CHAPTER I

INTRODUCTION

In today's technology-saturated world, the internet becomes an increasingly important feature of the learning educations and environment for teenagers and children. Good education must be an education that will not make children feel bored. Therefore, it should be an interesting thing to learn. The developers realize that educational media or teaching materials should go together with funny activities or games. Because the games can excite children's minds and give children repeated practice, as they enjoy playing the same games over and over. If these go together between educational media and games it would improve children in basic mathematic skill very well.

The Design and development of learning mathematic application for kids is an educational media that allow children to learn in basic math and playing a game to practice from what they had learned. And this application called Kids Math Challenge. Kids Math Challenge is an application that allow children to learn basic math such as counting numbers and operators learning that involving with addition, subtraction, greater than, less than and equal. And this application allow children to play practice in interesting exercises or games as well. This application will give children challenges in play practice by playing game in limit time. There are 15 level included of game practice for kids in this application. It will start from easy to hard and children will get the stars as a game reward in each level. This Kids Math Challenge application can educate children very well and give them a new experience in learning basic math.

The technological advances are contributing to the ability for reaching all learning sources everywhere, anytime, anywhere, and every situation. Therefore, we can say that technology is essential in everyday life. It’s producing the development of various applications on all 3 operating systems such as Android, iOs, and Windows mobile operating systems. An

application is to allow users to download and use it in everyday life. And the development of the Android system will be very popular. The user can be seen by downloading applications on GooglePlay Store there are as many as 2,678,137 applications. (AppBrain, 2560)

At present time, mobile phones or most people known as smartphones have been developed to be more modern, flexible and able to access the internet wirelessly in both wifi, 3G and 4G. From the survey of the Digital Advertising Association (Thailand) or DAAT together with the website, MarketingOOps.com explored the internet behavior of Thai people. It was found that the Thai population is 68.1 million people. There are 38 million internet users of this amount, and 10.8 million numbers are used in the 4G network (Digital Advertising Association, 2017).

From the foregoing above and the advancement of technology, the developers see the importance of learning education for children by using technology for more convenient and more interesting. Because they can learn by hearing the sound of educational media and see the movement of animation in this application together and also have really funny games for brain improving. Developers decided to develop an application based on Mathematics as the name is Kids Math Challenge in the Android Operating System. This application Includes with two educational media are number learning 0-9 or learn to count, and basic operator learning consist of addition, subtraction, less than, equal, and greater than. This application also includes with many levels of games to improve more their basic mathematical skill in what they had learned from this application before.

Games give students opportunities to explore fundamental number concepts, such as the counting sequence, one-to-one correspondence, and computation strategies. Playing games encourages strategic mathematical thinking as students find different strategies for solving problems and deepen their understanding of numbers.(Rutherford, 2015) Finally, the word of Rutherford indicates that Games are an important tool for learning mathematic and improve children’s in mathematical skill as well. Because it gives repeated practice, as they enjoy playing the same games over and over.

1.1 PROBLEM STATEMENT

Learning basic mathematics is very important for children because it can apply to use in everyday life. Children need to know the basic mathematics such as numbers, numbers comparing, how to count the numbers, and how to calculate the numbers. Even mathematics is very important, some children still ignoring because of hard, complicated, and not as interesting as other subjects. There are many educational media and mathematics games that can download from Play Store for children. But they almost separated. Children can learn mathematics from educational media but there is no exercise for children to practice what they had learned. Because of these problems, the developers realize that we need to combine together the interesting educational media, and funny activities or games for children improvement. From this application would makes children learn about basic math and practice then they can improve basic mathematics skill very well. In conclusion, the game can make children practice over and over from what they had learned from the teaching materials or educational media.

Having Kids Math Challenge application is very helpful for children because it combined together between educational media and games as interesting exercises. In this application children can learn basic mathematics from the beginning such as counting the numbers, basic operator for numbers comparing, and basic calculation. And finally, they can do exercise one's mind from playing games and improve in mathematical skill as well.

1.2 PROJECT OBJECTIVES

The objective of this project is to develop an application to be an educational media and games to improve children skill in basic mathematics such as counting number 0-9, operator learning includes with addition, subtraction, greater than, less than, and equal.

1.3 SCOPE

1. Valid only as the Android platform.

2. This application specifically only in the English Language

3. This application created for kids only.

4. This Kids Math Challenge application is for Educational media and basic mathematic games only.

1.4 SIGNIFICANT OF STUDY

Developer:

• To learn and increase more knowledge about design and coding.

• To practice working in a group and planning the system on the time table.

• To learn about the process and how to develop android game applications via unity program.

User:

• To help users (children) to learn in basic math of counting number 1 to 10, numbers comparing, and learn to count, and basic math calculation.

• Allowing users to use this application for improving mathematical skills.

• Users can be used this application in everyday life as a math materials teaching.

1.5 SOFTWARE AND HARDWARE REQUIREMENT

The software and hardware requirements used in project

SOFTWARE

The software requirements used in this project are

- Adobe Photoshop CS6 : for design the user interface and actor.
- Adobe Illustrator
- Unity: for setting motion

HARDWARE

The hardware requirements used in this project are:

- Processor: Intel(R) Core(TM) i7-4510U CPU @ 2.00 GHz
- Random Access Memory (RAM): 8.00 GB
- Hard Disk: 500 GB
- Keyboard
- USB Mouse

SUMMARY

This chapter has explained the reason why the developer develops this application, the objective, and the scope of application. The hardware and software to using and significant of developing the Kids Math Challenge application.

1.5 ORGANIZATION REPORT

The organization report consists of 5 chapters following:

Chapter 1 Introduction: This chapter discussed the overview, Problem statement, Project objective, Project scope and Project significant.

Chapter 2 Literature review: This chapter discussed the various theories and overview of existing work related to being a guideline in developing this project and tools. And order to provide benefits and guidelines for developing the household investment application.

Chapter 3 Methodology: Methodology explains the procedure of developing and achieves this project. It explains and describes in step by step of each phase of Addie Methodology: Analysis, Design, Development, Implementation, and Evaluation.

Chapter 4 Implementation: The implementation discussed and processed of progressing and testing the application. It will show the main user interface of this application and explain the important point of this project.

Chapter 5 Conclusion: This chapter includes the results of the project, described how this application could be, references and appendix.

CHAPTER II

LITERATURE REVIEW

This chapter describes the various theories and overview of existing work related to being a guideline in developing this project. In order to provide benefits and guidelines for developing the Kids Math Challenge game application.

1.1 DEFINITION

Application

In terms of the word an application also called application program or application software. An application is a computer software package that performs a specific function directly for an end user or, in some cases, for another application. Examples of applications include word processors, database programs, web browsers, development tools, image editors and communication platforms. Applications use the computer's operating system and other supporting programs, typically system software, to function. An application requests services from and communicates with other technologies via an application programming interface (API).(Alex Gillis and Don Rose,2018)

Mobile application

Mobile applications (also known as mobile apps) are software programs developed for mobile devices such as smartphones and tablets. They turn mobile devices into miniature powerhouses of function and fun. Some devices come preloaded with some mobile apps courtesy of their manufacturers or the mobile service providers with which they're associated (for example, Verizon, AT&T, T-Mobile, etc.), but many more apps are available through device-specific app stores.

Mathematics

Mathematics is the science that deals with the logic of shape, quantity and arrangement. Math is all around us, in everything we do. It is the building block for everything in our daily lives, including mobile devices, architecture (ancient and modern), art, money, engineering, and even sports.

Since the beginning of recorded history, mathematics discovery has been at the forefront of every civilized society, and in use in even the most primitive of cultures. The needs of math arose based on the wants of society. The more complex a society, the more complex the mathematical needs. Primitive tribes needed little more than the ability to count, but also relied on math to calculate the position of the sun and the physics of hunting. (Elaine J, 2013)

Mathematical game

A mathematical game is a game whose rules, strategies, and outcomes are defined by clear mathematical parameters. Often, such games have simple rules and match procedures, such as Tic-tac-toe and Dots and Boxes. Generally, mathematical games need not be conceptually intricate to involve deeper computational underpinnings. For example, even though the rules of Mancala are relatively basic, the game can be rigorously analyzed through the lens of combinatorial game theory.

Mathematical games differ sharply from mathematical puzzles in that mathematical puzzles require specific mathematical expertise to complete, whereas mathematical games do not require a deep knowledge of mathematics to play. Often, the arithmetic core of mathematical games is not readily apparent to players untrained to note the statistical or mathematical aspects.
Some mathematical games are of deep interest in the field of recreational mathematics.

When studying a game's core mathematics, arithmetic theory is generally of higher utility than actively playing or observing the game itself. To analyze a game numerically, it is particularly useful to study the rules of the game insofar as they can yield equations or relevant

formulas. This is frequently done to determine winning strategies or to distinguish if the game has a solution.(2013)

Game

A game is a structured form of play, usually undertaken for enjoyment and sometimes used as an educational tool. Games are distinct from work, which is usually carried out for remuneration, and from art, which is more often an expression of aesthetic or ideological elements. However, the distinction is not clear-cut, and many games are also considered to be work (such as professional players of spectator sports or games) or art (such as jigsaw puzzles or games involving an artistic layout such as Mahjong, solitaire, or some video games).

Games are sometimes played purely for entertainment, sometimes for achievement or reward as well. They can be played alone, in teams, or online; by amateurs or by professionals. The players may have an audience of non-players, such as when people are entertained by watching a chess championship. On the other hand, players in a game may constitute their own audience as they take their turn to play. Often, part of the entertainment for children playing a game is deciding who is parts of their audience and who is a player.

Key components of games are goals, rules, challenge, and interaction. Games generally involve mental or physical stimulation, and often both. Many games help develop practical skills, serve as a form of exercise, or otherwise perform an educational, situational, or psychological role.

Attested as early as 2600 BC, games are a universal part of human experience and present in all cultures. The Royal Game of Ur, Senet, and Mancala are some of the oldest known games.

Type of games

In 2019, according to John Spacey, **"**Games are a structured form of play. These can include goals, rules, art, environments, stories, challenges, characters, items, powers, reward, exploration and interaction players. The following are common types of game.

- Alternate Reality Game: games that take place in both the real world and within digital tools with a narrative that is driven by participant responses.

- Video Game: any game that includes a digital user interface as primary element including 2D, 3D and virtual reality interfaces.

- Augmented Reality: games that take place in the real world with overlaid sensory information. For example, a game that injects fictional characters into the real world and possibly subtracts things that exist from the player's view.

- Virtual Reality: a fully digital game that offers an immersive sensory experience that feels close to real.

- Pervasive Game: any video game that includes that real world elements such as augmented reality or alternative reality games.

- Role Playing Game: a game where you play the role of characters to develop a narrative. These include both tabletop and video games. Role playing games have a rich history and culture. For example, the culture of choosing a game master who acts as a game organizer, arbitrator and moderator for a game.

- Simulation: games that simulate real world activities such as life, sports, piloting vehicles, activities or development of thing ranging from civilizations to farms.

- Strategy: games that require strategic thinking and education to win.

- Real time Strategy: strategy based video games that allow players to move at any time such that speedy thinking is rewarded.

- Turn Base Strategy: strategy games that are based on turns such that the quality of your strategy is more essential element that time.

- Tactics: games that are focused on the immediate situation in a game as opposed to strategy that require long-term thinking. As with strategy, tactical video games can be either real time or turn-based.

- Adventure: a game of exploration whereby players assume the role of a protagonist in a narrative. Adventure games often have challenges based on puzzles, strategy or action sequences.

- Action: video games that constantly challenge a player's hand-eye coordination, reaction-time and spatial reasoning at speed. For example, games that feature combat, obstacle courses or sports simulations.

- Puzzles: puzzles that challenge mental abilities in areas such as spatial reasoning, logic and knowledge.

- Mystery: the solving of mysteries given clues.

- Interactive Fiction: storytelling that allows participants to change the course of the narrative. This can include books, media and films that allow the audience to participate. Interactive fiction can also occur in the context of a game world such as an adventure game with a player influenced narrative.

- Game of Chance: game where the outcome is mostly or completely the result of random chance such as the throw of die.

- Game of Skill: any game where a player's performance improves with time due the cultivation of skills, knowledge and talents.

- Physical Game: game that includes a physical activity such as dancing that is scored.

- Casual Game: a video game that is easy to learn and play such that it has mass appeal. There are able to attract people who don't normally play video games.

- Incremental Game: a game that features repetitive tasks known as grinding that gives players frequent rewards that may stimulate positive feelings.

- Idle Game: some incremental games require such minimal user interaction that they continue playing if the user does nothing at all. In other words, the user need do nothing but launch the game to rack up points and other rewards.

- Mod: a Mod is a game that has been altered by players or other third parties. These vary from cosmetic changes to complete overhauls of a game. Mods may be encouraged by game developers as they can improve a game and create a culture of participation in the game's design.

- Board Games: games based on a 2D physical playing surface.

- Card Game: any games based on playing cards such as poker.

- Collectible Card Games: card sold in randomized packs that represent game elements such as creatures, spells and tools, These are typically strategy games whereby each card has unique powers, abilities and artwork.

- Tabletop Game: any game that is typically played at a table including board games, card games, dice games and paper-based games.

- Educational Game: game designed for learning including elements such as memorization through repetition, experiences in a virtual world, designing things, experimentation and social interaction.

- Serious Game: a game that is used to produce real world result in areas such as training business processes, market research and decision making.

- Gasification: the practice of incorporating game elements into non-game applications. For example, a business tool that continually provides feedback, point and rewards to keep employees engaged and to encourage them to optimize their work.

- Art Game: the use of video game technique to create interactive art and media.

- Social Game: any game that people meet to play or that allows people to communicate in a virtual setting.

- Party Game: board games, video games and other game formats such as conversation games that are designed to be played at a social gathering. This includes a variety of sub-categories such as family games, children's games and icebreakers that may be used at meetings and events.

- Conversation Game: a game that is played verbally without any equipment or physical elements whatsoever often used to kill time when waiting for something.

- Zero-Sum: a game with fixed rewards with a competition between players or AI to outdo each other. This includes games that are win-lose with no possibility of multiple players walking away as the winner.

- Lose-Lose: a game with no reward with a competition to minimize losses.

- Win-Win: a game where rewards with can be increased. Often games have no cap on the points or number of rewards that can be collected."

Color for kids

Currently, the medical community is agreeing that color affects to human mind and makes them feel various. Colorful around us have a great influence on our lives. Such as the clear blue sky is make a people feel refresh, Solid gray of a sky may makes depressed and sunlight makes cheerful. When body or mentally have the disorder. Color can be brought back to normal. Therefore, contributes to the "color therapy" in medical circles.

Nature has many colors. The power of color has effect to people mood, feeling and decision. The use of color therapy is not limited to specific patients. But everyone can use color to their advantage, such as help in growth and development of children.

Psychological studies - first conducted by advertising firms - suggest that color selection can influence mood and behavior, stimulate the brain and body and even affect one's health. There are two types of color as following bellow:-

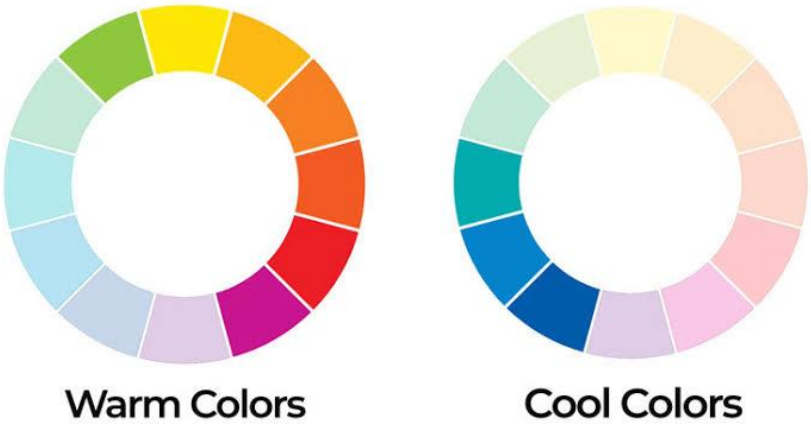


Figure: 2.2 colors for kid

1. Warm Colors

In general, warm colors elicit happiness and comfort, creating intimacy by making large, open spaces feel a little cozier. Bold shades of red, orange and yellow can stimulate the mind and have an energizing effect on the body- beneficial for growth and development, but less than advantageous during the nightly bedtime showdown with your average, overly energetic toddler.

Thus, warm colors are best used in moderation. Instead of painting an entire room a bold red or bright yellow, paint a single accent wall and tie in a few matching accessories. You might also consider pairing warm colors with cooler shades to create a sense of balance and temper any negative effects.

2. Cool Colors

Cool colors have a calming effect on the body and can make your child's room feel spacious and relaxing - Think open skies and rolling waves. However, dark, cool colors can evoke all the doom and gloom of an impending storm and should be used in moderation.

Despite their soothing nature, cool colors are not particularly inviting and can leave people feeling cold and reserved if the atmosphere is too stark. Too soften the effect, pair with creamy neutrals and dress with soft fabrics and comfortable accessories.

2.2 RELATED WORK

DEVELOPMENT OF BASIC MATHEMATICS SKILLS OF CHILHOOD CHILDREN AT PONG NAN WITTAYA SCHOOL USING EDUCATIONAL GAME

According to Sumari Chaiprasop (2016) gave the information of doing researched to study the development of basic mathematics skills of early childhood by using educational games at Pong Nam Ron Wittaya School, Wiang Pa Pao Chiang Rai Province, was studying the boy and girls aged 4 – 5 years who have studies in the 2nd semester of 2014 in the Kindergarten section.

This research was conducted to develop the basic mathematics skills of early childhood students by using an educational games and to study the activity results. The result found that after using educational games with early childhood in Pong Nam Ron Wittaya School. The overall development of basic mathematics skills was the right than predictable criteria was 75 percent. By the way before teachers started to play the games, the children score was only 5.37, and after they have done the educational games, their average scores was 9.00 from the progression was 3.27 which equal to the 32.75 of progression point that means the score was higher than the criteria that was only 25, Moreover, the observation of early childhood behavior during playing the educational games was found that were interested, enthusiastic, pay attention to the class and did whatever teachers ordered. Most of them asked about how to play the educational games, an educational media and also commented to their group and others. Educational games are activities that help children practice skills and growth the ideas about what they are learning. The educational game is also helps children to practice in problem solving, rationalization Observation, comparison and classification. Which is a basic mathematical skill as well. Educational games are activities that encourage of children education learning. And as well as help children develop and practice skills in various fields. Especially the basic mathematical skills which are an important element and foundation of the intellectual development process.(Wanni Wadjanasawad, 2009)

According to Pitchinee Chotiwong, 2011 said that educational games refers to gaming activities that help growth children's thinking skills and learning preparation to encourage the intellectual development and responding to the needs of learners. From these all of information mentioned above can conclude that the educational games are very helpful for children because it can help children to be observant and have better thinking. Playing game also help children have the ability in comparing, sorting, group classifying, counting and know about the value of numbers 0-9 which is a basic mathematical skill for children's development.

Thus, developers absolutely agreed to develop "the Design and development of learning mathematic application for kids" call Kids math challenge, that included with teaching materials as number counting, comparing numbers, calculating and have funny game to practice from what they had learned from our application. Having this application helps children understand in math faster and clearer, because they can learn themselves by using smart phone or tablet. This teaching material would be a media education learning where children can learn in anywhere and any places the world.

CANOE PUPPIES

Figure: 2.3 Canoe puppies game

Canoe Puppies is a multiplayer math game that allows students from anywhere in the world to race against each other while practicing adding two-digit numbers.

While Kids Math Challenge allow player to learn basic of mathematics such as counting numbers, learn how to count numbers, numbers comparing and allow player to practice what they had learned by playing funny games. There are many level of Kids Math Challenge game. Player will play the game from easy to hard and get stars as a reward of winning game in each level.

UNDERWATER COUNTING GAME

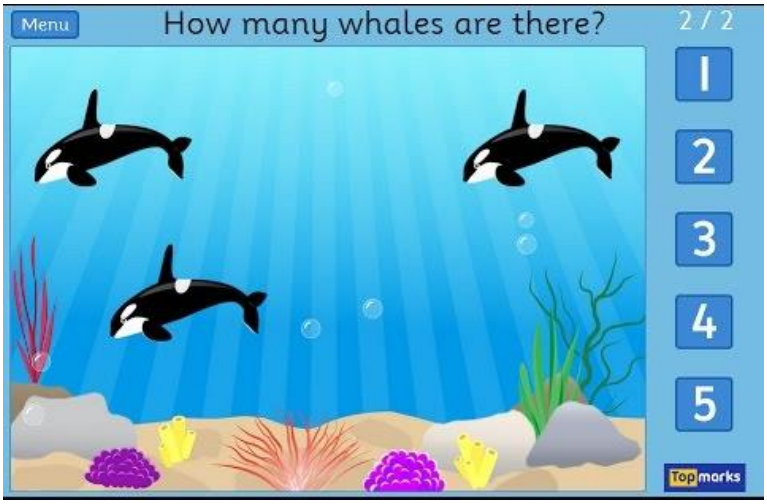


Figure: 2.4 Underwater Counting game

Underwater Counting is an interactive counting game for young children involving counting the number of objects to 10. The game takes the form of treasure hunt where children are challenge to find the treasure by achieving ten correct answers. Designed for children from 2 to 5 years of age, the game has two difficulty levels which can be matched to the appropriate numerical ability. As well as reinforcing the concept of counting the game also children with number recognition. Underwater Counting is the game that allow player counting the numbers which mean the player already know the basic skill of counting numbers.

Kids Math Challenge is a teaching material that will allow the user to learn the way to count the numbers for young children, it would be the first step of learning mathematics. And this application allows users or players to learn in number comparing, an additional subtraction number as well. The main point of Kids Math Challenge is to teach children in basic math and practice what they had learned by playing funny games.

2.3 TOOLS OF USED

Adobe Photoshop

Photoshop is Adobe's photo editing, image creation and graphic design software. The software provides many image editing features for raster (pixel-based) images as well as vector graphics. It uses a layer-based editing system that enables image creation and altering with multiple overlays that support transparency. Layers can also act as masks or filters, altering underlying colors. Shadows and other effects can be added to the layers. Photoshop actions include automation features to reduce the need for repetitive tasks. An option known as Photoshop CC (Creative Cloud) allows users to work on content from any computer. Photoshop is used by photographers, graphic designers, video game artists, advertising and meme designers. It is published for both macOS and Windows, but not Linux.

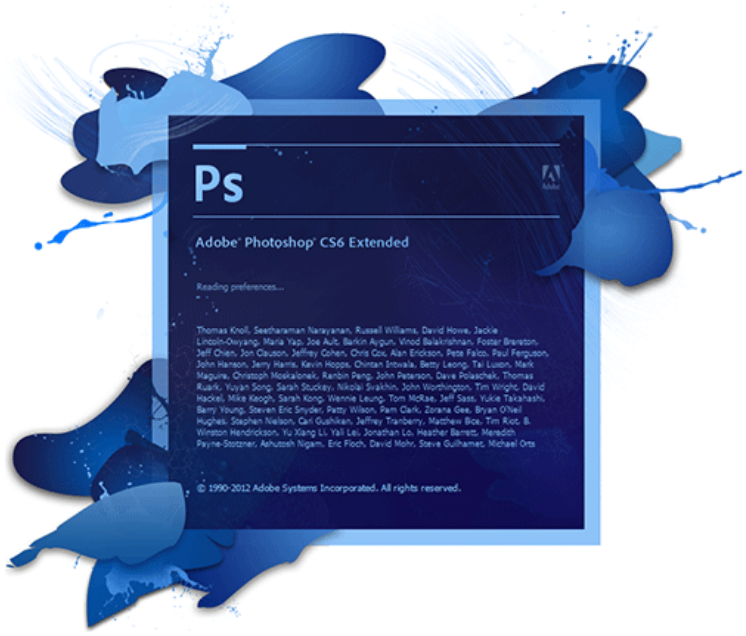


Figure: 2.4 Adobe Photoshop

Adobe illustrator

Adobe Illustrator is a software application for creating drawings, illustrations, and artwork using a Windows or MacOS computer. Illustrator was initially released in 1987 and it continues to be updated at regular intervals, and is now included as part of the Adobe Creative Cloud. Illustrator is widely used by graphic designers, web designers, visual artists, and professional illustrators throughout the world to create high quality artwork. Illustrator includes many sophisticated drawing tools that can reduce the time need to create illustrations.

Adobe Illustrator is used to create a variety of digital and printed images, including cartoons, charts, diagrams, graphs, logos, and illustrations. Illustrator allows a user to import a photograph and use it as a guide to trace an object in the photograph. This can be used to re-color or create a sketch-like appearance of a photograph. Illustrator also makes it possible to manipulate text in many ways, making Illustrator a useful tool for creating postcards, posters, and other visual designs which use text and images together. Illustrator's ability to place text around a curve is especially useful for artists creating logos. Illustrator is also used in designing mockups which show what the website will look like when it's completed, and creating icons used within apps or websites.

Figure: 2.5 Adobe Illustrators

Unity

Unity gives users the ability to create games and experiences in both 2D and 3D, and the engine offers a primary scripting API in C#, for both the Unity editor in the form of plugins, and games themselves, as well as drag and drop functionality. Prior to C# being the primary programming language used for the engine, it previously supported Boo, which was removed with the release of Unity 5, and a version of JavaScript called *UnityScript*, which was deprecated in August 2017, after the release of Unity 2017.1, in favor of C#.

Within 2D games, Unity allows importation of sprites and an advanced 2D world renderer. For 3D games, Unity allows specification of texture compression, mimaps, and resolution settings for each platform that the game engine supports, and provides support for bump mapping, reflection mapping, parallax mapping, screen space ambient occlusion (SSAO), dynamic shadows using shadow maps, render-to-texture and full-screen post-processing effects.

Figure: 2.6 unity

2.4 CONCLUSION

Generally, this chapter discussed and made understanding about work existing related that would make developers more understand and clearly in developing this mobile game application. And in this chapter also talked about the tool of used to create and develop the Kids Math Challenge Application in the right way. It is very helpful for developers to work smoothly.

CHAPTER III

METHODOLOGY

The objective of this chapter is to describe the executing of project development. The Design and development of learning mathematics applications for kids are used Multimedia Development Life Cycle Apply Method. This method is suitable for develops a multimedia project. It has eight phases. The Design and development of learning mathematics applications for kids use only five phases are Concept Validity phase, Availability of content phase, Tool selection phase, Authoring phase and Testing phase. Each phase has defined what we have to do? It is easy to show and explain step by step of processing on each page of this project.

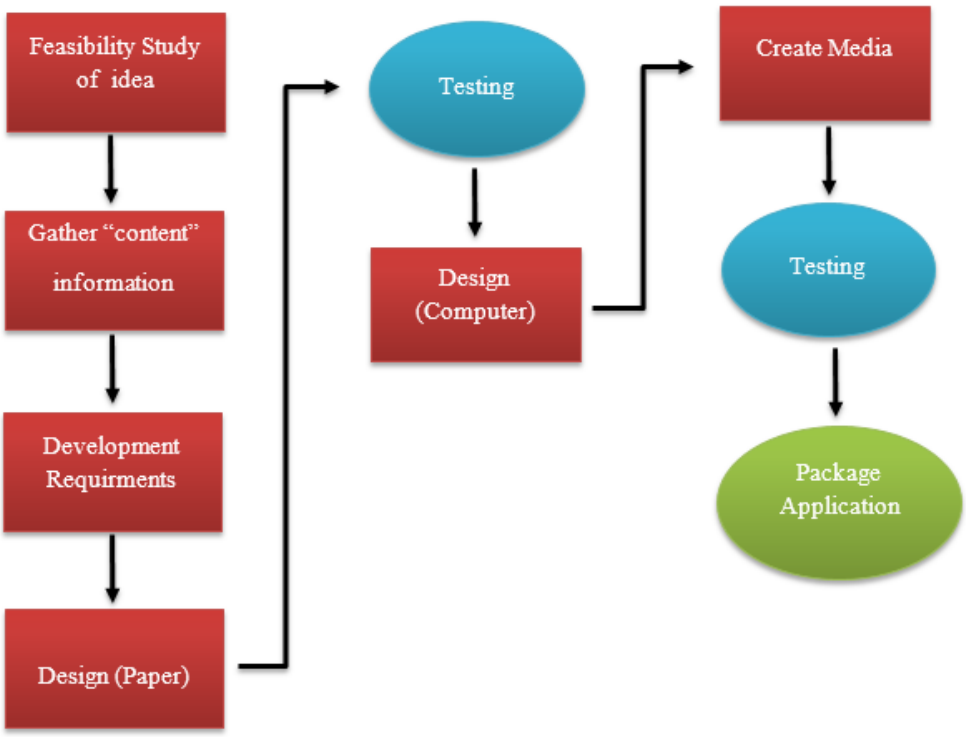


Figure 3. 1: Multimedia Development Life Cycle Apply Method

3.1 Concept Validity phase

The Concept Validity Phase is a concept of the development project. It includes:

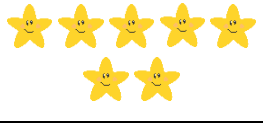
1. Idea and function: Design and development of learning mathematics applications for kids is develop for being a choice for children age 3-5 years of age. It is an interesting choice for children to learn the basics of mathematics. This application name is Kids Math Challenge.

The Kids Math Challenge has 3 main menu, The first is to learn the numbers zero to nine and practice to counting material numbers such as balloon and answer the questions correctly. There are 15 questions to random. The children should answer 10 questions. The second menu is basic operator learning and such as greater than, less than, equal, plus and minus. The children must answer the questions correctly 10 questions. On each page of this has 15 questions of operator practicing by random the question. The last menu is games, consists of 15 levels. In each level, the questions will be different start from easy to difficult questions up to the level. The children have to answer the correct answer within 30 seconds in limit time for unlocking to the next level. Each level has different of scene.

2. Propose: This project proposes is to develop the Kids Math Challenge applications that include basic mathematic games, learning and practicing the numbers and operator. It is use skill of children in term of addition, subtraction, greater than, equal and less than. In addition, the children also fun in the basic calculations games and testing of calculating and comparing number skills.

3. Target group: The Kids Math Challenge is developing for children from 3-5 years old od age and who are interested.

3.2 Availability of content phase

The Kids Math Challenge			
Category	Mathematic Content		
Number	0	Zero	-
	1	One	
	2	Two	
	3	Tree	
	4	Four	
	5	Five	
	6	Six	
	7	Seven	
	8	Eight	
	9	Nine	
	+	Addition/Plus	 / 1 + 2 = 3

Operator	**-**	**Subtraction/Minus**	 **/ 3 – 1 = 2**
	<	**Less than**	 **/ 1 < 3**
	=	**Equal**	 **/ 2 = 2**
Operator	**>**	**Greater than**	 **/ 4 > 2**

Table 3.1 : Availability of Contents

The content of The Kids Math Challenge Application it's refer to Math book's name is Pre-Math Skill (วันละหน้า หนูน้อยเก่งทักษะคณิตศาสตร) and ปูพื้นฐานคณิตศาสตร์ หนูน้อยวัยอนุบาล ฝึกนับ เปรียบเทียบ จำนวน.

3.2.1 Flow Chart

A flowchart is a formalized graphic representation of a logic sequence, work or manufacturing process, organization chart, or similar formalized structure. The purpose of a flow chart is to provide people with a common language or reference point when dealing with a project or process. The flow chart figure 3.3 below the step of Kids Math Challenge work.

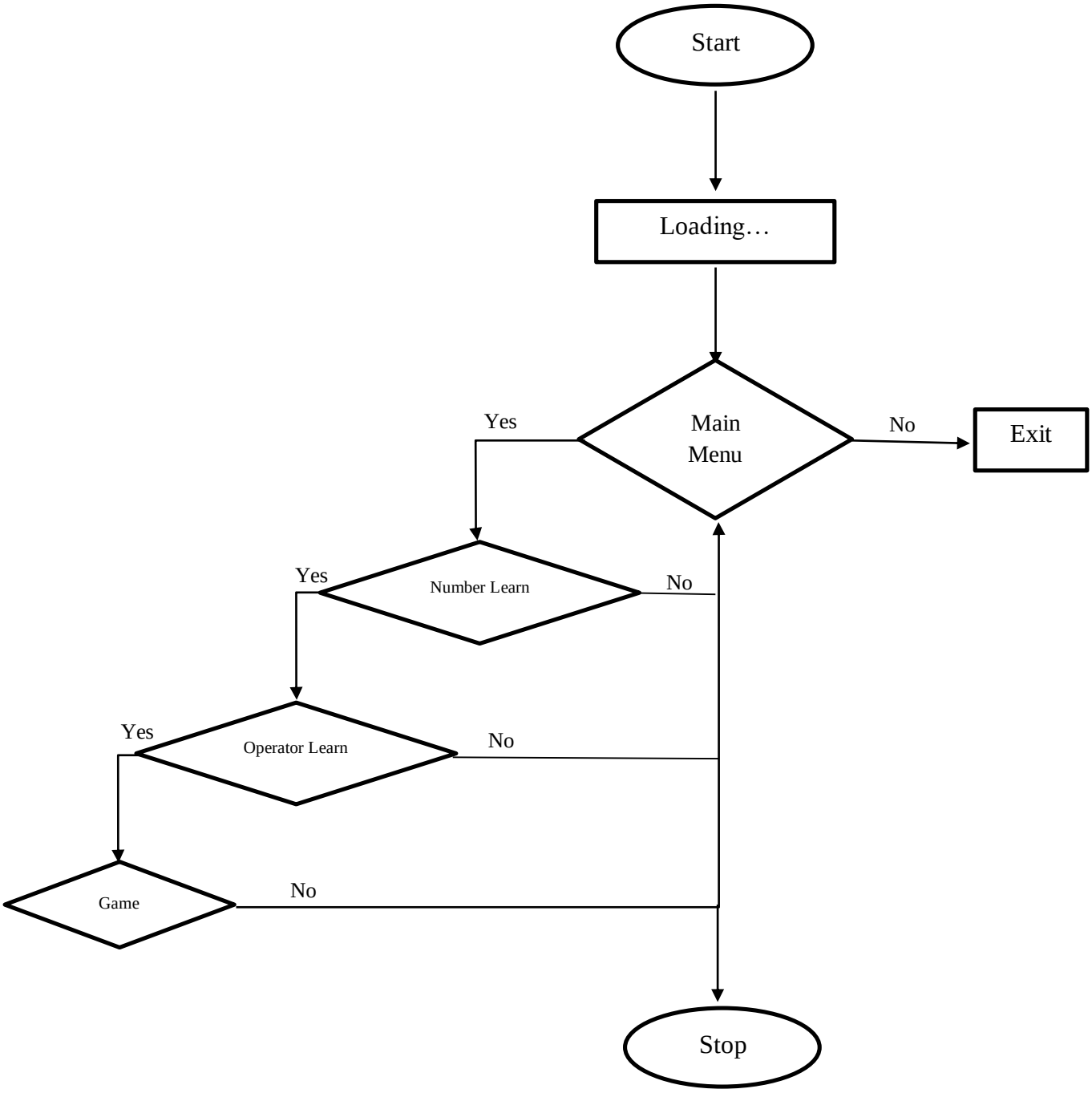


Figure 3. 2 : Flow Chart of Main Menu Page

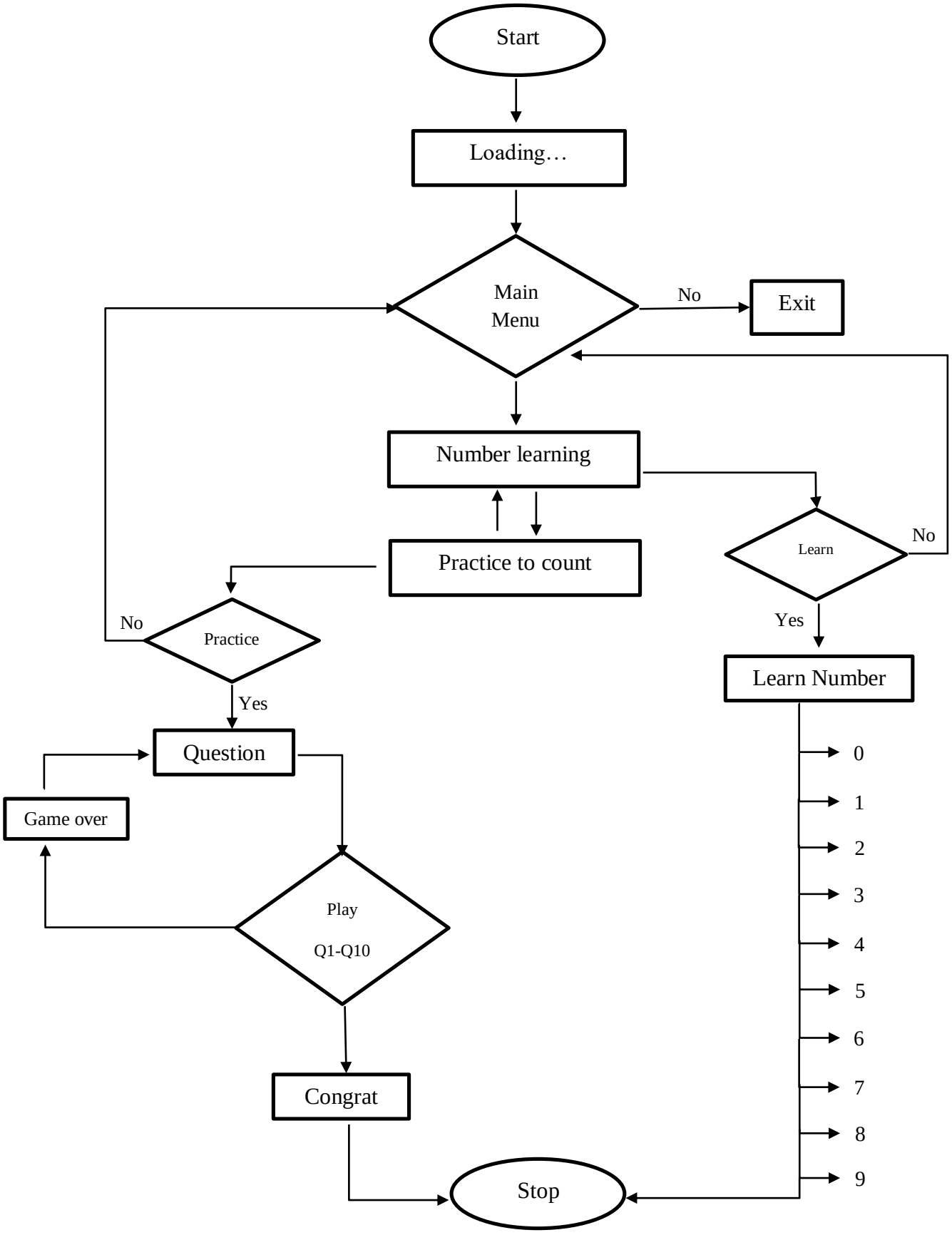


Figure 3. 3 : Flow Chart of Number learning

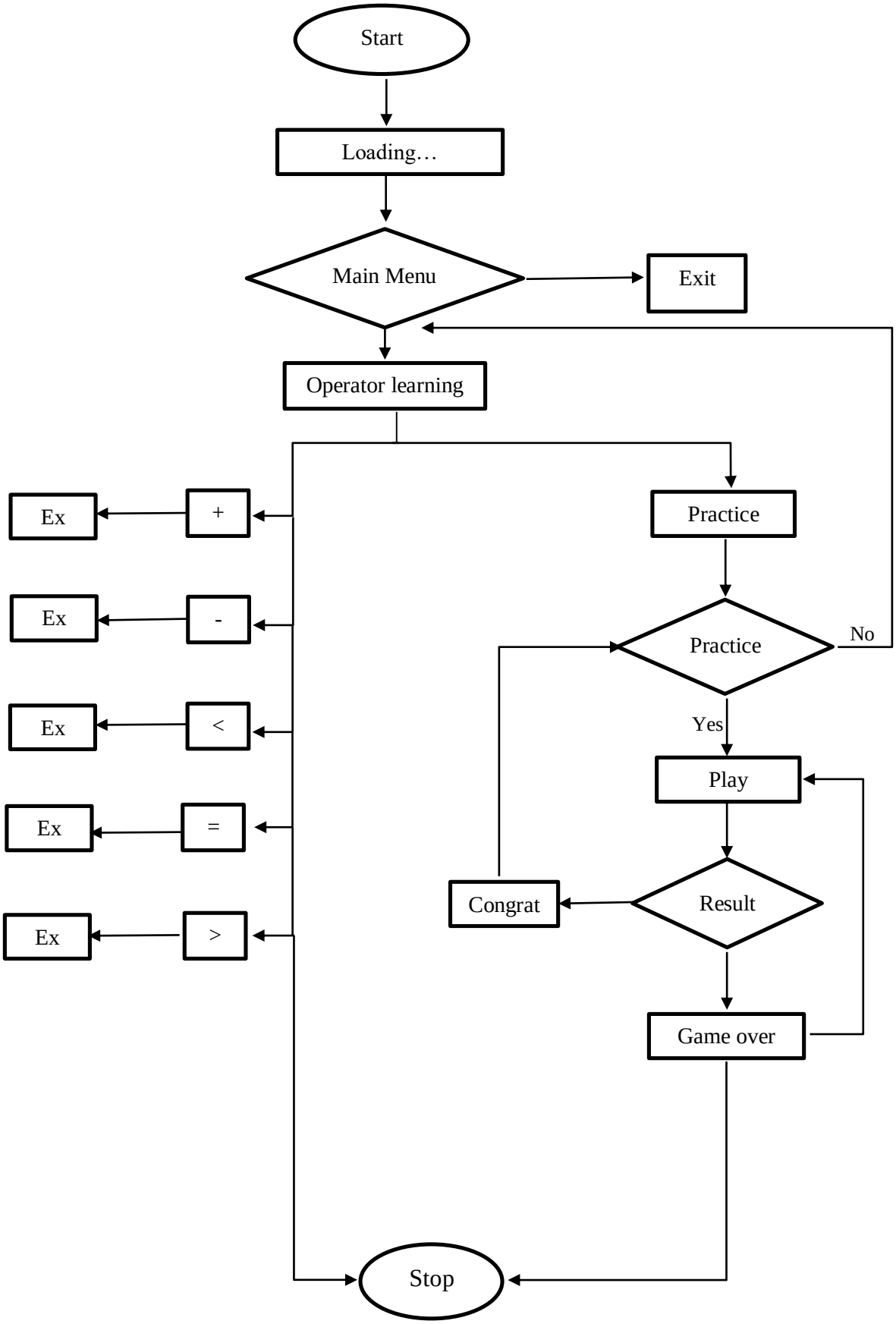


Figure 3. 4 : Flow Chart of Operator learning

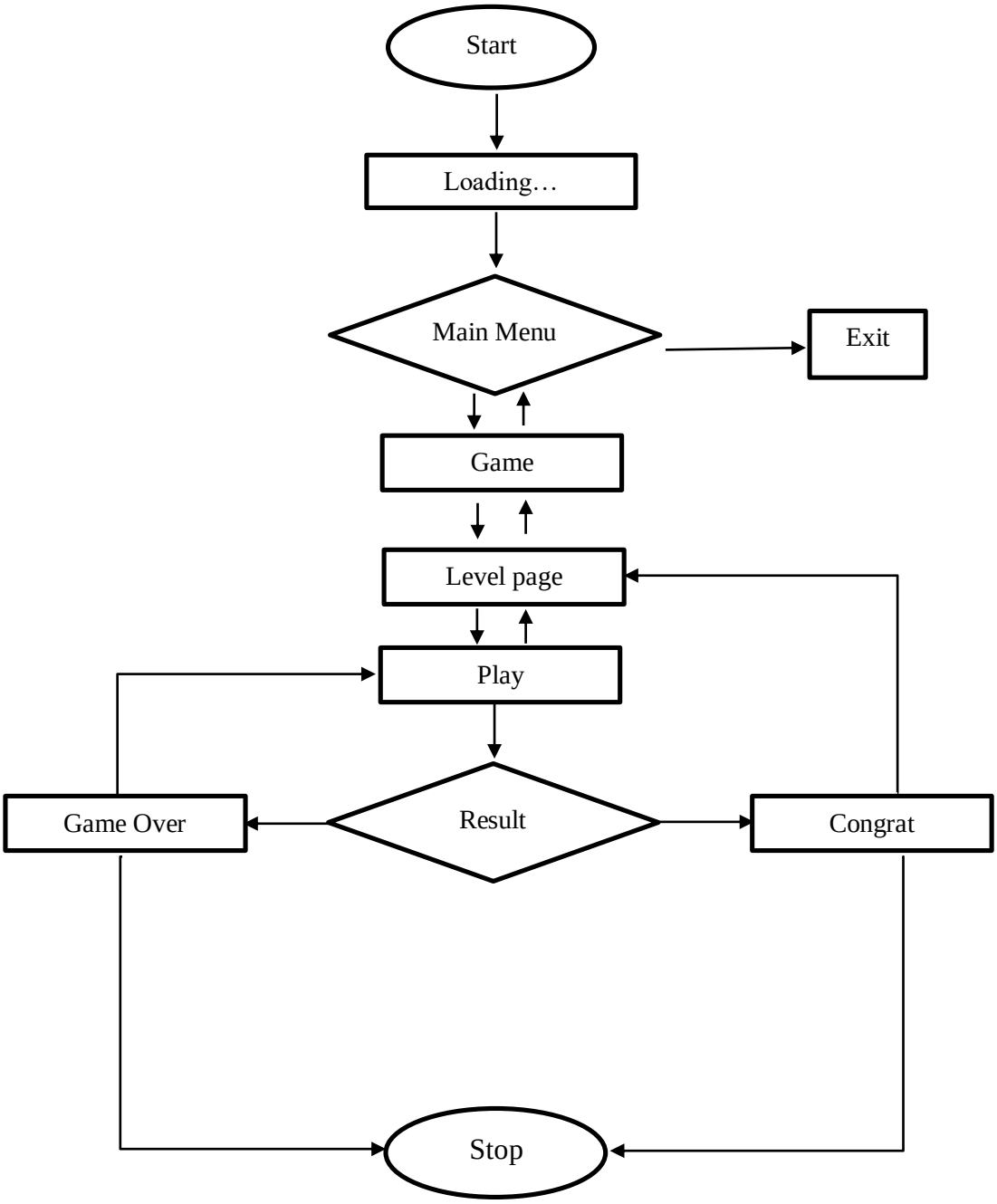


Figure 3. 5 : Flow Chart of Game

3.2.2 Site Map

Sitemap as part of the site. It is describing the structure of the site, this Site map be like "Table of Contents" or "Index" of websites, including the website of the Link within a single page. The figure 3.4 below is Site Map of The Kids Math Challenge.

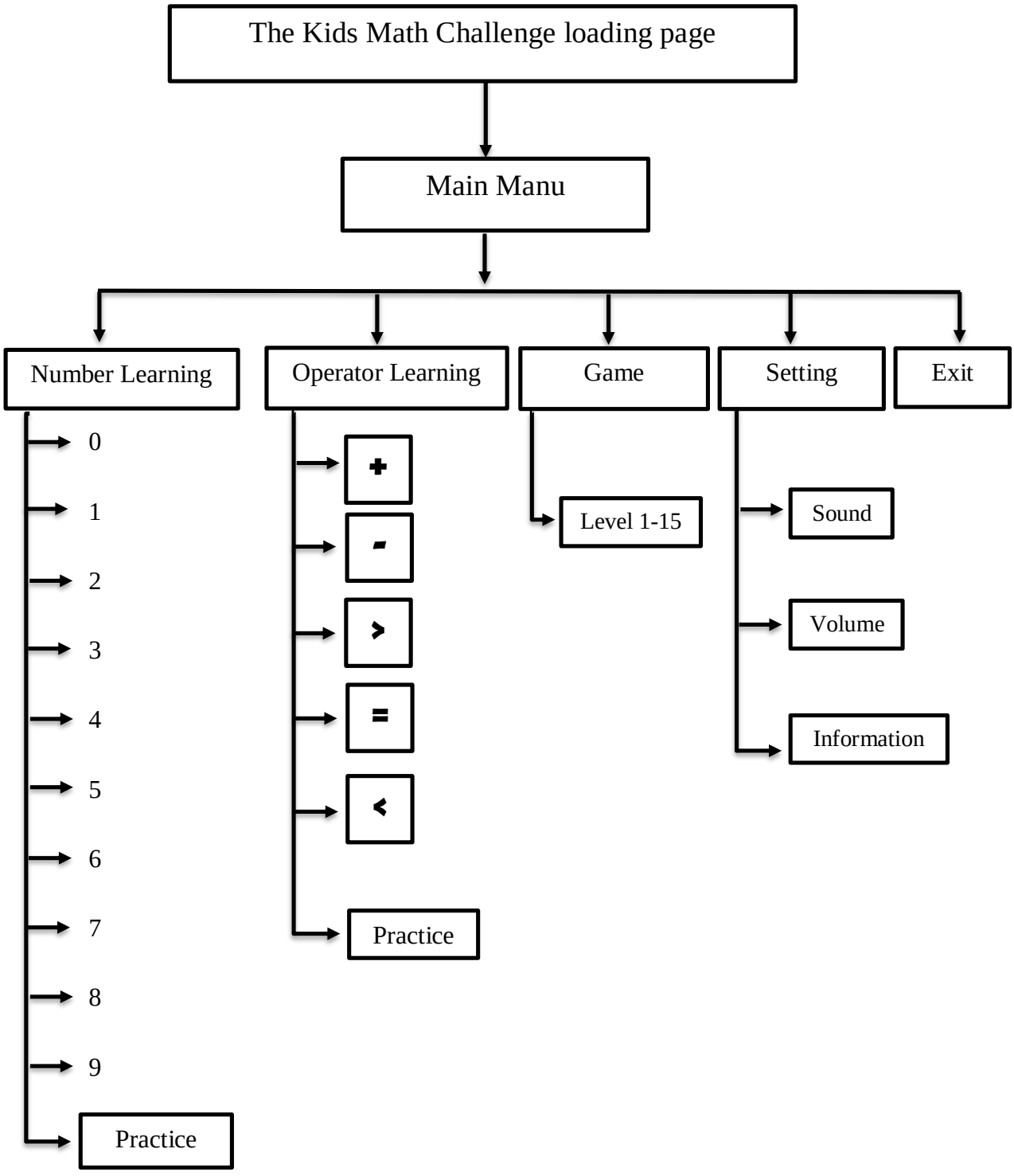


Figure 3. 6: Site Map of The Kids Math Challenge

3.3 Tool selection phase

The developers are choosing Adobe Photoshop and Adobe illustrator to create actor and interface and choosing Unity to design motion and putting audio. The programs have easily step and suitable to create the Kids Math Challenge.

3.3.1 Adobe Photoshop /Adobe illustrator

3.3.1.1 Preparing and Designing Storyboard

<table>
<tr><td colspan="2">Project Name : The Design and development of learning mathematic application for kids.</td></tr>
<tr><td rowspan="2"> 
</td><td>Function information:

-Show loading page</td></tr>
<tr><td>Button:

-</td></tr>
<tr><td colspan="2">Note : This page is display the loading page</td></tr>
</table>

Figure 3. 7 Loading page of The Kids Math Challenge

<table>
<tr><td colspan="2">Project Name : The Design and development of learning mathematic application for kids.</td></tr>
<tr><td rowspan="2"> 
</td><td>Function information:

-Show Main Manu Page</td></tr>
<tr><td>Button:

-Number learning,

-Operator Learning,

- Game, -Setting

-Exit</td></tr>
<tr><td colspan="2">Note : This page is display the Main Manu Page. There are three main menu of Kids Math challenge. It is Number learning, Operator Learning, Game. Number learning is educational media that teach the Number 0 to 9 and children can practice to count one by one from media given. Operator Learning is educational media that give the example of addition, subtraction, less than, equal and greater than and children can use this skill to comparing and calculate the number in practice page. Game consists of 15 level. It’s include all of educational media from this application. The questions will be difference start by easy questions to difficulty questions up to the level.</td></tr>
</table>

Figure 3. 8 Main Manu page of The Kids Math Challenge

Project Name : The Design and development of learning mathematic application for kids.	
	Function information: - Show Number learning number Page
	Button: -Home, -Practice 0-9 -Next , -Back
Note : The Children can click on next or back button to Show Number 0-9 and also can hear the sound of the numbers. There is Practice 0-9 button for go to another page and learn to count the number from what the children had learn.	

Figure 3.9 Learning number page of The Kids Math Challenge

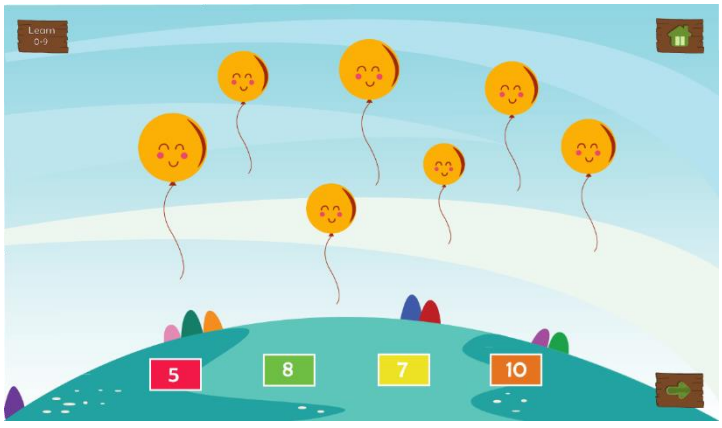
Project Name : The Design and development of learning mathematic application for kids.	
	Function information: This page is display **Learn to count** page The materials are the balloon and include sound
	Button: -Home, -Next, -Back
Note : Children learn to count one by one from animations given and choose the right answer on this page	

Figure 3. 10 Learn to count page of The Kids Math Challenge

<table>
<tr><td colspan="2">Project Name : The Design and development of learning mathematic application for kids.</td></tr>
<tr><td rowspan="2">  </td><td>Function information:

- This page is display operator learning page

- Children Learn the different of symbol compare, plus and minus on this page</td></tr>
<tr><td>Button:

-Home, -Play

-Plus, -Minus

-Greater than, -Equal, -Less than

-Practice</td></tr>
<tr><td colspan="2">Note : The children learn the example of operator : Plus, Minus, Greater than, Equal, Less than on this page and the children can click on play button to go to practice page.</td></tr>
</table>

Figure 3. 11 Operator learning page of The Kids Math Challenge

Project Name : The Design and development of learning mathematic application for kids.

Function information:

-This is pop-up of **Plus (Addition)** example.

Button:

-Home,

-Close,

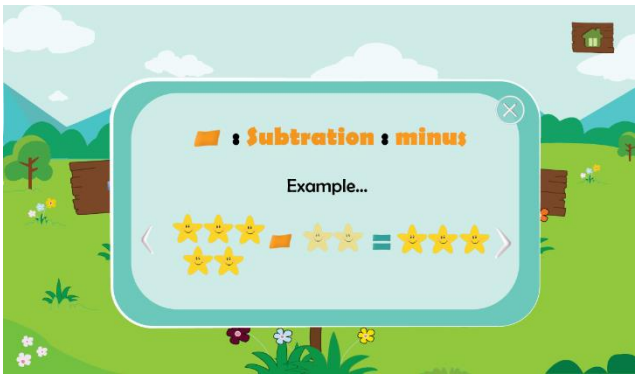
-Next,

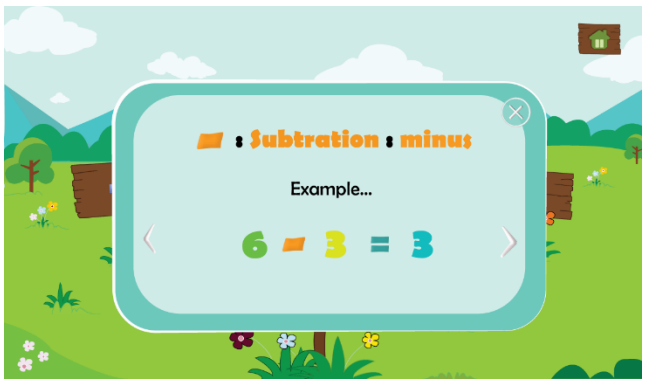
-Back

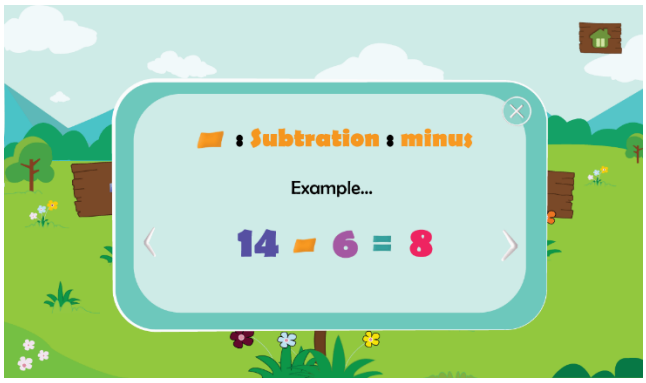
Note : The Pop-up will appear the example of Plus when children chick on Plus (Addition) Button. There are many example, they can click on next or back to see other example.

Figure 3. 12 Pop-up of Plus (Addition)

Project Name : The Design and development of learning mathematic application for kids.







Function information:

-This is pop-up of **Minus (Subtraction)** example.

Button:

-Home,

-Close,

-Next,

-Back

Note : The Pop-up will appear the example of Minus when children chick on Minus (Subtraction) Button. There are many example, they can click on next or back to see other example.

Figure 3. 13 Pop-up of Minus (Subtraction)

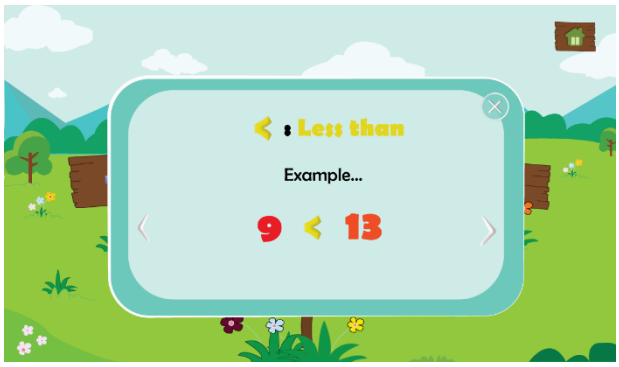
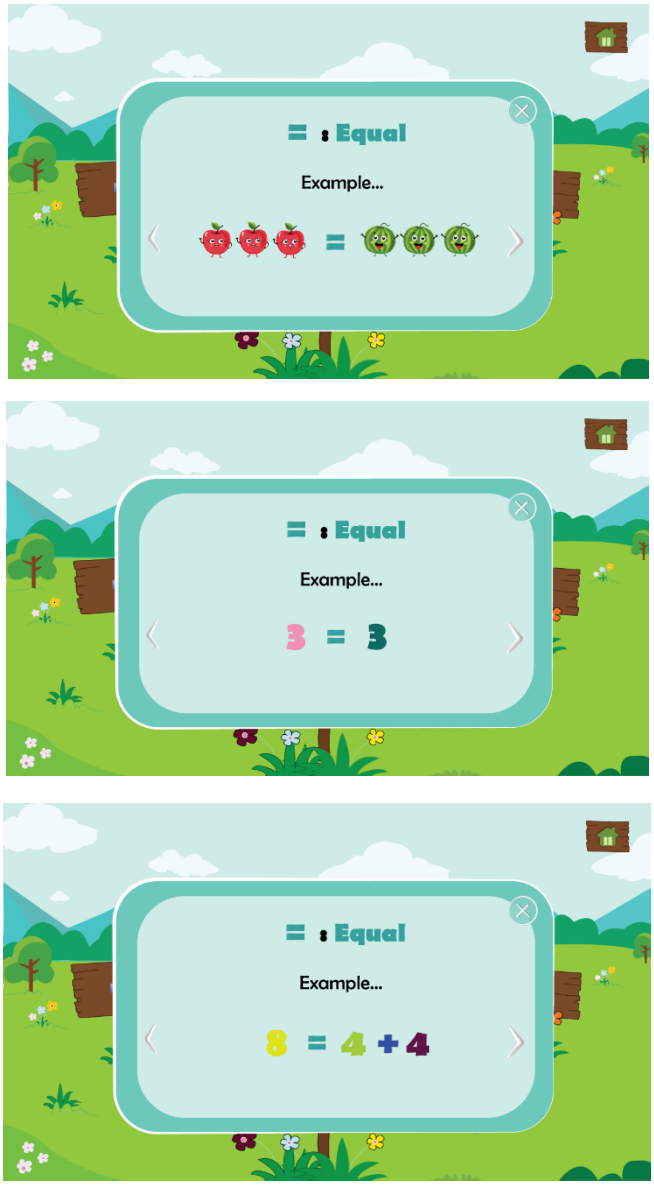
Project Name : The Design and development of learning mathematic application for kids.	
  	Function information: -This is pop-up of **Less than** example. Button: -Home, -Close, -Next, -Back
Note : The Pop-up will appear the example of Less than when children chick on Less than button. There are many example, they can click on next or back to see other example.	

Figure 3. 14 Pop-up of Less than

Project Name : The Design and development of learning mathematic application for kids.



Function information:

-This is pop-up of **Equal** example.

Button:

-Home,

-Close,

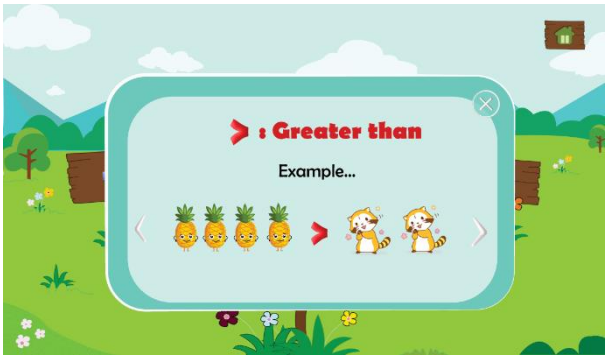
-Next,

-Back

Note : The Pop-up will appear the example of **Equal** when children chick on **Equal** button. There are many example, they can click on next or back to see other example.

Figure 3. 15 Pop-up of Equal

Project Name : The Design and development of learning mathematic application for kids.



Function information:

-This is pop-up of **Greater than** example.

Button:

-Home,

-Close,

-Next,

-Back

Note: The Pop-up will appear the example of **Greater than** when children chick on **Greater than** button. There are many example, they can click on next or back to see other example.

Figure 3. 16 Pop-up of Greater than

Project Name : The Design and development of learning mathematic application for kids.	
	Function information: -This page is display **Practice Operator Skill** page - It's show star reward when answer is correct.
	Button: -Home, -Next, -Back, - Operator Learning
Note: The children learn to compare and calculate the basic questions and drag the right answer on this page. The children can use the skill from the example given. There is an Operator Learning button to go to learn and see an example of each operator.	

Figure 3. 17 Practice page of The Kids Math Challenge

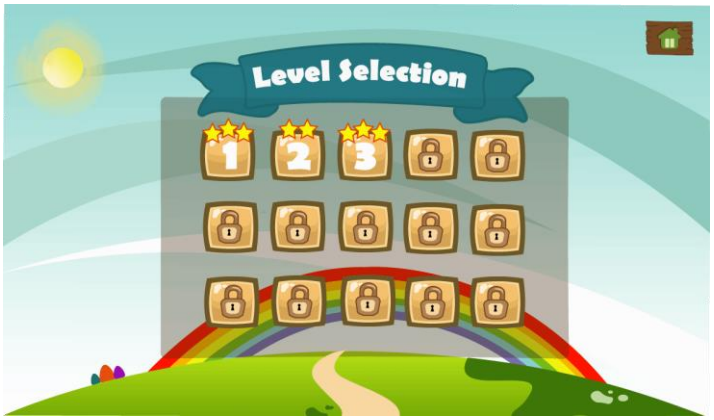
Project Name : The Design and development of learning mathematic application for kids.	
	Function information: -This page is display **The level of game** page
	Button: -Home
Note: This is the level selection page of game. It consists of 15 level. In each level the questions will be difference start by easy questions to difficulty questions up to the level. The children have to answer the correct answer within 30 second for unlock to the next level.	

Figure 3. 18 The level of game page of The Kids Math Challenge

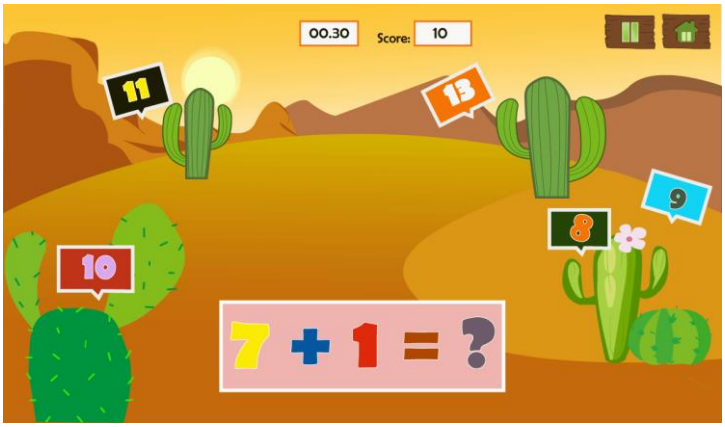
Project Name : The Design and development of learning mathematic application for kids.	
	**Function information:** -This page is display **game** page - Score -Time **Button:** -Home, -Stop
Note: This is an example of game page. There are many different scene of game in different level.	

Figure 3. 19 Game page of The Kids Math Challenge

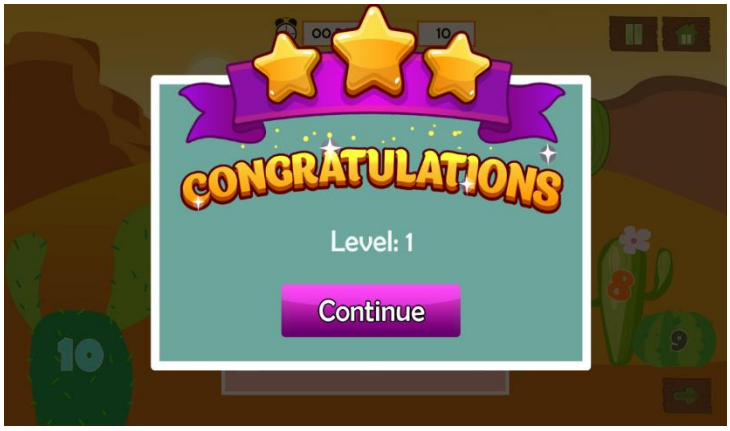
Project Name : The Design and development of learning mathematic application for kids.	
	Function information: -This page is display **Congratulations** page Button: -Continue
Note: This page is display of Congratulations page. The children should click on the continue for go to next level.	

Figure 3. 20 Congratulations page of The Kids Math Challenge

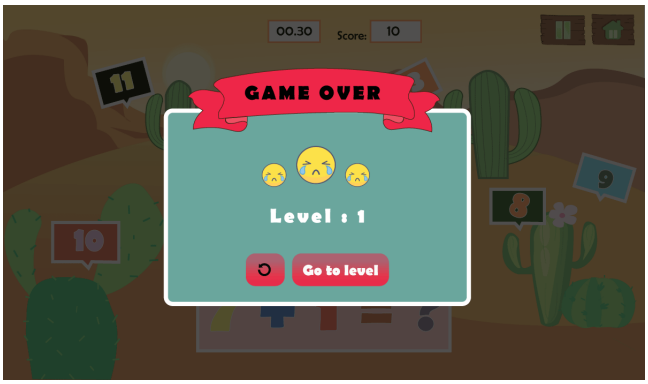
Project Name : The Design and development of learning mathematic application for kids.	
	Function information: - This page is display **Game over** page
	Button: replay, go to level,
Note: There are replay and go to level button. Replay button is for who want to play in same level again. Go to level button is for go to level page.	

Figure 3. 21 Pop-up Game over

Project Name : The Design and development of learning mathematic application for kids.	
	Function information: -This page is display **pop-up setting** of this application
	Button: Information, Background sound, Button sound
Note: There are information, Volume and sound button	

Figure 3. 22 Pop-up setting of The Kids Math Challenge

3.3.2 Unity

Is a suitable engine and a user friendly development environment. It is Easy enough for the beginner user to use it. Unity should interest anybody who wants to easily create games and applications for mobile, desktop, the web, and consoles. For the Kids Math Challenge game using unity program as a tool to setting motion and putting sound in game.

3.4 Authoring

Authoring phase is all processing of doing project including: storyboard and designing. First step, the preparing of doing game in design user interface, actor, button, and background in Adobe Photoshop and Adobe illustrator programs and also fine various elements that the developer wish to take to game. such as sound, effect etc.

3.5 Testing

In the testing phase, the developer will test an animation of the game to find error and to test it and editing by using Unity program until the application is completed follow as user requirement. This phase is the last task in development process of this project. This phase will be focus in the next chapter.

Summary

Design and development of learning mathematic application for kids is use the Multimedia Development Life Cycle Apply Method in development game. This method is suitable for develop multimedia project. It has eight phases. The Kids Math challenge game is use only five phases are Concept Validity, Availability of content, Tool selection, Authoring and Testing. In addition, to describe the step of development project.