height
<code>dx</code>	Destination x	o
<code>dy</code>	Destination y	o
<code>dw</code>	Destination width	Frame width
<code>dh</code>	Destination height	Frame height

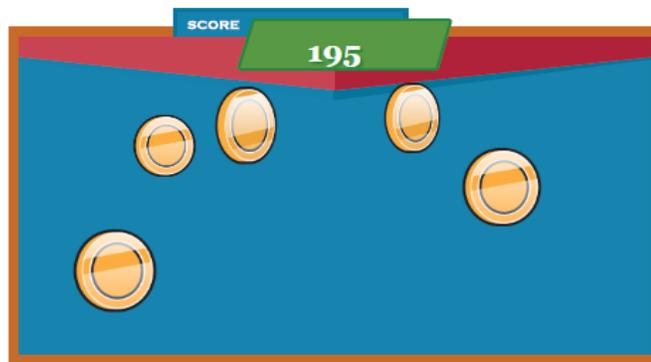
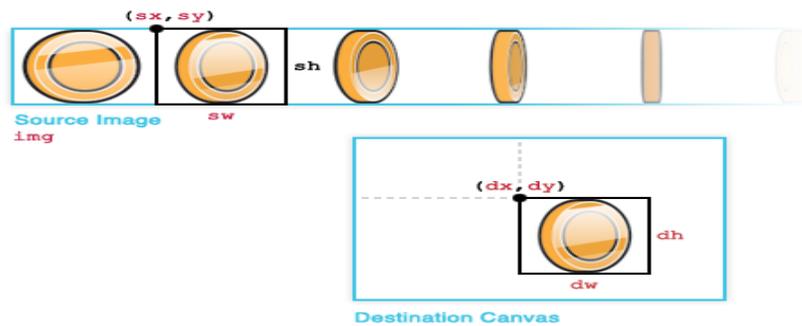


Figure 2-2-F5: William Malone Website

**2-2-5 Compare with Existing Website**

	<b>Crafty JS</b>	<b>Code 9leap</b>	<b>Game Dev Academy</b>	<b>William Malone</b>	<b>This Project</b>
<b>Code Enter Function</b>	Yes	Yes	No	No	Yes
<b>Detect code enter and sandbox function</b>	Yes	Yes	No	No	Yes
<b>Explanation of coding</b>	Yes	Limited	Excellent	Excellent	Yes
<b>Whole Game development teaching</b>	No	Limited	Yes	Yes	Yes
<b>Sample Game with whole Function</b>	No	Yes	No	Yes	Yes
<b>Education Game</b>	No	No	Yes	No	Yes
<b>Provide quiz to testing user knowledge</b>	No	No	No	No	Yes
<b>Allow game source download</b>	No	No	No	No	No

**Table 2-2-T1: Compare with Existing System**

**Description of Table 1**

1. **Code Enter Function:** Allow user enter code in website to try and learning.
2. **Detect code enter and sandbox function:** Display the output of user code enter in the website.
3. **Explanation of Coding:** Explain the sample game code for user to understand each function.
4. **Whole Game Development teaching:** Provide whole game coding for user, not only the small specific function such as just movement function.
5. **Sample game with function:** Provide sample game with function for user to try playing and attract user interest.
6. **Education Game:** Focus on education game for user to learn real life knowledge.
7. **Provide quiz to testing user knowledge:** Provide multiple choice question for users to testing their knowledge at which level.
8. **Allow game source download:** Allow user to download JS file with the code their enter and can import their game to own website.

## **2-3 HTML 5 and JavaScript Game Engine**

Game engine is a software that for user to create and development game. Game developer are using game engine to create game, it can be create mobile or personal computer game. The core functionality typically provide by game engine include rendering engine for physics engine, sound, animation, memory management and other. In this project, it will using game engine to create each game. Today it have several HTML5 game engine exist in market, below are four different game engine:

### **2-3-1 PHASER Game Engine**



**Figure 2-3-F1: Phaser Game Engine**

Phaser is a game engine that develop game by using JavaScript and TypeScript. This game engine is open source and well software that provide a lot of tutorial for user to learning. Besides that, it also can create physical game, animation, and other.

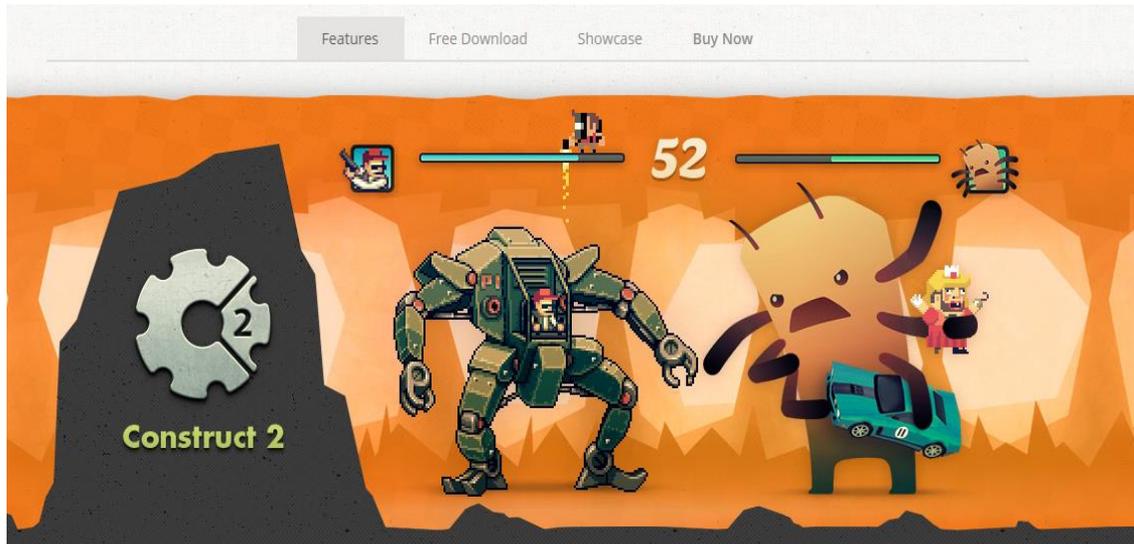
#### **Advantage**

- Open source
- Free download
- Provide tutorial and example
- Sandbox Function (allow user develop game online)
- use WebGL for faster performance

#### **Disadvantage**

- Limited code explanation
- Focus on 2D game editor

### **2-3-2 CONSTRUCT 2 Game Engine**



**Figure 2-3-2: Construct 2 Game Engine**

Construct 2 is an HTML 5 game maker and based on 2D and 3D game editor, this software can allow user create game without code knowledge. It can create game by drag and drop fashion, all the code will be general by system.

#### Advantage

- Free download
- Active community and new releases weekly
- Drag and drop fashion
- Easy create game without code knowledge
- Allow 2D and 3D game editor
- use WebGL for faster performance

#### Disadvantage

- No coding teaching
- No open source
- No Sandbox Function (allow user develop game online)

### **2-3-3 PIXI.JS Game Engine**



**Figure 2-3-F3: Pixi.js Game Engine**

Pixi.js is game engine that released in 2013, and can develop game by using HTML5 and JavaScript. This game engine is use Web Graphics Library to make the game and development faster performance. WebGL can support the game graphic in 3D and 2D in any web browser, If not use Web Graphic Library it will just support the engine falls back to standard canvas.

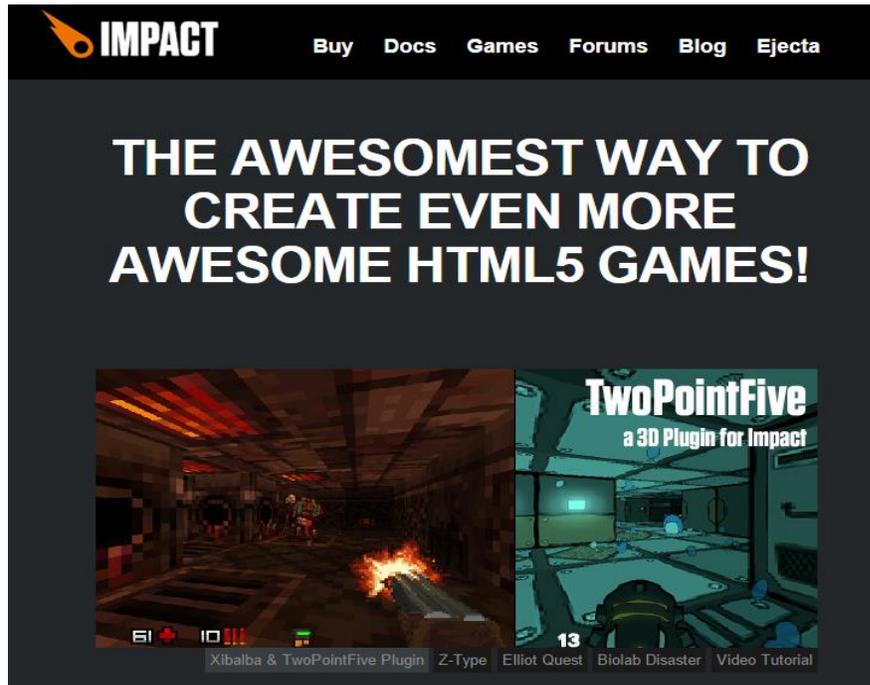
#### Advantage

- Open source
- Sandbox Function (allow user develop game online)
- Free download
- Physical game design
- Use Web Graphics Library for faster performance
- Focus on 2D and 3D graphic

#### Disadvantage

- Limited code explanation
- No step-by-step teaching

### 2-3-4 IMPACTJS Game Engine



**Figure 2-3-F4: ImpactJS Game Engine**

ImpactJS is a tested and true HTML5 game engine that release in 2010. User can develop game in JavaScript and HTML 5 for computer and mobile application. The game engine can impact to any HTML 5 capable browser such as Google Chrome, Firefox or IOS mobile.

#### Advantage

- Open Source
- 2D and 3D game editor
- Provide a lot of game example
- Allow develop physical game

#### Disadvantage

- No free version, need to buy
- Limited explanation
- No step-by-step teaching
- No Sandbox Function (allow user develop game online)

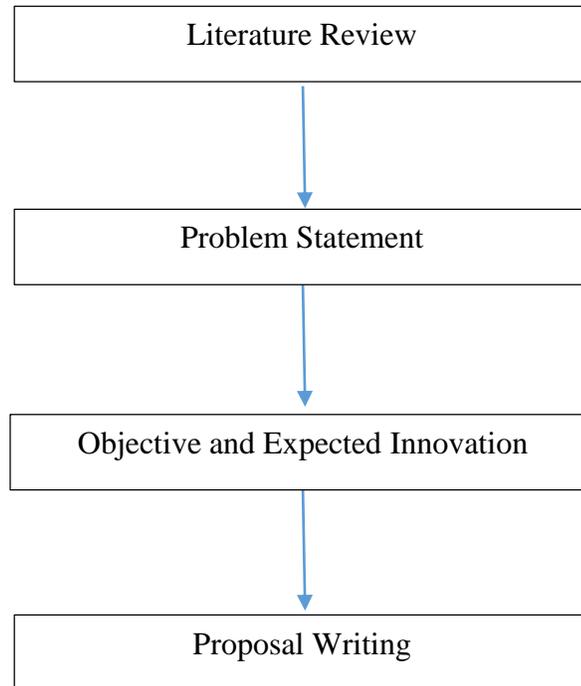
**2-3-5 Compare of game engine**

	<b>Phaser</b>	<b>Construct 2</b>	<b>Pixi.js</b>	<b>ImpactJS</b>
<b>Open Source</b>	Yes	No	Yes	Yes
<b>3D game editor</b>	No	Yes	Yes	Yes
<b>Use WebGL</b>	Yes	Yes	Yes	No
<b>Free Version</b>	Yes	Yes	Yes	No
<b>Provide game Sample</b>	Yes	Limited	Limited	Limited
<b>Sound Effect</b>	Yes	Yes	Yes	Yes
<b>Sandbox Function</b>	Yes	No	Yes	No
<b>Suitable for develop physical game</b>	Yes	Yes	Yes	Yes

**Table 2-3-T1: Compare of Game Engine**

## CHAPTER 3 System Design

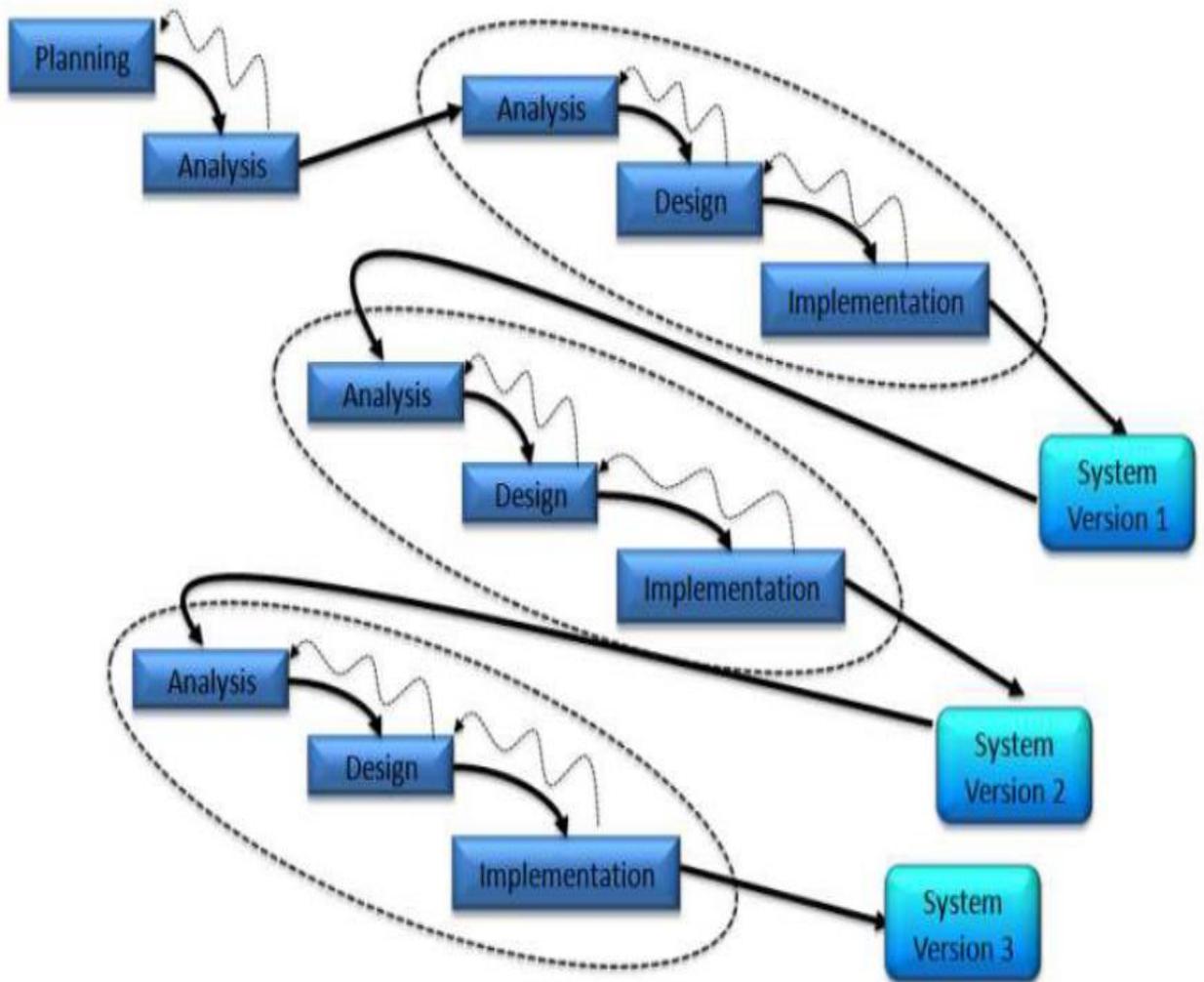
### 3-1 Methodology



**Figure 3-1-F1: Proposal Writing Process**

At the early of this project, it have doing the literature review of the topic about Educational Game Development with JavaScript. After the review, found out that the different system have the different problem, the problem statement of the technique has proposed on the document. The objective of this topic that have been search out and proposal on the document and have draft the expected innovative to explain how to solve the problem and fulfil the objective. At last, whole proposal document will be written out that include introduction, objective, review literature, expected innovative and system design of the project.

**3-2 Phased Development**



**Figure 3-2-F1: Phased Development Process**

After all the research, phased development is most suitable methodology to develop this project. Phased development is one type of methodology that separate system requirements to three versions, the most important function of system will be develop first, after the main function is built, the next version function of the system will be developed and all the version of the system will be tailored together at last. Each version has their own analysis, design and implementation phase. This method will develop system quickly and effectiveness. Phased Development is need to avoid or prevent mistake of development process, they are:

**- Chaos caused by the complexity of the system**

In Phased Development, the system will be separated into several parts and developed step by step. This can reduce the complexity to develop the system. By using this method, it will reduce the chances of chaos happened when developing the system because all the problems can be solved in the development of the current version of the system until they are noticed in the future development. Therefore this will save the cost and time to handle the chaos when they appear. After entering the development of next version of the system, it will not be able to reverse back to the previous version of system.

**- Complexity of estimated time and cost**

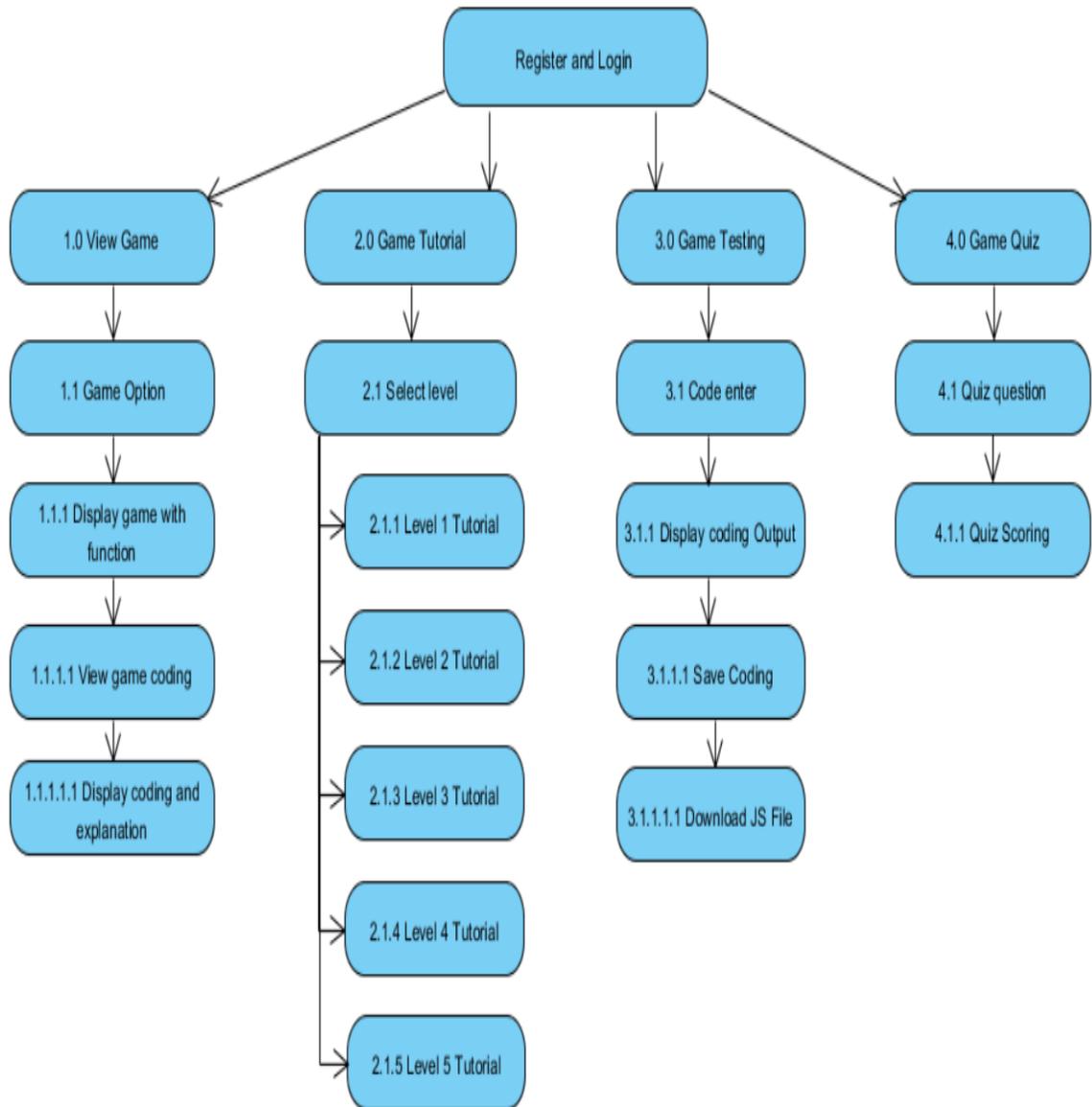
The team or group will try to estimate time and cost to complete the system so that they can manipulate the resources effectively and efficiently. However, the realistic time and cost could not be accurately predicted at the beginning of the system development because of the uncertainties happened like the changing requirements requested by the client. Therefore the Phased Development can avoid this problem.

**- Energy and cost to develop the prototype might be wasted**

The developer may waste time to develop the whole system prototype, it will cause problem when keeping changing whole system due to changes on system requirements. Therefore this will cause the structure of the system become messy.

Therefore, in this project webpage will develop first, after the main function is created will starting to design the education game. In the end, all the functionality of the project is created then link together the webpage and the education game. This type methodology is suitable using to develop complex system because when the system is too complex developer may choose the important part in the project as starting develop and finish it as system version 1. After version 1 is complete the system can perform well but the interface of the software is not user friendly so developer can improve the user friendly and complete as version 2. The other reason that choose phase development is because is methodology can checking and test the system version by version, therefore as the first system is built, developer can checking the game function can run well or not. If having error in version 2, development only checking version 2 part, because version can run well so the error is occur in version 2. This can be save time to checking the error, due to no need check all the version.

**3-3 System Flow**



**Figure 3-3-F1: System Flow**

### **Description of System Flow**

This project is focus for kids to learning JavaScript to develop education game. Therefore, the system should design interface with very simple for kids can understand and easy to access. First, the user much using web browser to open the webpage and need register and login to webpage.

The webpage will separate to four different part, first part is provide different game poster and game to attract kid interest, this is because need to attract user have interest to learn how to create game, therefore kids only will trying to access our system. Kids also can play the game and view the whole game development coding with simple language explanation for kids to understanding.

Second part is game tutorial, this part is separate to five level teaching. At the first level is teaching how to create object such as a person or animal. Second level with learn about an object can movement, third is multiple object can interactive and, four is create calculation function in game and last is audio insert.

Third part is game testing, this part is for kids to practices how to create a game. Kids can enter the code in the webpage and system will display code output for them, this is most effective way for kids to learning and understanding. Kids also can save and open back the work they done before, and can download the JS File with their code import to their own webpage.

Last part is Quiz, this part will design multiple choice question to test kids coding knowledge base on different level. Normally need to get above 65 mark only can pass it. The purpose of the quiz is for user to know which level is their weakness and the level they need to practice more.

### 3-4 System Design

This system is develop a webpage connect with database and education game. For the webpage is use HTML, ASP.net and CSS (Cascading Style Sheets) to design and having JavaScript to preform specific functions such as search function.

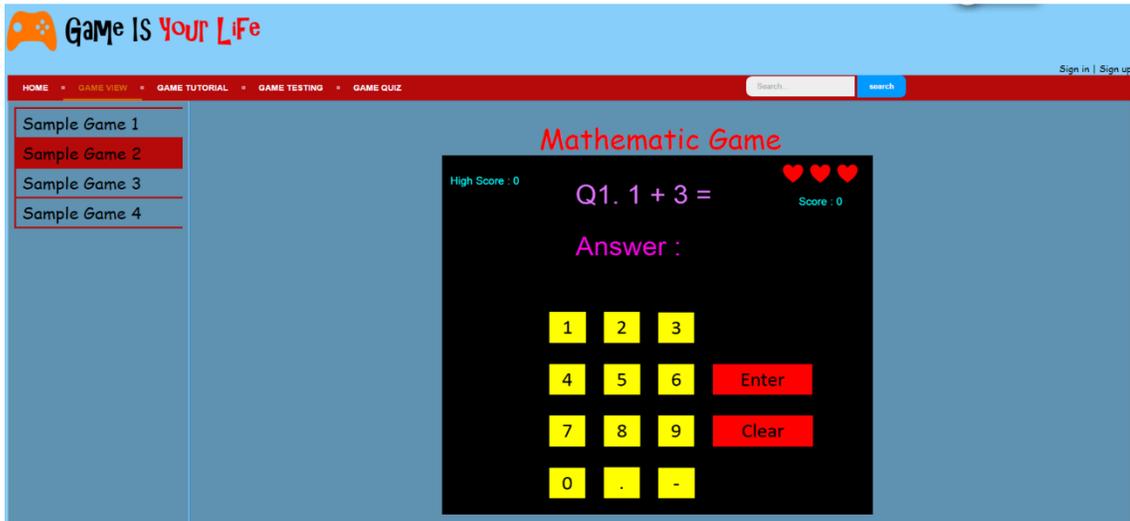


Figure 3-4-F1: Sample of Game

The web site will separate to four main features, first is provide the sample game for user to playing and try attract user interests to learning how to develop game and whole code with explanation to guide user understanding.

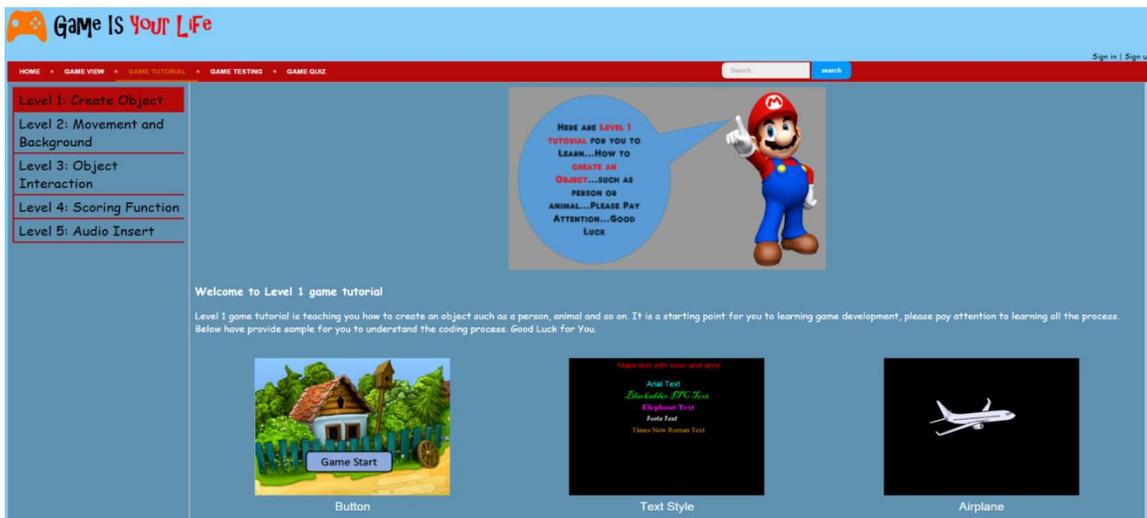
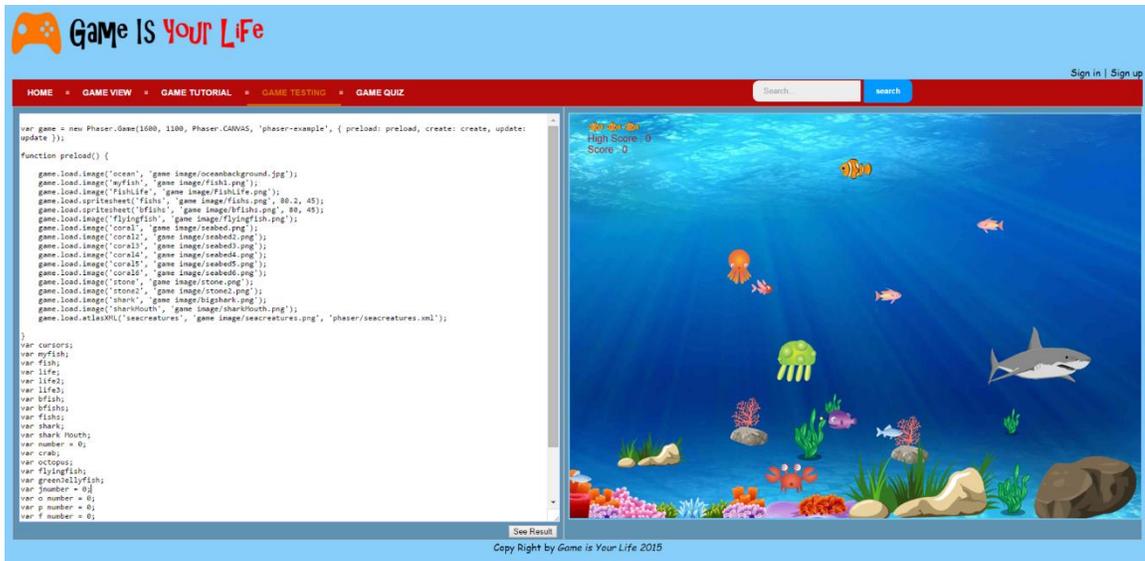


Figure 3-4-F2: Sample of Game Tutorial

Second is game tutorial, in game tutorial it will separate to five level teaching which is create an object, object with movement, condition detection, calculation function and

## Chapter 3 System Design

audio insert. In all level will provide sample for user and explanation, the purpose of this function is to teaching user step by step, this is most effectiveness way for user to learn faster.



**Figure 3-4-F3: Sample of Game Testing**

From game testing part, it will save the JavaScript code enter by user to JS File and detect the code then display the output for them. User also can download the JS File to their desktop and import their game to their own website.



**Figure 3-4-F4: Sample of Game Quiz**

Last is game quiz, the quiz will design 15 multiple choice question for each level. System will calculate the result for user and can post it to Facebook. This function is for user to know which level they need to be improvement and practice more.



### **Description of Use Case Diagram**

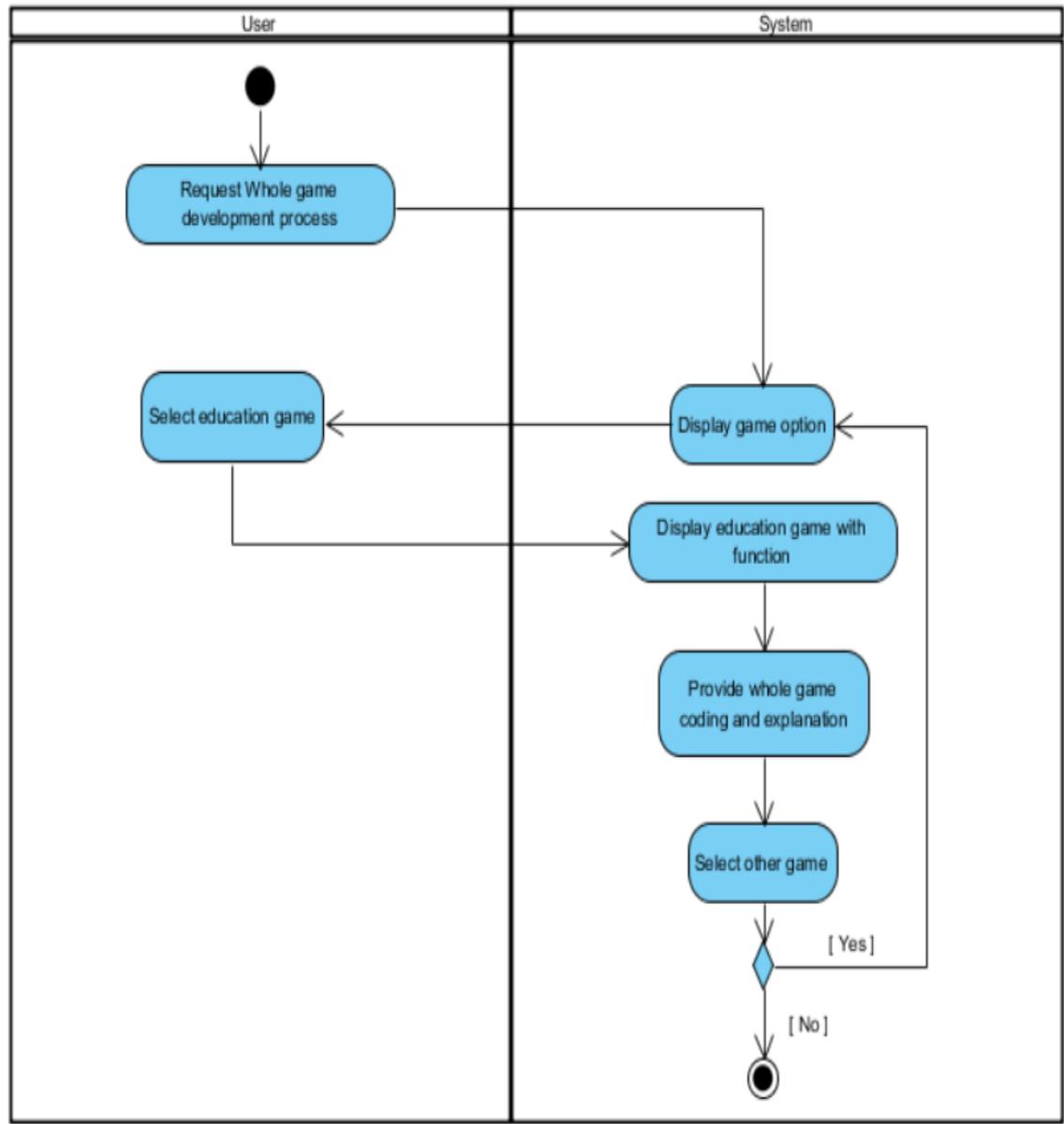
In the first of this system is need user to create an account, after user login to system only can perform the functionality. This system is separate to four main function, first is user need to request develop education game process by using JavaScript knowledge. Therefore, system will provide several sample of education game for user to learning and playing, provide game coding and explanation for user to know each code process.

Second, user will request game tutorial. During game tutorial it will separate to five different level to teach user step-by-step. System will generate code, animation, explanation and game for user to understand each process.

Besides that, user can request game testing, user are allow to create project online and download the file. User can enter the code in system and system will generate the code output display to user. This system also have provide database allow user to store their work.

Last is user can request game quiz, in this phase is meet user are request to take a quiz to know which level they need to improvement. System will provide game coding question to test each user knowledge and calculate the scoring for user. Also have provide the recommendation to let user know which part need to be improve.

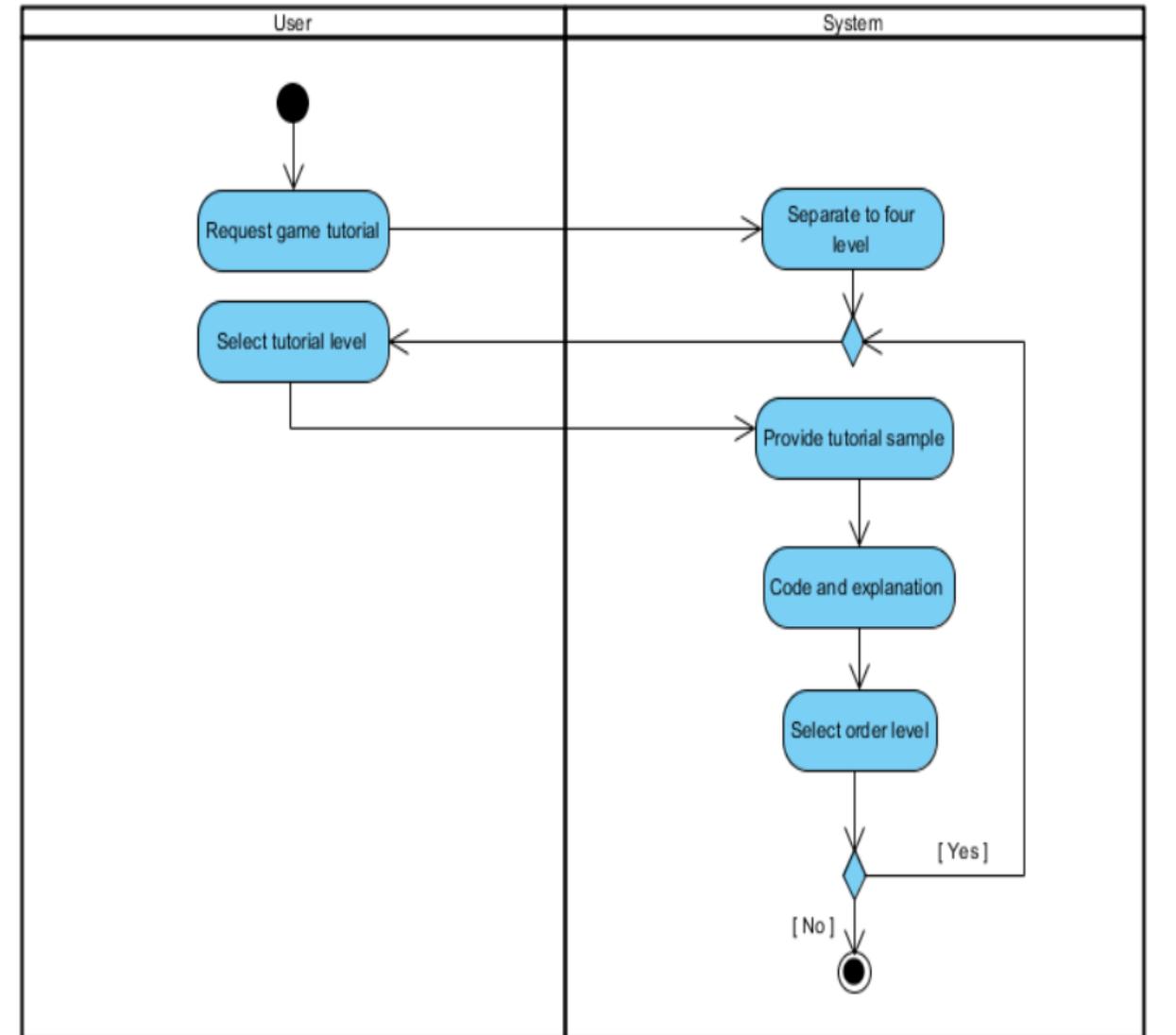
**3-6 Activity Diagram**



**Figure 3-6-F1: Activity Diagram for Game Option**

**Description of Activity Diagram**

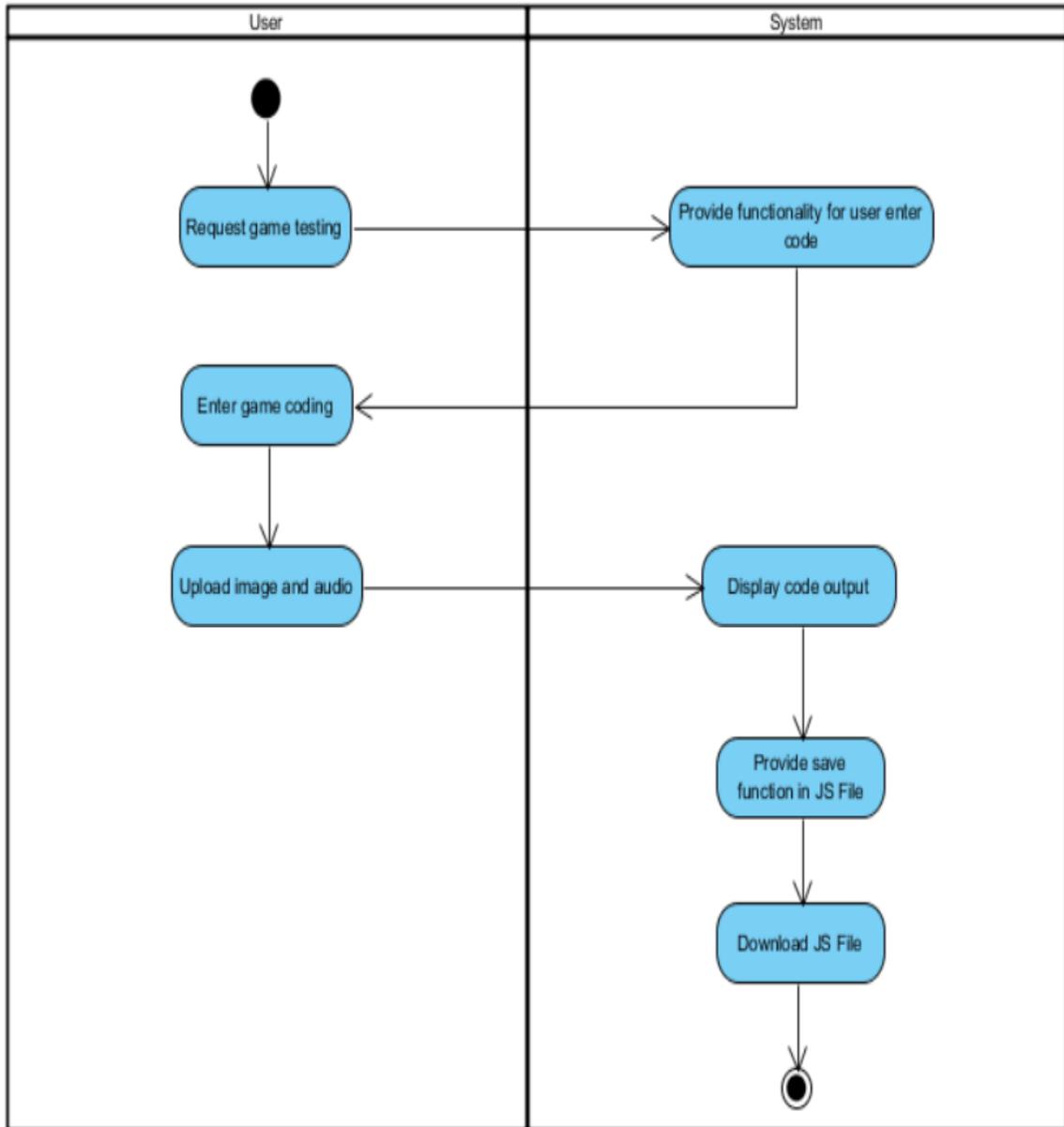
This activity is display game sample for user, user just need to choose the game that want to learn. User can try to play it and view the source code with explanation.



**Figure 3-6-F2: Activity Diagram for Game Tutorial**

**Description of Activity Diagram**

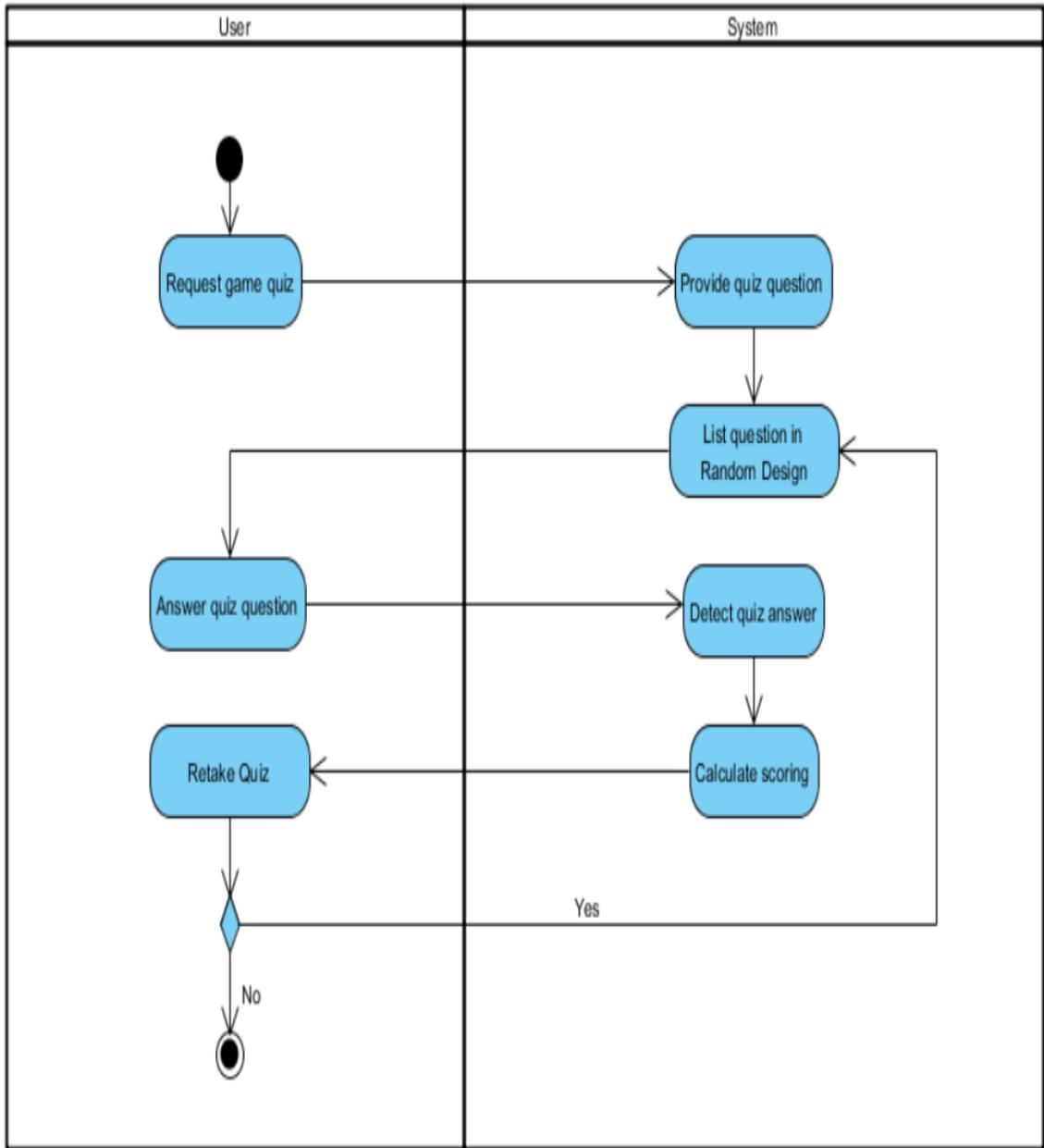
This activity is for user to learn create game, user can choose the level they want to learn and view the sample provide in web with source code and explanation.



**Figure 3-6-F3: Activity Diagram for Game Testing**

**Description of Activity Diagram**

This activity is for user to practice game development, user can enter the coding in the webpage, and system will display the output for them. User also can upload the asset (image or audio) they want to use in development game. When user upload the file, it will save the code in JS File and save asset to database, it also allow user download JS File and import to their own wed.

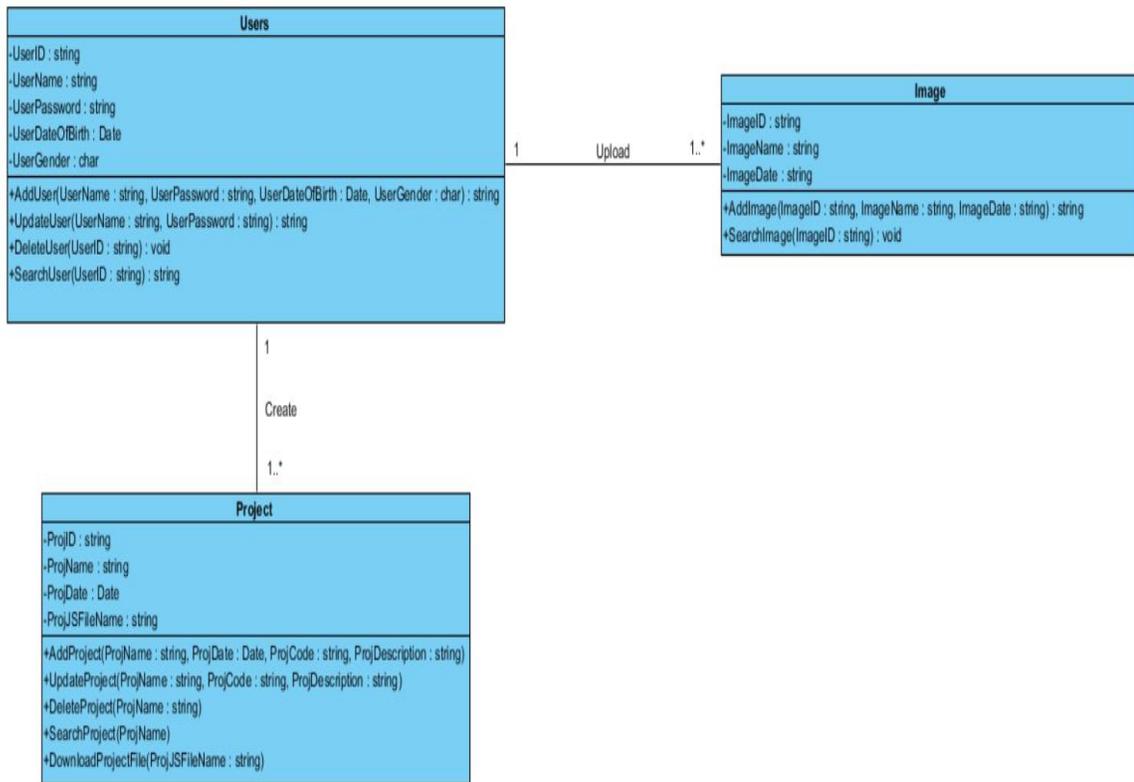


**Figure 3-6-F4: Activity Diagram for Game Quiz**

**Description of Activity Diagram**

This activity is for user to take game development quiz, user can know which level they need to improvement by answer all the question. System will add each level 20 question in web, and random list 15 question to test user. User just need to answer all question, system will detect answer and calculate the scoring.

**3-7 Class Diagram**



**Figure 3-7-F1: Class Diagram**

**Description of Class Diagram**

Due to this system is not store large data, therefore it only design three main class to store important information which is user, image and project information. User class is store the user information such as name, password, date of birth and other. Each user can create one or multiple project and all the information is save on database, and user can download the JS File form database, it will save the project id, project name and other. Furthermore, each user can upload image to database, this image is they need use in game development. The image will save image id, image name and image date.

### **3-8 Project Development Tools**

#### **HTML 5**

This project is using HTML 5 to develop a webpage it can be design the text in the webpage, create table and game animation. HTML 5 is a specific type of computer language call Hypertext Markup Language (HTML) use for structure of webpage. Normally, HTML 5 is enable to create content that render appropriately across the extraordinary range of device connect to the Internet

#### **CSS**

Besides that, the webpage is using CSS (**Cascading Style Sheets**) to set the specific design, such as set the text size and color in table. Cascading style sheets is use to set, format and design the layout of the website, it can use to set text style or size, table text and size, and other aspects of webpage. This project will use CSS to set the webpage layout such as text size, search box layout and etc.

#### **JAVASCRIPT**

In the end, webpage will add JavaScript to perform specific function on the webpage and game. JavaScript is a standard programming language normally use this programing language in web development for specific function. It was originally developed by Netscape. JavaScript object are collections of properties, which are like the members of classes in JAVA and C++. JavaScript is a tools can make the specific item to perform function such as make a search function. This project will use JavaScript to develop game and web search engine.

## **SQL**

Structured Query Language is a programming language that design to manage and store importance data use in web or other application to relational database management system (RDBMS). This project will use this language to store user information, game image and etc.

## **ASP.NET**

Asp.net is open source programming language for server-side web application framework, it is design for website development to make dynamic web pages. The type of language can develop website to administrator use, administrator can maintain, update or make change to website without change any source code.

## **C Sharp**

C Sharp is a multiple paradigm programming language that similar with C++ and Java language. This programming language is more simple language for develop program or preform other function compare to other language. In this project will use C Sharp to do back-end function such as save user enter code to JS File, connect with database and etc.

### **3-9 Software and Hardware Requirement**

**Software Requirement** - The software needed for developing this system is categorized into three part:

#### 1. Design and Development Tools

- Visual Paradigm Community Edition

It is a software that design the UML diagrams related to system, processes and idea. It is also a software that can reverse engineer the diagram from the programming code. Information can be conducted clearly, efficiently and concisely through the diagram constructed.

- Microsoft Visual Studio

It is an integrated development environment from Microsoft. It is use to create computer programs such as wed application and wed sites. In this project will use visual studio to develop web page and specific function.

- Phaser Game Engine

Phaser game engine is a software for develop game by using JavaScript or TypeScript. This game engine can create physics and mathematics education games, it also have provide a lot of tutorial and example for user to learn. It also is open source software that allow user to know each code process, added sound effect and provide free software for user can enjoy it. Therefore, this project will using this software create all the game.

#### 2. Operating System

- Microsoft Windows 7.0

This is an operating system developed by Microsoft which is used in system development. Microsoft Windows 7.0 contains new technologies and comfortable work environment that can help the users to develop the system efficiently and effectively. It also highly secures the user information which are

very important and can provide user support when there is any bugs and problems.

- Web browser

Web browser is a software application, this application can allow to presenting, traversing and retrieving information on the WWW (World Wide Web) such as Google Chrome, Opera, and so on. The information resource is identify by URL (Uniform Resource Identifier) such as web page, image, video and other.

### 3. Database Management System

- Microsoft SQL

Microsoft SQL is an object relational database management system, the database system is develop by Microsoft, the primary function of this system is to store and retrieve data. Other software application can connect with this database to store the important data needed and it may run in same computer or another computer across a network. In this project will use Microsoft SQL to store necessary information and JS file.

### 4. Web Server

- Google Drive

This project will use Google Drive to host the website. The source file will upload to google drive and sharing it to public, google drive will generate a new URL. When user paste the URL to web browser google drive will provide the connection with source file and display the web site. The benefits of use Google Drive is easy and faster build up and provide backup of source file.

## **Hardware Requirement**

- Intel Core i3 with CPU 3.0 GHz
- 2 GB RAM
- Internet access

## CHAPTER 4: DEVELOPMENT AND TESTING

### 4-1 Operation Manual and Methodology

#### 4-1-1 How to register and login



**Figure 4-1-F1: Register page**

This page is for user register to access the webpage, user need to enter the necessary information to the web. All the information will save to database.



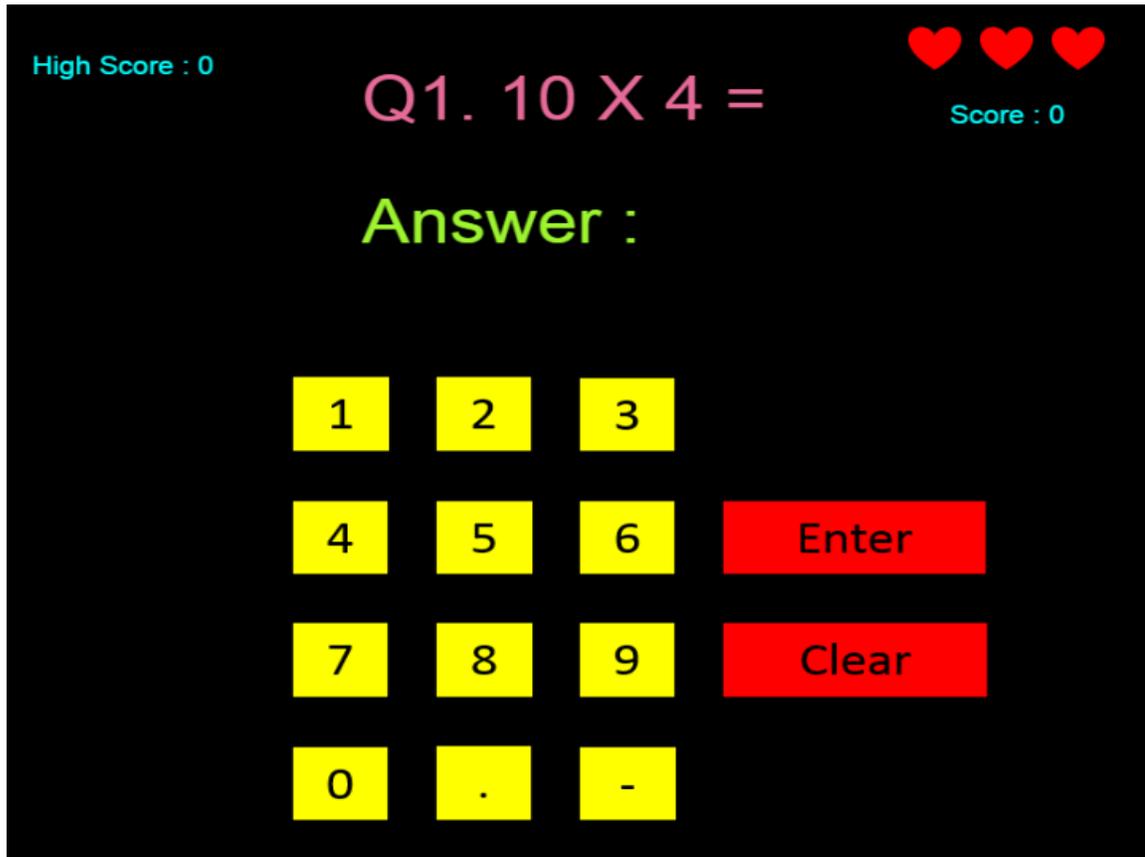
**Figure 4-1-F2: Login page**

After register successful, user can login to website, database will detect the user information.

#### Methodology

The login function is use SQL Server to build, it will save the user data inside to database table and detect it when user login.

### 4-1-2 Game design



**Figure 4-1-F3: Mathematics Game**

This game is design for user to play simple mathematics and teaching the user simple game design pattern. Due to target audience is target form kids, therefore the game design will not too complex. This game will use plus, minus, multiple and divide mothed to build the question and player will have three life to play. If player answer correct the question, score will add ten point, if wrong will kill a life. The game also will save the higher point for user to challenge.

#### Methodology

This game is using Phaser game engine to build, it is use Microsoft Power Point to design each necessary button and import to game. Using the plus, minus, multiple and divide mothed to set the question. Also write scoring function for calculate the score and save higher score. Lastly is connect Phaser, JS File of game development and website.



**Figure 4-1-F4: Underwater Game**

This game is design for kids to know undersea environment and how the fish survive. Due to kids is difficult to go undersea take a look, therefore this game can provide a simple knowledge for them understand about real life undersea environment and more safety compare to self diving.

#### Methodology

This game is using Phaser to set the game output, physical layout, function and animation, Microsoft Power Point to resize the image and search internet to find necessary image. Lastly is connect Phaser, JS File of game development and website.

## 4-1-3 Game Tutorial

### Level 1 Tutorial



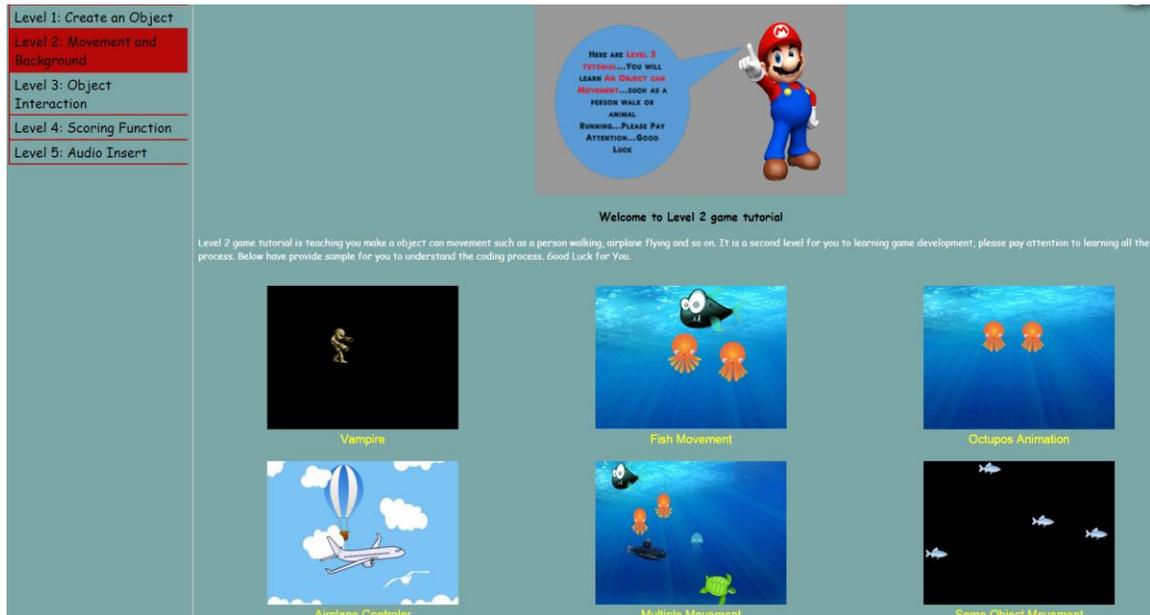
**Figure 4-1-F5: Level 1 Tutorial**

In level 1 tutorial will teaching user how to create an image, button or text inside game, this tutorial will provide the menu page sample, text output sample and load image to game sample. This three element is necessary tools for user to create game, every game is need button, text and image, and this is a starting stage for game development.

### Methodology

First is need to find out the image and animation needed and load the image to the game by using JavaScript, for example “game.load.image('background','game image/background1.jpg');” and call the image insert to background screen by using “var background = game.add.tileSprite(0, 0, 800, 600, 'background');”

## Level 2 Tutorial



**Figure 4-1-F6: Level 2 Tutorial**

In level 2 tutorial will teaching user how to make the object can movement and inside background. It will provide several sample for user to understand the process and teaching different type of code to make object movement.

### Methodology

All movement of the object is write in JavaScript code, if the image is animation image user can use “fish.animations.play('swim', 30, true);” to make the image can movement, and can set the object from one position to another position, for example “game.add.tween(fish).to({ y: 300 }, 2000, Phaser.Easing.Quadratic.InOut, true, 0, 1000, true);”.

## Level 3 Tutorial

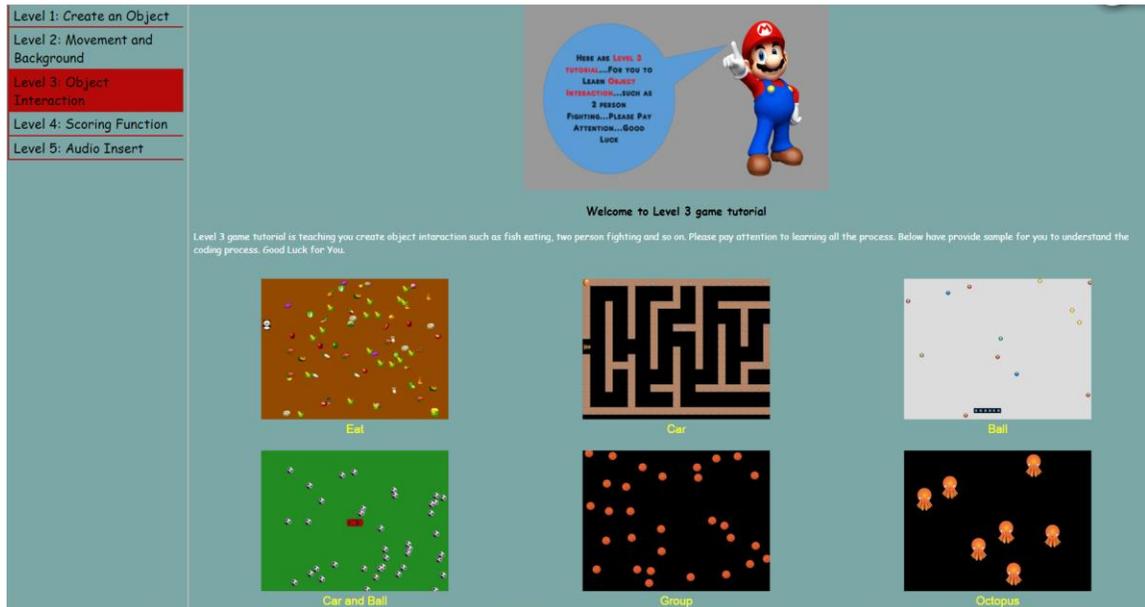


Figure 4-1-F7: Level 3 Tutorial

In tutorial 3 will teaching the object interaction, during this stage it have provide six sample for users to know how to set the object become physical and set the effect when two physical object interaction.

### Methodology

The object interaction is use Phaser set the object become physical, for example “fish.physicsBodyType = Phaser.Physics.ARCADE”. After set the object to physical, can write a function of effect when two object touching. For example,

```
function collisionHandler2 (myfish, flyingfish){  
    flyingfish.kill();  
    score += 20;  
    scoreText.text = scoreString + score;  
}
```

Figure 4-1-F8: Code use in Tutorial 3

## Level 4 Tutorial



**Figure 4-1-F9: Level 4 Tutorial**

In tutorial 4 is teaching user to writing a calculation function, this calculation function can be use in scoring, create question in mathematics, calculation object in game and etc. This function is necessary for each game, because all type of game is need to provide a scoring for player.

## Methodology

All the game calculation function code by JavaScript, first is need to set the variable to become number “var score = 0;” and make calculation in the function call. For example,

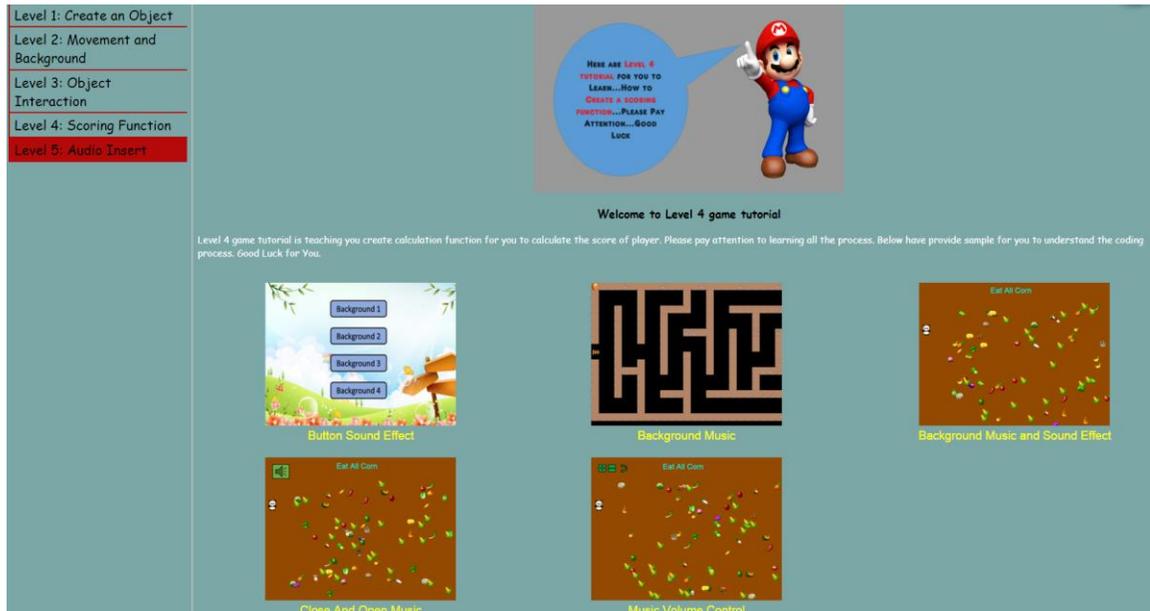
```
function collisionHandler (player, chilli) {

    // If the player collides with a chilli it gets eaten :)
    chilli.kill();
    score++;
    scoreText.text = scoreString + score;
    sound.play();

}
```

**Figure 4-1-F10: Code use in Tutorial 4**

## Level 5 Tutorial



**Figure 4-1-F11: Level 5 Tutorial**

In last tutorial is teaching how to inside a music or sound effect inside the game. It also provide sample for user to know how can close or open the music when user need, and can control the volume increasing or decreasing.

### Methodology

First is need to find out the sound effect and background music needed and load the audio to the game. For example,

```
game.load.audio('background', 'audio/background2.mp3');  
  
backgroundMusic= game.add.audio('background');  
backgroundMusic.play();
```

**Figure 4-1-F12: Code use in Tutorial 5**

## 4-1-4 Game Testing

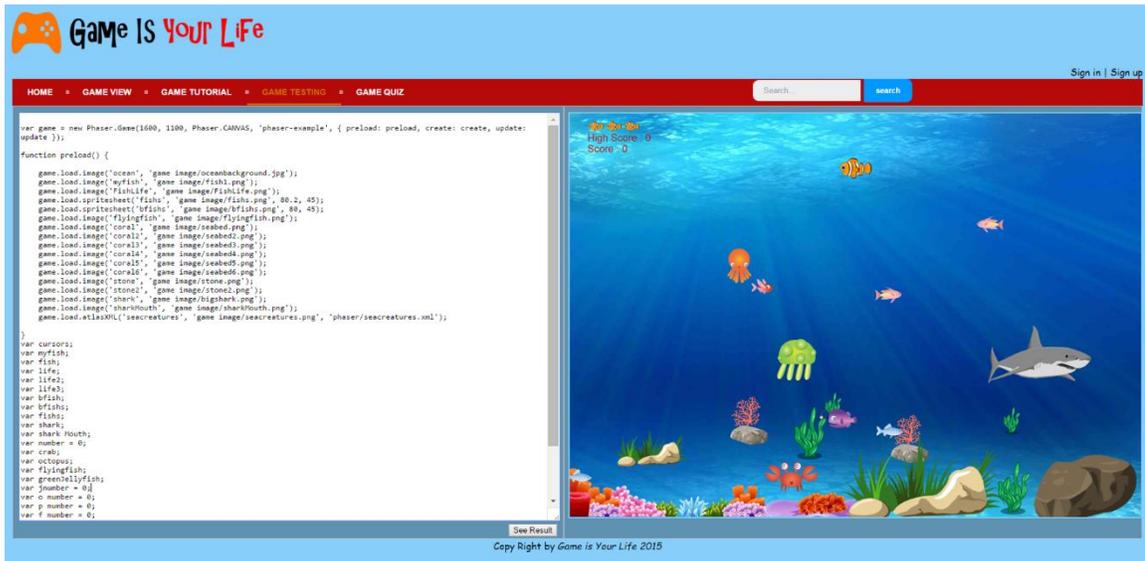


Figure 4-1-F13: Game Testing

This function is design for users to trying develop game online, users can enter the JavaScript code to website and system will detect the code and display the output. User also can update the image and audio they want to web and insert to game screen. When user upload, system will detect whether is mp3 file or image file, If not will upload fail.

### Methodology

This function is use “TextBox” and “Button” to design, users allow to enter code in “TextBox” and click the “Save Button” to save the code inside JS File. Therefore, the “Save Button” have write backend code to retrieved “TextBox” text and save it to JS File. The save file is need to import “System.IO” and use “StreamReader” to read the text inside the file and use “StreamWriter” to write the “TextBox” text to JS File. The backend code also will detect the text user enter, it will detect and checking each word and symbol, if got any error will display a “MessageBox” to tell user.

### 4-1-5 Game Quiz



**Figure 4-1-F14: Game Testing**

The purpose of this page is design for user to take each level quiz for them to know which level need to improvement. The quiz will design 15 multiple choice question for each level. System will calculate the result for user and can post it to Facebook.

#### Methodology

Set each level 20 question in Microsoft word. After that, insert all the question to website, make the random question adjustment.

**4-2 Testing**

Function	Input or Event	Expected Output	Actual Output	Comments
Login	Set and login password use number and alphabet	Login success	Login success	Pass
	Set and login password use symbol such as "%", "#", and "!"	Login success	Login success	Pass, but not a good way to input symbols.
Website connection with game	Insert the JS File to asp page	Display game output in website	Display game output in website	Pass
Mathematics Game	Insert button image and sound effect	Display all the element and sound effect	Display all the element and sound effect	Pass
	Insert answer to game	Detect answer and correct	All correct but divide question need insert two decimal point such as 2 need insert 2.00	Pass, but divide question will made users confuse.
Underwater Game	Insert the calculation function for detect the score for player	Display current scoring point and higher score	Display current scoring point and higher score	Pass
Tutorial Sample	Connection all the tutorial to website and each tutorial sample run correctly	Display all sample and can function	Display all sample and can function	Pass

**Table 4-2-T1: Software Testing Part 1**

Function	Input or Event	Expected Output	Actual Output	Comments
Game Testing	Enter the code to text box and save it to JS file	Save the code enter to JS file	Save the code enter to JS file	Pass
	Catch the code enter error	Display error message to user	Display error message to user	Pass, but not all the error can be catch.
	Allow user to upload image and audio	Save the image to game image file and audio to audio file	Save the image to game image file and audio to audio file	Pass, but user cannot delete the image or audio after they upload it.
	Catch upload file is right or not	If audio and image file can upload. If not display error message for user.	If audio and image file can upload. If not display error message for user.	Pass.
Game Quiz	Detect the user answer and make a scoring	Detect answer and calculate the scoring for quiz	Detect answer and calculate the scoring for quiz	Pass

**Table 4-2-T2: Software Testing Part 2**

## CHAPTER 5 CONCLUSION

### **5-1 Conclusion**

In conclusion, this project will be using four type of technology language to develop all the functionality which is ASP.Net, HTML5, JavaScript, Cascading Style Sheets and Structured Query Language. Using several software to develop this system such as game engine, visual studio and other. It also will analysis and careful design the interface due to target audience is kids and will explain all the teaching process clearly for kids can easy to understand. This system is not only share with users how to use JavaScript create education game but also share about real life experience purpose.

The novelties of this project is teaching the game development in step by step. It have teach the start of the game until last, for example the menu page until the game end, users just need to follow the teaching given, they can success build the simple game. Besides that, it also provide the whole game sample with code for kids to know whole game process, it is because need users to know the simple design pattern of game, the necessary tools needed and the calculation function. Lastly, is allow users to download source file for them to import to their own website and share to friends. Other website is no provide this few novelties, this is more effective way for user to learn.

### **5-2 Objective Achieved and Problem Solved**

1. Most of the system is design for adult to access, the explanation is difficult for kids to understand, lack of user friendly interface for them. Therefore, this project is design a users' friendly interface webpage to help kids simple to access the website and learning.
2. Improve teaching method to provide enough tutorial and explanation for using to learn and understand compare to other website. Teaching them in step by step for them easy and effective to learn.
3. Focus on education game, not same with other website only teaching the basic animation for user to learn.
4. Provide each level quiz for user to testing their knowledge, users can based on the quiz result to know which level need to improve.
5. Allow user to download the game source of their developed online. Not same with other website that just can enjoy create game online but can't download it and can't share with friends or import to their own website.

### **5-3 Limitation and Problem Faced**

This project have several limitation and problem cannot be done:

- The checking code error function is not done, a lot of mistake cannot be catch such as “game.load.image” when “game.loadimage” missing “.”.
- The Json file cannot be found when using visual studio 2013 debug, but use brackets software can debug.
- The mathematics game divide question need users to enter two decimal point, if not it will calculate wrong answer.
- The quiz question is limited, each level just have prepare 20 question to choose 15 question for user to test. The user will face get the same question when they take second time quiz in same level.
- The game display cannot set the position in the web, this will influence the view and design of website.
- Code explanation is not so efficiency for user to understand.

### **5-4 Knowledge Gained**

Thought build his project, I have gained several qualified knowledge:

- Learnt how to design pattern of website.
- Learnt how to create game in web by using Phaser.
- Learnt how to connection website, database and game engine.
- Learnt more JavaScript platform to develop game.
- Learnt how to teaching kids for develop game step by step.

### **5-5 Future Enhancement**

This project have several weaknesses can be upgrade further for future use:

- Website can change it to administrator use, build to server-side can add game, quiz, and tutorial by just upload to website no need to change source code.
- Improve the code error checking function for user to know which part is mistake and provide the direction.
- Allow user to upload the game they build in to website, for every user to enjoy and make improvement.
- Add the code enter in text box can detect the code of users enter, such as when user enter “g”, system display all the possible option word to guide user and make the code text have different color, for them to easy view and make change.
- Improve code explanation for user can easy to learn and understand.

## Reference

### References

Anon., 1999. *W3schools*. [Online]

Available at: <http://www.w3schools.com/angular/default.asp>

Anon., 2012. *Flash vs. HTML5 analysis*. [Online]

Available at: <http://www.sbp-romania.com/Articles/flash-vs-html5-analysis.aspx>

Anon., 2014. *WilliamMalone*. [Online]

Available at: <http://www.williammalone.com/articles/>

Anon., n.d. *ARTICLES OF WILLIAM MALONE*. [Online]

Available at: <http://www.williammalone.com/articles/>

Anon., n.d. *Code 9leap*. [Online]

Available at: <http://code.9leap.net/>

Anon., n.d. *Code 9leap*. [Online]

Available at: <http://code.9leap.net/>

Anon., n.d. *Crafty JS*. [Online]

Available at: <http://craftyjs.com/>

Anon., n.d. *Flash vs. HTML5 analysis*. [Online]

Available at: <http://www.sbp-romania.com/Articles/flash-vs-html5-analysis.aspx>

Anon., n.d. *Game Dev Academy*. [Online]

Available at: <http://www.gamedevacademy.org/create-a-mobile-educational-game-with-html5/>

Anon., n.d. *HTML 5*. [Online]

Available at: <http://www.rivellomultimediaconsulting.com/pros-and-cons-of-html5-for-gaming/>

Anon., n.d. *Prons and Cons of HTML5 for Gaming*. [Online]

Available at: <http://www.rivellomultimediaconsulting.com/pros-and-cons-of-html5-for-gaming/>

Anon., n.d. *W3school*. [Online]

Available at: <http://www.w3schools.com/angular/default.asp>

Emaze, 2013. *THE BENEFITS OF HTML5 VS. ADOBE FLASH*. [Online]

Available at: <http://www.emaze.com/blog/html5-vs-flash/>

Glickman, D., 2013. *The Benefits of HTML5 vs. Adobe Flash*. [Online]

Available at: <https://www.emaze.com/blog/html5-vs-flash/>

Griffiths, M., 2002. The Educational Benefits of Videogames. *Education and Health*, Volume 20, pp. 47 - 51.

Isabela Granic, Adam Lobel, & Rutger C. M. E. Engels, 2014. The Benefits of Playing Video Games. *American Psychologist*, Volume 69, pp. 66-78.

## Reference

Maria Virvou, George Katsionis & Konstantinos Manos , 2005. Combining Software Games with Education: Evaluation of its Educational. *Educational Effectiveness. Educational Technology & Society*, pp. 54-65.

Park, H., 2012. Relationship between Motivation and Student's Activity on. *International Journal of Grid and Distributed Computing*, Volume 5, pp. 101-114.

Zenva, 2013. *GameDevAcademy*. [Online]

Available at: <http://www.gamedevacademy.org/create-a-mobile-educational-game-with-html5/>