

**AN INTERACTIVE MULTIMEDIA COURSEWARE FOR KIDS TO LEARN
MATHEMATICS**

**BY
WONG SOOK FANG**

A REPORT

SUBMITTED TO

Universiti Tunku Abdul Rahman

in partial fulfillment of the requirements

for the degree of

BACHELOR OF INFORMATION SYSTEMS (HONS)

BUSINESS INFORMATION SYSTEMS

**Faculty of Information and Communication Technology
(Perak Campus)**

JAN 2018

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DECLARATION OF ORIGINALITY

I declare that this report entitled “**AN INTERACTIVE MULTIMEDIA COURSEWARE FOR KIDS TO LEARN MATHEMATICS**” is my own work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

Signature : _____

Name : WONG SOOK FANG

Date : 28 March 2018

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ABSTRACT

This project was aimed to develop an interactive multimedia courseware for kids to learn Mathematics. In this project, teaching approaches and the problem with current Mathematics education were analyzed. The solution of the existing was aimed to be done throughout the delivery of the multimedia courseware. Besides, this project also aimed to deliver attractive and colorful interfaces and useful contents for the users. Mostly importantly, this project was aimed to help the kids to improve and enhance their Mathematics skills through multimedia technology.

Kids' learning styles and attention span were discussed and analyzed in this project. These topics were important to enhance the delivery of the content of the multimedia courseware. In order to increase the attention span of kids, the courseware was intended to be interesting, colorful and involved high level of interactivity. Furthermore, kids' learning styles were also vital to this project as it may contribute to deliver a courseware that suit most of the kids.

TABLE OF CONTENTS

TITLE	i
DECLARATION OF ORIGINALITY	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	xii
LIST OF TABLES	xv
LIST OF ABBREVIATION	xix
CHAPTER 1 INTRODUCTION	1
1-1 Problem Statement and Motivation	1
1-1-1 Problem Statement	1
1-1-2 Motivation	2
1-2 Project Scope	2
1-3 Project Objectives	3
1-4 Impact, Significance and Contribution	4
1-5 Project Background	5
CHAPTER 2 LITERATURE REVIEW	6
2-1 Literature Review	6
2-1-1 Kids Attention Span	6
2-1-2 Learning Styles	9
2-2 Critical Remark of Previous Work	11
2-2-1 Inkster	11
2-2-1-1 Course Introduction	11
2-2-1-2 Strengths	12
2-2-1-3 Weaknesses	12
2-2-2 Math Man	13
2-2-2-1 Course Introduction	14

2-2-2-2 Strengths	14
2-2-2-3 Weaknesses	14
2-2-3 Teddy Numbers	15
2-2-3-1 Course Introduction	16
2-2-3-2 Strengths	16
2-2-3-3 Weaknesses	16
2-2-4 AdaptedMind	17
2-2-4-1 Course Introduction	19
2-2-4-2 Strengths	19
2-2-4-3 Weaknesses	19
CHAPTER 3 SYSTEM DESIGN	20
3-1 System Flow Design	20
3-2 Storyboard Design	21
3-2-1 Splash Screen	21
3-2-2 Main Menu	22
3-2-3 Learning Module	23
3-2-4 Counting	24
3-2-5 Coin	25
3-2-6 Addition	27
3-2-8 Multiplication	29
3-2-9 Division	30
3-2-10 Time	31
3-2-11 Shape	32
3-2-12 Quiz Module	33
3-2-13 Counting Quiz	34
3-2-14 Time Quiz	35
3-2-15 Addition Quiz	36
3-2-16 Subtraction Quiz	37
3-2-17 Multiplication Quiz	38

3-2-18 Division Quiz	39
3-2-19 Coins Quiz	40
3-2-20 Shape Quiz	41
3-2-21 Correct Answer	42
3-2-22 Wrong Answer	43
3-2-23 Game Module	44
3-2-34 Game Interface	45

CHAPTER 4 METHODOLOGY AND TOOLS

4-1 Methodology	46
4-1-1 Analysis Phase	47
4-1-2 Design Phase	47
4-1-3 Development Phase	47
4-1-4 Implementation Phase	47
4-1-5 Evaluation Phase	48
4-2 Tools	48
4-2-1 Adobe Director	48
4-2-2 Microsoft PowerPoint	48
4-2-3 Meitu Xiu Xiu	49
4-2-4 Balabolka	49
4-3 Requirement Specification	49
4-3-1 User Requirement	49
4-3-2 Functional Requirement	49
4-3-3 Non-Functional Requirement	50
4-4 System Requirement	50
4-4-1 Minimum Hardware Requirement	50
4-4-2 Software Requirement	51
4-5 Verification Plan	51
4-5-1 Unit Testing	51
4-5-2 Integration Testing	51

4-5-3 System Testing	52
4-5-4 Acceptance Testing	52
4-6 Project Timeline	53
4-6-1 Final Year Project I	53
4-6-2 Final Year Project II	55
CHAPTER 5 DEVELOPMENT	57
5-1 Pre-Authoring Process	57
5-1-1 Graphic	57
5-1-1-1 Trimming	57
5-1-1-2 Button	59
5-1-2 Text	61
5-1-3 Audio	63
5-1-4 Animation	64
5-2 Authoring Process	66
5-2-1 Main Menu	66
5-2-2 Exit Page	68
5-2-3 Learning module	69
5-2-4 Counting	71
5-2-5 Coin	72
5-2-6 Addition(a)	74
5-2-7 Addition(b)	75
5-2-8 Subtraction	76
5-2-9 Multiplication	78
5-2-10 Division	79
5-2-11 Time	81
5-2-12 Shape	82
5-2-13 Quiz Module	84
5-2-14 Counting Quiz	85
5-2-15 Coin Quiz	87

5-2-16 Addition Quiz	88
5-2-17 Subtraction Quiz	90
5-2-18 Multiplication Quiz	91
5-2-19 Division Quiz	93
5-2-20 Time Quiz	94
5-2-21 Game Module	96
5-2-22 Game Introduction	97
5-2-23 Game Interface	98
5-3 Post-Authoring Process	100
CHAPTER 6 TESTING	102
6-1 Alpha Testing	102
6-1-1 Unit Testing	102
6-1-1-1 Main Menu	102
6-1-1-2 Exit Page	103
6-1-1-3 Learning Module	103
6-1-1-4 Counting	105
6-1-1-5 Coins	111
6-1-1-6 Addition	113
6-1-1-7 Subtraction	114
6-1-1-8 Multiplication	115
6-1-1-9 Division	116
6-1-1-10 Time	117
6-1-1-11 Shape	118
6-1-1-12 Quiz Module	119
6-1-1-13 Counting Quiz	121
6-1-1-14 Coin Quiz	122
6-1-1-15 Addition Quiz	123
6-1-1-16 Subtraction Quiz	125
6-1-1-17 Multiplication Quiz	126

6-1-1-18 Division Quiz	127
6-1-1-19 Time Quiz	128
6-1-1-20 Shape Quiz	130
6-1-1-21 Quiz Module	131
6-1-1-22 Easy Game	132
6-1-1-23 Medium Game	133
6-1-1-24 Hard Game	135
6-1-2 Integration Testing	137
6-1-2-1 Main Menu	137
6-1-2-2 Learning Module	137
6-1-2-3 Counting	138
6-1-2-4 Coins	138
6-1-2-5 Addition	139
6-1-2-6 Subtraction	139
6-1-2-7 Multiplication	140
6-1-2-8 Division	140
6-1-2-9 Time	141
6-1-2-10 Shape	141
6-1-2-11 Quiz Module	142
6-1-2-12 Counting Quiz	142
6-1-2-13 Coin Quiz	143
6-1-2-14 Addition Quiz	143
6-1-2-15 Subtraction Quiz	144
6-1-2-16 Multiplication Quiz	144
6-1-2-17 Division Quiz	145
6-1-2-18 Time Quiz	145
6-1-2-19 Shape Quiz	146
6-1-2-20 Game Module	146
6-1-2-21 Easy Game	147

6-1-2-22 Medium Game	147
6-1-2-23 Hard Game	148
6-1-3 System Testing	149
CHAPTER 7 CONCLUSION	150
7-1 Future Enhancements	150
7-2 Problem Encountered	150
7-3 Learning Learnt	151
7-4 Conclusion	151
BILIOGRAPHY	153
POSTER	157
PLAGIARISM CHECK RESULT	158
FYP 2 CHECKLIST	160

LIST OF FIGURE

Figure Number	Title	Page
Figure 2-1	Attention deficit hyperactivity disorder	7
Figure 2-2	Statistics of ADHD	7
Figure 2-3	The traditional learning process	9
Figure 2-4	The main menu of Inkster	11
Figure 2-5	The game interface of Inkster	11
Figure 2-6	Main menu of Maths Man	13
Figure 2-7	Instruction page of Maths Man	13
Figure 2-8	Game page of Maths Man	13
Figure 2-9	Main menu of Teddy Numbers	15
Figure 2-10	Game interface of Teddy Numbers	15
Figure 2-11	Main Menu of Adapted Mind	17
Figure 2-12	Level of Adapted Mind	17
Figure 2-13	Game interface of Adapted Mind	18
Figure 3-1	System Flow Diagram	20
Figure 3-2	Splash screen	21
Figure 3-3	Main menu	22
Figure 3-4	Learning Module	23
Figure 3-5	Counting	24
Figure 3-6	Coin interface	26
Figure 3-7	Addition interface	27
Figure 3-8	Subtraction interface	28
Figure 3-9	Multiplication interface	29
Figure 3-10	Division interface	30
Figure 3-11	Time interface	31
Figure 3-12	Shape interface	32
Figure 3-13	Quiz module	33
Figure 3-14	Counting Quiz	34

Figure 3-15	Time quiz	35
Figure 3-16	Addition quiz	36
Figure 3-17	Subtraction quiz	37
Figure 3-18	Multiplication quiz	38
Figure 3-19	Division quiz	39
Figure 3-20	Coins quiz	40
Figure 3-21	Shape quiz	41
Figure 3-22	Correct answer interface	42
Figure 3-23	Wrong answer interface	43
Figure 3-24	Game module	44
Figure 3-1	ADDIE model	46
Figure 4-1	Timeline of FYP1	53
Figure 4-2	Gantt Chart of FYP1	54
Figure 4-3	Timeline of FYP2	55
Figure 4-4	Gantt Chart of FYP2	56
Figure 5-1	Trimming – Step 1(a)	57
Figure 5-2	Trimming – Step 2	58
Figure 5-3	Trimming – Step 3	58
Figure 5-4	Trimming – Step 4	59
Figure 5-5	Creating Button – Step 1	59
Figure 5-6	Creating button – Step 2	60
Figure 5-7	Creating button – Step 3	60
Figure 5-8	Creating text – Step 1	61
Figure 5-9	Creating text – Step 2	62
Figure 5-10	Creating text – Step 3	62
Figure 5-11	Creating narrator	63
Figure 5-12	Cutting audio	64
Figure 5-13	Creating animation – Step 1	65
Figure 5-14	Creating animation – Step 2	65
Figure 5-15	Main Menu	66

Figure 5-16	Exit Page	68
Figure 5.17	Learning module	69
Figure 5.18	Counting	71
Figure 5.19	Coin	72
Figure 5-20	Addition(a)	74
Figure 5-21	Addition(b)	75
Figure 5-22	Subtraction	76
Figure 5-23	Multiplication	78
Figure 5-24	Division	79
Figure 5-25	Time	81
Figure 5-26	Shape	82
Figure 5-27	Quiz module	84
Figure 5-28	Counting quiz	85
Figure 5-29	Coin quiz	87
Figure 5-30	Addition quiz	88
Figure 5-31	Subtraction quiz	90
Figure 5-32	Multiplication quiz	91
Figure 5-33	Division quiz	93
Figure 5-34	Time quiz	94
Figure 5-35	Game module	96
Figure 5-36	Game introduction	97
Figure 5-37	Game interface	98
Figure 5-38	Publishing – Step1	100
Figure 5-39	Publishing – Step2	101

LIST OF TABLES

Table Number	Title	Page
Table 2-1	Attention span by ages	6
Table 3-1	Storyboard of splash screen	21
Table 3-2	Storyboard of main menu	22
Table 3-3	Storyboard of learning module	23
Table 3-4	Storyboard of counting	25
Table 3-5	Storyboard of coin	26
Table 3-6	Storyboard of addition	27
Table 3-7	Storyboard of subtraction	28
Table 3-8	Storyboard of multiplication	29
Table 3-9	Storyboard of division	30
Table 3-10	Storyboard of time	31
Table 3-11	Storyboard of shape	32
Table 3-12	Storyboard of quiz module	33
Table 3-13	Storyboard of counting quiz	34
Table 3-14	Storyboard of time quiz	35
Table 3-15	Storyboard of addition quiz	36
Table 3-16	Storyboard of subtraction quiz	37
Table 3-17	Storyboard of multiplication quiz	38
Table 3-18	Storyboard of division quiz	39
Table 3-19	Storyboard of coins quiz	40
Table 3-20	Storyboard of shape quiz	41
Table 3-21	Storyboard of correct answer	42
Table 3-22	Storyboard of correct answer	43
Table 3-23	Storyboard of game module	44
Table 3-24	Storyboard of game interface	45
Table 5-1	Hardware requirement specifications	50
Table 5-2	Software requirement specifications	51

Table 5-3	Development of main menu	67
Table 5-4	Development of exit page	68
Table 5-5	Development of learning module	70
Table 5-6	Development of counting	71
Table 5-7	Development of coin	73
Table 5-8	Development of addition(a)	75
Table 5-9	Development of addition(b)	76
Table 5-10	Development of subtraction	77
Table 5-11	Development of multiplication	79
Table 5-12	Development of division	80
Table 5-13	Development of time	82
Table 5-14	Development of shape	83
Table 5-15	Development of quiz module	85
Table 5-16	Development of counting quiz	86
Table 5-17	Development of coin quiz	88
Table 5-18	Development of addition quiz	89
Table 5-19	Development of subtraction quiz	91
Table 5-20	Development of multiplication quiz	92
Table 5-21	Development of division quiz	94
Table 5-22	Development of time quiz	95
Table 5-23	Development of game module	97
Table 5-24	Development of game introduction	98
Table 5-25	Development of game interface	99
Table 6-1	Unit testing on main menu	103
Table 6-2	Unit testing on exit page	103
Table 6-3	Unit testing on learning module	105
Table 6-4	Unit testing on counting	110
Table 6-5	Unit testing on coins	111
Table 6-6	Unit testing on addition	114
Table 6-7	Unit testing on subtraction	115

Table 6-8	Unit testing on multiplication	116
Table 6-9	Unit testing on division	117
Table 6-10	Unit testing on time	118
Table 6-11	Unit testing on shape	119
Table 6-12	Unit testing on quiz module	121
Table 6-13	Unit testing on counting quiz	122
Table 6-14	Unit testing on coin quiz	123
Table 6-15	Unit testing on addition quiz	124
Table 6-16	Unit testing on subtraction quiz	126
Table 6-17	Unit testing on multiplication quiz	127
Table 6-18	Unit testing on division quiz	128
Table 6-19	Unit testing on time quiz	129
Table 6-20	Unit testing on shape quiz	131
Table 6-21	Unit testing on quiz module	131
Table 6-22	Unit testing on easy game	133
Table 6-23	Unit testing on medium game	134
Table 6-24	Unit testing on medium game	135
Table 6-25	Integration testing on main menu	137
Table 6-26	Integration testing on learning module	137
Table 6-27	Integration testing on counting	138
Table 6-28	Integration testing on coins	138
Table 6-29	Integration testing on addition	139
Table 6-30	Integration testing on subtraction	139
Table 6-31	Integration testing on multiplication	140
Table 6-32	Integration testing on division	140
Table 6-32	Integration testing on time	141
Table 6-33	Integration testing on shape	141
Table 6-34	Integration testing on quiz module	142
Table 6-35	Integration testing on counting quiz	142
Table 6-36	Integration testing on coin quiz	143

Table 6-37	Integration testing on addition quiz	143
Table 6-38	Integration testing on subtraction quiz	144
Table 6-39	Integration testing on multiplication quiz	144
Table 6-40	Integration testing on division quiz	145
Table 6-41	Integration testing on time quiz	145
Table 6-42	Integration testing on shape quiz	146
Table 6-43	Integration testing on game module	146
Table 6-44	Integration testing on easy game	147
Table 6-44	Integration testing on medium game	148
Table 6-45	Integration testing on hard game	148
Table 6-45	System testing	149

LIST OF ABBREVIATION

<i>ADD</i>	Attention Deficit Disorder
<i>ADHD</i>	Attention Deficit Hyperactivity Disorder
<i>ASD</i>	Autism Spectrum Disorder
<i>OHP</i>	Overhead Projector

1-1 Problem Statement and Motivation

1-1-1 Problem Statement

- **Children have shorter attention span**

For a teacher or tutor, children are the most difficult for them due to the children's shorter attention span. It is almost impossible for kids to sit down and learning or studying for few hours. (Lauren Q Hill, 2015). Instead, children are more focusing on immediate here and now. Therefore, instead of learning from a static textbook, learning process should be designed to capture their immediate interest. Besides, the activities also should be designed to keep attention and interest alive (Fauziyah, 2015).

- **Every kid has different learning pace**

Based on Robin Smorenberg, he stated that everyone is at a different pace in a very different way, so it is impossible to cater everyone's learning needs (daily adventures, 2014). It is almost impossible or very difficult for a teacher to follow every student's learning pace especially when the class has a large number of students. For this case, student with slow learning pace may find difficulties to follow the lessons taught by the teachers. On contrary, kid who has faster learning pace may find the lessons are too boring for them and eventually they will lose their interest in the subject.

- **Attract the attention of kids**

The system developed required to be able to attract the attention of kids. Courseware that are too simple which does not have lots of graphics, animation and sound may not be able to attract them. Besides, the colour used to design the courseware has to be attractive enough in order to draw attention. So, the system must be colourful so that the kids will be interested to use and learn by the courseware.

1-1-2 Motivation

The motivation to do this project is aimed to solve the problem stated as the problem statement in order to help the kids to achieve a better result in Mathematics. Therefore, it is extremely important to build a strong fundamental in Mathematics because it will bring benefits for our daily life. Firstly, it can help us to become more systematic. The reason is because Mathematics is known as a methodical application of matter (The Times of India, 2015). Furthermore, consisting of strong fundamental of Mathematics also aids the children in their future studies. It is because Mathematics is actually relevant to many other subjects such as Science, literature writing, arts and social studies. In other words, the students who perform poorly in Mathematics may also struggling and perform badly in other subjects (Thompson, 2017).

1-2 Project Scope

In the end of the project, an interactive multimedia courseware will be developed delivered. The multimedia courseware was intended to teach the children to learning Mathematics. The users of this multimedia courseware were the kids whose age range from 5 to 7 years old. the secondary students or adult user are not included in this application.

There were three modules included in this project which were learning module, story mode module and quiz module.

In learning module, the users are able to learn the basic Mathematics. Mixed operations which are addition, subtraction, multiplication and division are included in the learning module. Besides, the learning module also includes counting which teach the kids to count from 1 to 100. Other modules included are coins, time and shape. With coin modules, kids will able to identify the coins. Furthermore, they are also able to tell out the time and identify and differentiate some basic shape.

The next module of the courseware is quiz module. Quiz module is designed to test the understanding and the standard of users.

Lastly, story module will be also included in this multimedia courseware. In this module, the user also will be tested for their understanding and standard. The difference between quiz module and story module is the question is mixed from all chapters in story module. However, the question is chapter by chapter for quiz module. The story module will consists of 3 level which are easy, medium and hard.

1-3 Project Objectives

- **To produce a multimedia courseware that consisted a lot of multimedia elements**

Kids are easily diverting their attention especially when the lessons are too boring. Therefore, a lot of multimedia elements such as graphic, animation and sound should be included in the courseware. The elements able to helps the kids to focus more on the courseware as the elements mentioned will draw the kids' attention.

- **To produce a multimedia courseware that can adjust to the kids' learning pace**

Like the problem statement mentioned above, every kids has different learning pace. So, in order to solve this problem, a courseware that able to adjust to the kids' learning pace should be produced. Interactivity will be included in this module so that the kids can learn according to their learning pace. For example, when the kid thinks he is ready to move on to next topic, he can press the next button and the courseware will only move to the next topic when the users press next button.

- **To produce a multimedia courseware that has colourful layout**

It is important that the courseware developed is appealing to the kids. Beside the multimedia elements that were mentioned in the first objective, colour also play an important role to grab the kid's attention. Therefore, the courseware should be

colourful and heavy usage of bright colour instead of dull colour in order to fascinate the kids.

1-4 Impact, Significance and Contribution

By using this multimedia courseware, the kids can learn Mathematics in a more effective way. Based on the research, visual learning which are learning utilizes graphs, charts, maps and diagrams is making complete sense when considering that our brain is mainly an image processor instead of a word processor. Actually, the part of the brain that used to process visual images is larger than the part that used as a word processor (Kouyoumdjian, 2012). In short, by delivering the interactive multimedia courseware proposed, the kids are able to improve their Mathematics as they are more engaging to it when learning through the courseware.

One of problem statements stated that every kid has different learning pace and teacher is difficult to fit everyone's learning pace. However, the interactive multimedia courseware is able to solve this problem as the users able to learn at their learning pace. For example, a slow learner may repeat the lesson that he or she doesn't understand as many as he or she wants. Self-adjustment of time and determination of information based on individual differences are vital and significant for students. It is because when the individual differences can be taken in by having substitutes in learning, they will engage the learning at a deeper level with more sense of participation (Alessi & Trollip 2001; Ma, O'Toole & Keppel, 2008).

1-5 Background Information

From very early ages to higher grades, Mathematics can be recognized as a core component of education (Lee and Ginsburg, 2010). Based on Greg Duncan, early mathematics skill helps in predicting later academic success(Christensen, 2014) as mathematics performance also predict later reading ability beside from later mathematics (Duncan et al., 2007). Therefore, it is important that the kids able to learn mathematics in

an effective way so that they can obtain the mathematics skills which will benefit them in the future. However, there are a lot of misconceptions and problems about mathematics education for kids which cause the kids lose the chance to build a strong foundation on mathematics.

Nowadays, our technologies have become more and more advanced. One of the technologies that has a great improvement from past is education technology where more effective and interesting learning approaches are produced through interactive technologies. The example of education technology is interactive multimedia courseware. The learning processes have been broadened and higher levels of interactions are enabled through the advancement of technology in this digital era and this contribute in making more meaningful for overcoming the insufficiency in rote learning (Dembo & Seli, 2012).

Besides, conventional teacher-centered approach should be changed to student-centered learning approach such as multimedia courseware with technology learning environment. It is because student-centered learning approach performs better in motivating the students to interact with others and take part in the learning process (LEOW and NEO, 2014). By this, students are able to learn in a better learning environment. A good learning environment is important for the students as it will help to improve the quality of learning and they are given more choices to determine their learning experience (Manson, 2007).

By the end of this project, an interactive multimedia courseware for kids to learn Mathematics will be delivered. The courseware is aimed to help the kids to learn Mathematics in a more effective way by providing a better learning environment where the kids can interactive with the application and control the pace of learning by themselves.

2-1 Literature Review

2-1-1 Kids Attention Span

Attention span for a normal child is calculated as 2-5 minutes per year old they are. The table below shows the attention span of kids by age.

Age	Attention Span
2	4 – 10 minutes
3	6 – 15 minutes
4	8 – 20 minutes
5	10 – 25 minutes
6	12 – 30 minutes
7	14 – 35 minutes
8	16 – 40 minutes
9	18 – 5 minutes
10	20 – 50 minutes

Table 2-1: Attention span by ages(studydog.com)

In particular learning environment, kids generally able to filter the small distractions occurred. However, if they are uninterested, find something that is difficult for them or do not have any guidance around them, they might be only able to attend the activity for 5 – 10 minutes (O'Hanlon, 2017). In other words, in order to keep the kids concentrated, the content of the lessons should be able to grab their attention, curiosity and interest. However, it is difficult to satisfy all the kids since every one of them has different learning style where the child at different learning pace (Centre for Educational Neuroscience, n.d.).

Furthermore, the number of children being diagnosed with Attention Deficit Disorder (ADD) has been raising and this problem has spread throughout the society. The characteristics of this disorder are distractibility, hyperactive and impulsive behavior (Paxton and Shoemake, 2007). In other words, children with ADD will get distracted easily and have a short attention span ADD also is known as Attention Deficit

Hyperactivity Disorder (ADHD). The symptoms of ADHD are having trouble in paying attention, remembering details and staying organization. The figures below show a simple statistics of ADHD:

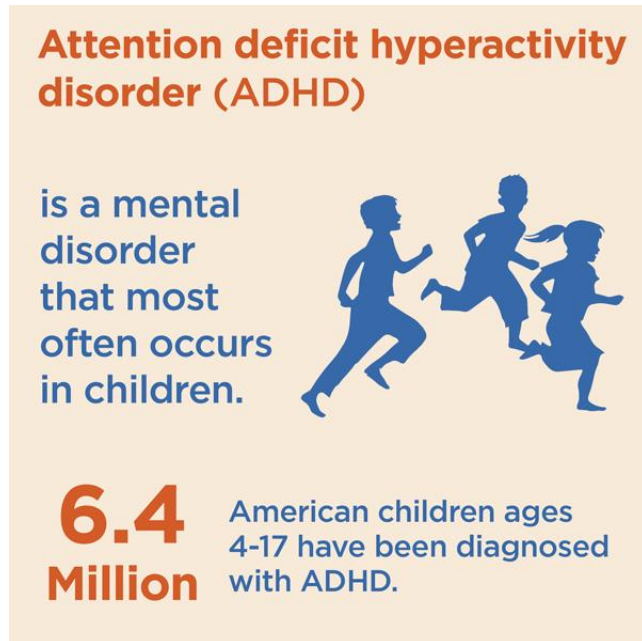


Figure 2-1: Attention deficit hyperactivity disorder (Healthline, 2014)

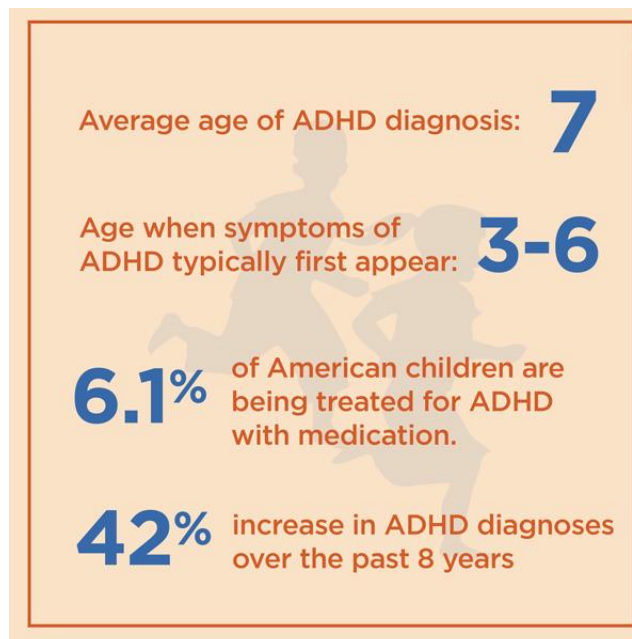


Figure 2-2: Statistics of ADHD (Healthline, 2014)

From the figures above, it is stated ADHD is usually occurring in children. From the statistics, it is clearly showing that there was a high increasing in ADHD diagnoses. However, there is only very few of children with ADHD are being treated for medication. It is a serious problem as it might prevent them from learning properly as they are having trouble in concentrating. Based on Healthline(2014), one of the ways to minimize the distractively of a ADHD kid is to use visual such as graphics, charts or color coding. Learning from textbook may cause the kid with ADHD feel boring and lose their interest soon. Therefore, an interactive multimedia courseware with lots of visual aids may help to increase the attention span of an ADHD kid.

In fact, visual aids are not only benefit to ADHD. Some other categories that can be benefit from visual aids are Down syndrome, developmental delay, and autism spectrum disorder (ASD) and learning difficulties (Addison, n.d.). Moreover, many kids are stronger in visual areas compared to other areas, especially those who are having ASD. The reason that the children have strengths in visual areas is because a graphic or a visual cue remains long after the spoken word has been completed (Kid Sense Child Development, n.d.). In short, visual aids such as graphic or animation will help children in increasing their attention span.

2-1-2 Learning Styles

Conventional classroom learning was found out that it was the least effective learning methods and it does not provide self-pace learning. Although using technology in education isn't something new today, many were still limited by conventional classroom teaching and learning methods. Many educators were still using the conventional teaching method which was the teachers will be explaining and writing the notes on the board. Meanwhile, the students were copying the same things onto their notebooks and some will be day-dreaming or sleeping. (Yap, 2016)

The learning environment is important in a way to help to retain what we learnt. Besides, interactivity in learning such as involve in solving a problem also important as it helps to increase the retention rate of the users. It is not suitable for all the students to gain knowledge when different levels of information are presented with equal facility, such as learning a difficult and complex lesson with a classroom lecture (Booth, 2007).

The immersion of multimedia technology into the learning process is changing the way of how student learn. Technology can be served as the mediator in order to form interactive learning along with students' participation (Salajan et al., 2009). Learning with multimedia technology able to help in gaining better attention from the students, increasing the retention rate of them and also the participation rate of the students will be also increased. (Oncu and Cakir, 2011)

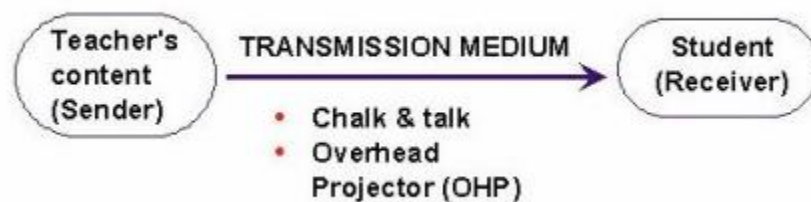


Figure 2-3: The traditional learning process. (Source: Neo & Neo 2002).

Conventional classroom learning or traditional learning or teaching process, only a single medium is used which is text throughout the whole process and the educational process is in a linear way which. The figure 2-3 above shows the traditional learning

process. From the figure, teacher was known as the sender which the student was the receiver. The transmission medium between the sender and receiver is chalk and talk and overhead projector (OHP). This traditional method usually does not or involves a little interactivity. According to the Skinner, the author of behaviours of organisms, this traditional teaching method was known as directed instruction model which its foundations were embedded in the behavioral learning perspective. Usually, the instructional process is under the control of teacher and they tend to deliver the content by emphasizing the factual knowledge to the whole class (Neo & Neo, 2002). In short, the student is learning passively through the traditional conventional classroom learning.

Nowadays, the numbers of computer-based programs that are designed with the concept of student-centered learning approaches are increasing (O'Neill & McMahon, 2005). Student-centered learning approaches mean focusing on the student's needs by placing the student in the center of learning process (Griffiths, Oates & Lockyer, 2007). In this scenario, in order to encourage active learning and higher-level learning skills as well as improve the comprehension and rate of retention, multimedia material can be used (Neo & Neo 2001). Throughout the learning process collaborate with multimedia element, the students can decide how they want to achieve the outcomes (Neo & Neo, 2002).

Besides, by adding more control and interaction such as they can select the content they would like to see or select the difficulty through the multimedia courseware, it can help to enhance and increase the students' motivation and interest. Furthermore, students were known as digital natives as nowadays they were highly connected with the technology in their daily lives. Therefore, the use of technology in education is necessary. (Yap, 2016)

In conclusion, multimedia material can be used as a teaching material for kids to learn. It will bring many benefits such as improves their retention rates. Besides, they can learn according to their learning pace.

2-2 Critical Remark of Previous Works

2-2-1 Inkster

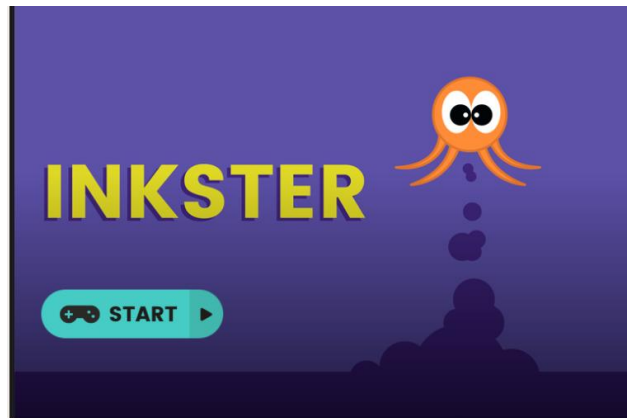


Figure 2-4: The main menu of Inkster

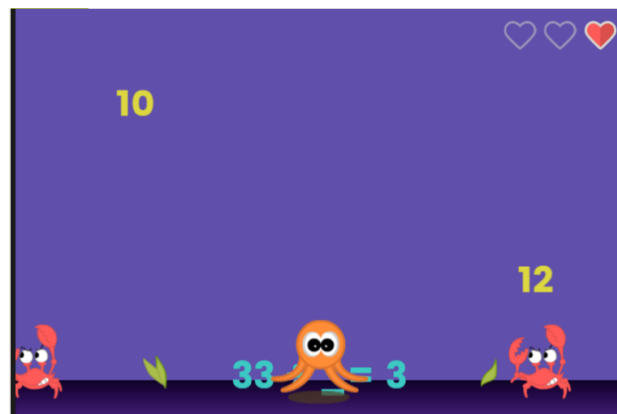


Figure 2-5: The game interface of Inkster

2-2-1-1 Courseware Introduction

Inkster (Funbrain.com, n.d.) is a Mathematics courseware for kids to learn the basic operation of Mathematics. The questions included addition, subtraction, multiplication and division. The users need to grab either the missing symbol or missing number to the question. If the users picked the wrong answer, they may undo it by dropping the answer they picked to the floor. The users will explore themselves with an octopus avatar; they will need to avoid crabs to prevent loss of life. There were total 3 lives for the users.

2-2-1-2 Strengths

- **The interface of the courseware was colorful and it contained a lot of graphics.**

Colorful interface can help in attracting the attention of kids. Besides, the cute animals such as octopus and crabs also able to make the kids feel interesting towards the courseware. Thus, the interface of this courseware can be considered as one of the strengths.

- **There was high interactivity level in this courseware.**

Inkster used adaptive interaction in this courseware where the user will adapt themselves as an octopus to explore in this courseware. By high level of interactivity, the users may feel more engaged to courseware and a better learning environment was created.

2-2-1-3 Weaknesses

- **It was difficult to control.**

The users were required to move the octopus by using the arrow keys in order to swim to grab the correct answer. The users were also need to make sure they will not touch the crabs. Otherwise, they will lose 1 life. However, it was difficult for kids to move accurately by using arrow keys without touching the crabs. Eventually, it may cause the kids to lose their patience on this courseware.

- **There was no navigation or instruction to guide the user.**

One of the weaknesses of this courseware is there was no navigation or instruction given to users on how to play the games. When there was no instruction given, the users need to spend their time to explore how to use the courseware. Furthermore, the target audience of this courseware was kids and kids might feel lose when using this courseware and may cause boredom for them to use it.

2-2-2 Math Man



Figure 2-6: Main menu of Maths Man



Figure 2-7: Instruction page of Maths Man

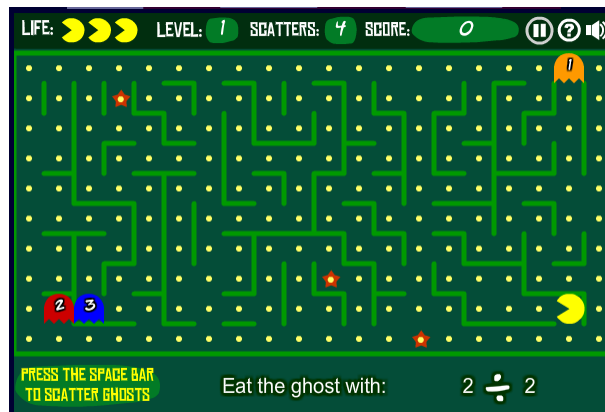


Figure 2-8: Game page of Maths Man

2-2-2-1 Courseware Introduction

Maths man (Sheppardsoftware.com, n.d.) was a courseware that taught kids on basic mixed operations. The users need to move the Maths man by the arrow keys to eat the ghost. Of course, the users need to eat the ghost with correct answer. Otherwise, the life will be deducted. Besides, the users can scared to ghost by using spacebar to prevent loss of life.

2-2-2-2 Strengths

- **This courseware provided high interactivity level which makes the users feel interesting.**

Users can adapted themselves in this courseware as a Math man and move around to eat or scare the ghost. By providing high level of interactivity, the users will experienced a more engaged experience. With the nice experience, the users may enjoy using this courseware.

- **Clear instruction and navigation were given and accessible all the time.**

Instructions on how to play were given to the users before the game started. Instructions were important element in this courseware as it let the users understand how to use the courseware instead of let the users to spend time to explore the features of the courseware. Besides, the navigation was always accessible by the users. For instances, the help button was always located at the top right corner of the courseware.

2-2-2-3 Weaknesses

- **The color scheme of this courseware was to dull for kids**

Since the courseware was intended for kids, the color chosen for the interfaces should be brighter and contain more color in order to grab the attention of kids. However, the interfaces of Maths man were made up of green and yellow which was too dull and not attractive for kids.

- **The repetition of action may cause boredom**

Throughout the whole process of the courseware, the users only be allowed to move the Maths man around to eat or scare the ghost. The users may find interesting at the beginning. However, the repetition of the same actions may make the users feel boring.

2-2-3 Teddy Numbers



Figure 2-9: Main menu of Teddy Numbers



Figure 2-10: Game interface of Teddy Numbers

2-2-3-1 Courseware Introduction

Teddy number was a courseware that taught children on counting and drags and drops the correct number of cupcakes on the teddy bear. There were two main modules in this courseware which were number module and word module. Each module consisted of three modules which were up to 5, up to 10 and up to 15.

2-2-3-2 Strengths

- **This courseware consisted of a lot of color and graphics.**

In teddy numbers, many colors and graphics were used to grab the attention of kids. For instances, the answer was made up by numbers of colorful and cute cupcakes which might be liked by kids.

- **The courseware was simple to use.**

Teddy numbers was easy to use. The users just need to drag the correct amount of cupcakes to the teddy bear and did not involve complex action. Although the function provided was simple, the users able to learn counting in simple and fun way which was suitable for kids.

2-2-3-3 Weaknesses

- **The length of the content was too short which cause less engagement between the courseware and users.**

The content was finished when the users able to answer the correct answer once. Although the users may choose to play again, it consisted less engagement with users. For example, the users should be level up when they able to answer certain amount of answer.

- **No instruction or navigation was given to guide the users.**

There were no instructions or navigations provided to the users on how to use the courseware. The users may feel loss when they don't know what to do with the courseware.

2-2-4 AdaptedMind

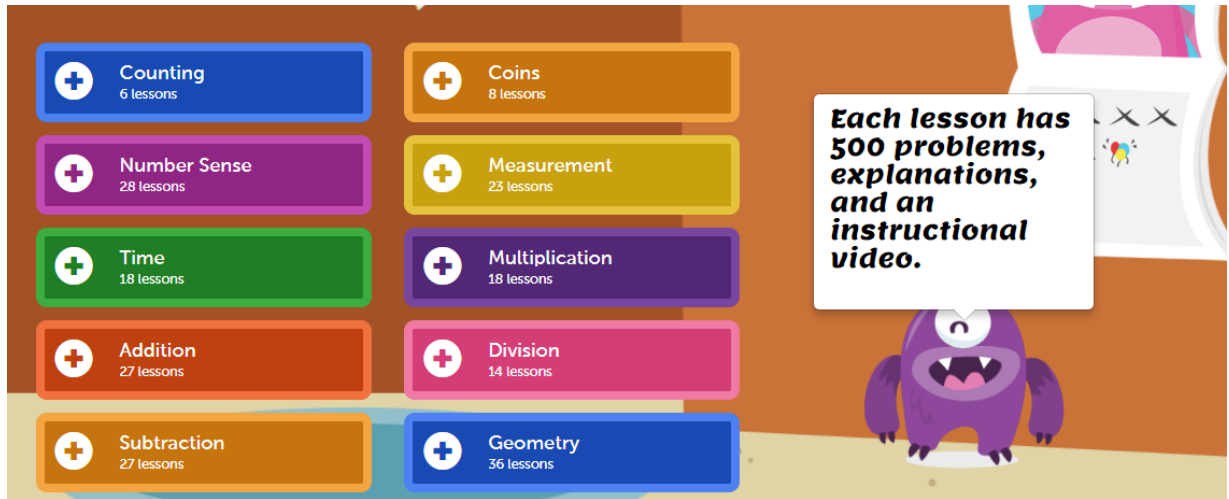


Figure 2-11: Main Menu of Adapted Mind



Figure 2-12: Level of Adapted Mind



Figure 2-13: Game interface of Adapted Mind

2-2-4-1 Courseware Introduction

AdaptedMind is an online learning resources where the user can access to this courseware by using internet. This courseware consists of lots of modules which are counting, coins, number sense, measurement, time, multiplication, addition, division, subtraction and geometry. The main method of this multimedia courseware is teaching through playing the games.

2-2-4-2 Strengths

- This courseware consisted of colourful layout and lots of graphics

The courseware was designed with colourful layout and it contains of a lot of cute and appealing graphic. This design may help in attracting the kids' desire to use and learn Mathematics by using this courseware.

- The narrator and instruction was provided in this courseware

The next strength of this courseware is narrator was provided throughout the whole courseware. Instruction and navigation may help in reducing the time wasted for users to explore how to use the courseware. So, the instruction and narrator provided will facilitates the learning process.

- The content of this courseware was substantial

Unlike other coursewares mentioned above which were focused on one topic only, this courseware consists of many topics of Mathematics for kids to learn.

2-2-4-3 Weakness

- The courseware does not include learning module

This courseware does not contain any learning module. All the modules consisted required the users to answer the question. However, if some of the kids do not have any knowledge or do not have strong fundamental on the particular topic, it may difficult for them to answer the question.

3-1 System Flow Design

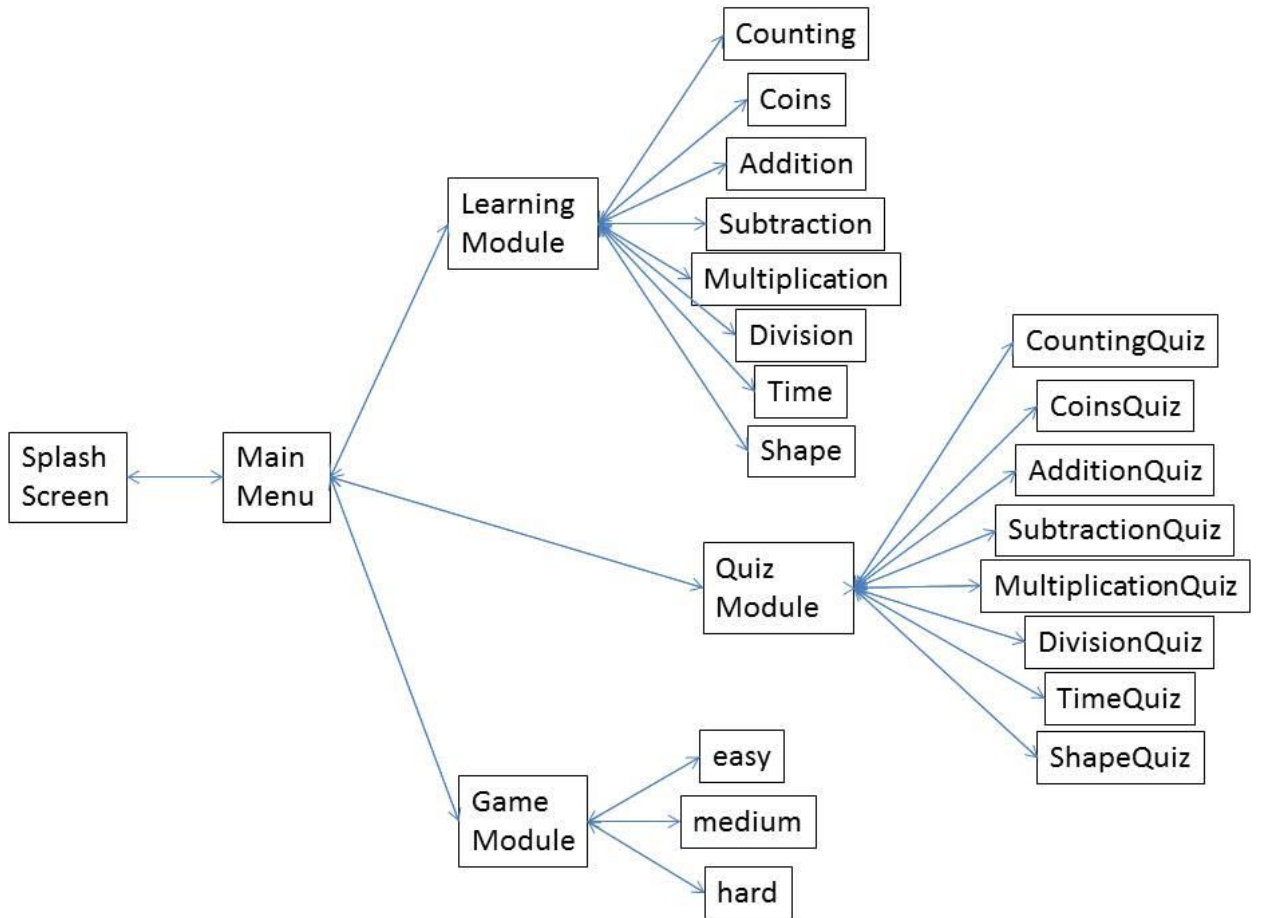


Figure 3 -1: System Flow Diagram

3-2 Storyboard Design

3-2-1 Splash Screen

No. of Storyboard	: 1
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Splash Screen
Internal Link Page	: Main Menu
Description	: This storyboard shows the design of the splash screen

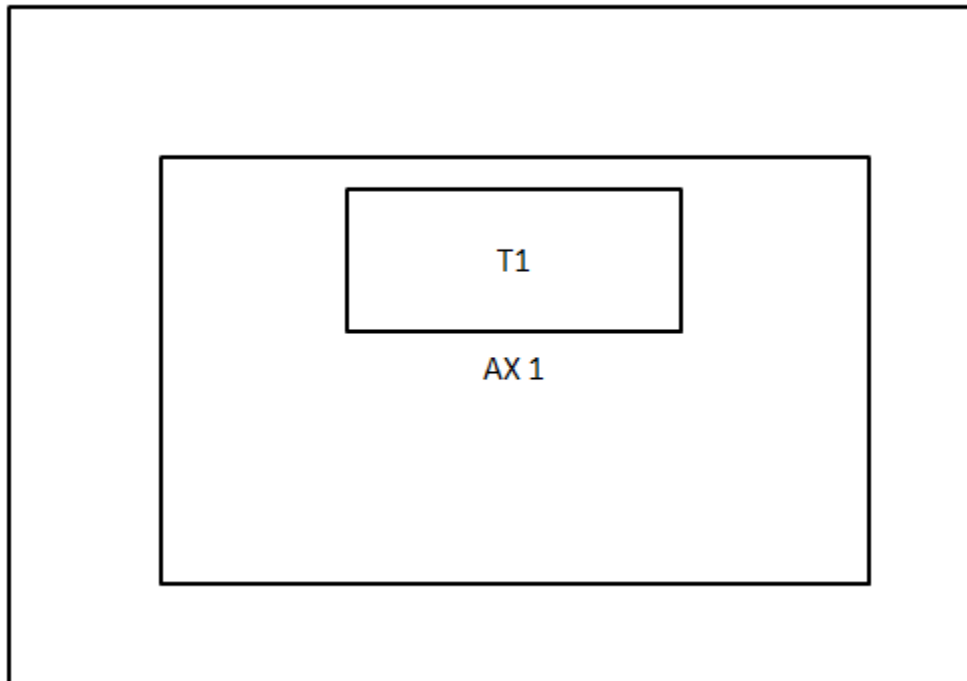


Figure 3-2: Splash screen

Label	Description
AX1	This animation element which a Mathematics textbook with the action of flipping the pages will be shown at the beginning.
T1	The name of the courseware “Big Math” will appear after the AX1.

Table 3-1: Storyboard of splash screen

3-2-2 Main Menu

No. of Storyboard	: 2
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Main Menu
Internal Link Page	: Learning Module, Quiz Module, Game Module
Description	: This storyboard shows the design of the main menu

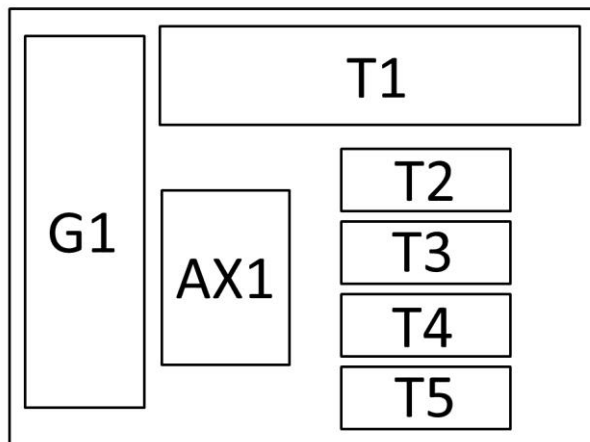


Figure 3-3: Main menu

Label	Description
T1	This element will shows the name of the application which is “Big Math”.
T2	“Learning” text that will link to the Learning Module.
T3	“Quiz” text that will link to the Quiz Module.
T4	“Game” text that will link to the Game Module.
T5	Exit” text which provides the function for the users to close the application.
G1	Graphic element that will shows a group of kids.
AX1	An animation element that will change according to the user’s mouse over of selection

Table 3-2: Storyboard of main menu

3-2-3 Learning Module

No. of Storyboard	: 3
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Learning Module
Internal Link Page	: Main Menu, Counting, Time, Addition, Subtraction, Multiplication, Division, Shape, Coin
Description	: This storyboard shows the design of the learning module

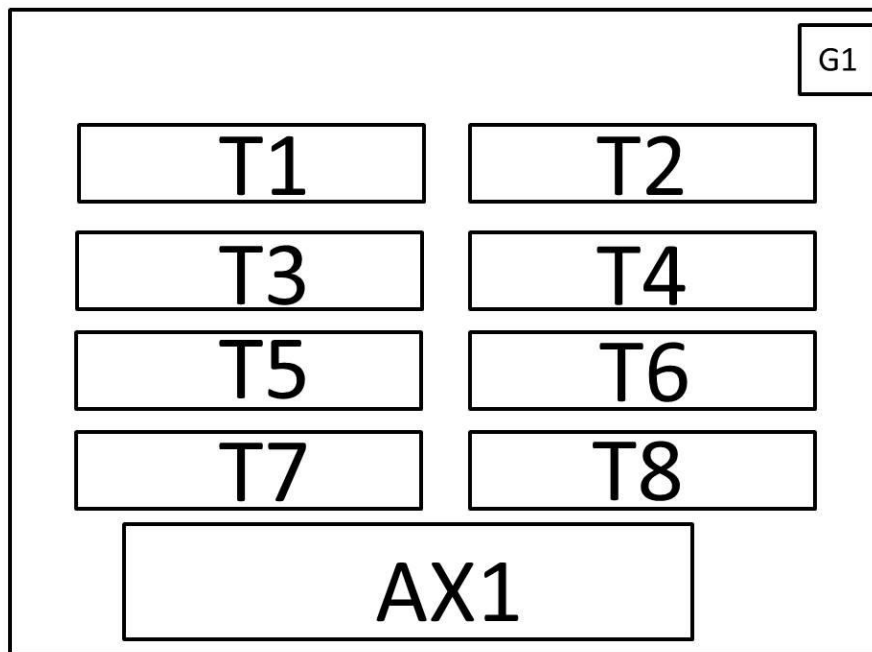


Figure 3-4: Learning Module

Label	Description
G1	This graphic element represent as a home button which will link to the main menu
T1	“Counting” text which will link to the Counting.
T2	“Time” text which will link to the Time.
T3	“Addition” text which will link to the Addition.
T4	“Subtraction” text which will link to the Subtraction.

T5	“Multiplication” text which will link to the Multiplication.
T6	“Division” text which will link to the Division.
T7	“Coin” text which will link to the Coin.
T8	“Shape” text which will link to the Shape.
AX1	The animation element which will change according to the users’ mouse over the options and briefly show what is it about.

Table 3-3: Storyboard of learning module

3-2-4 Counting

No. of Storyboard	: 4
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Counting
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the counting

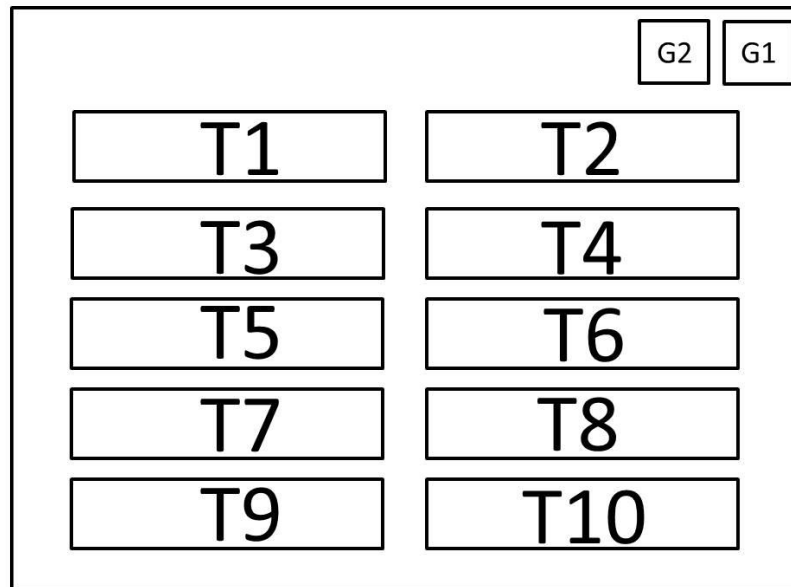


Figure 3-5 Counting

Label	Description
G1	This graphic element represent as a home button which will link to the main menu.
G2	This graphic element represent as a back button which will link to the learning module.
T1	“1 – 10” text which will link the users to learn 1 – 10.
T2	“11 – 20” text which will link the users to learn 11 - 20.
T3	“21 - 30” text which will link the users to learn 21 - 30.
T4	“31 - 40” text which will link the users to learn 31 - 40.
T5	“41 - 50” text which will link the users to learn 41- 50.
T6	“51 – 60” text which will link the users to learn 51 – 60.
T7	“61 – 70” text which will link the users to learn 61 – 70.
T8	“71 – 80” text which will link the users to learn 71 – 80.
T9	“81 – 90” text which will link the users to learn 81 – 90.
T10	“91 – 100” text which will link the users to learn 91 -100.

Table 3-4: Storyboard of counting

3-2-5 Coin

No. of Storyboard	: 5
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Coin
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the coin

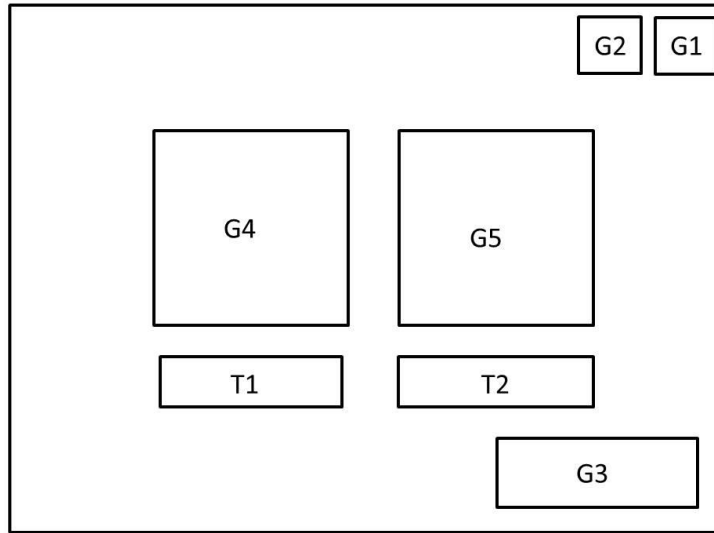


Figure 3-6: Coin interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the learning module.
G3	This graphic element represents as a next button which will link to the next coin.
G4	This graphic element represents the front side of a coin.
G5	This graphic element represents the back side of a coin.
T1	“Front side” text to indicate the users that the graphic above represent the front side of a coin.
T2	“Back side” text to indicate the users that the graphic above represent the back side of a coin.

Table 3-5: Storyboard of coin

2-2-6 Addition

No. of Storyboard	: 6
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Addition
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the addition

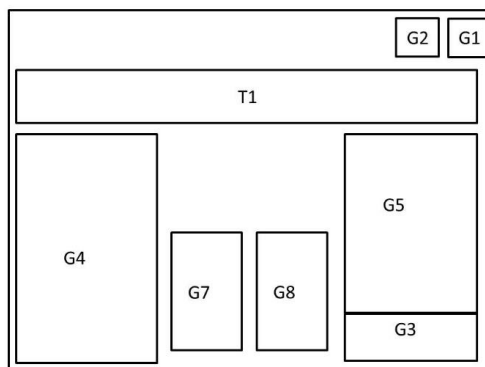


Figure 3-7 Addition interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the learning module.
G3	This graphic element represents as a next button which will link to the next coin.
G4	This graphic element represents a tree with three acorns on it.
G5	This graphic element represents a tree with four acorns on it.
G7	This graphic element represents a squirrel.
G8	This graphic element represents a basket with acorns.
T1	This text element represents the explanation or instruction given to the users.

Table 3-6: Storyboard of addition

2-2-7 Subtraction

No. of Storyboard	: 7
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Subtraction
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the subtraction

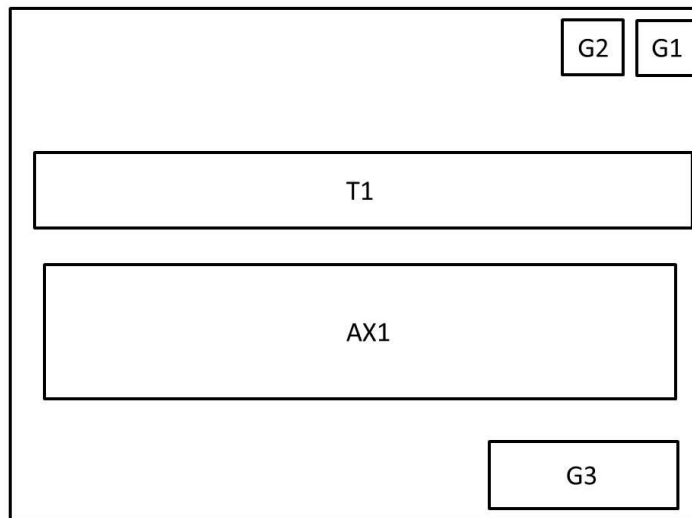


Figure 3-8: Subtraction interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the learning module.
G3	This graphic element represents as a next button which will link to the next coin.
T1	This text element represents the explanation or instruction given to the users.
AX1	This animation element represents the teaching content to the users.

Table 3-7: Storyboard of subtraction

2-2-8 Multiplication

No. of Storyboard	: 8
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Multiplication
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the multiplication

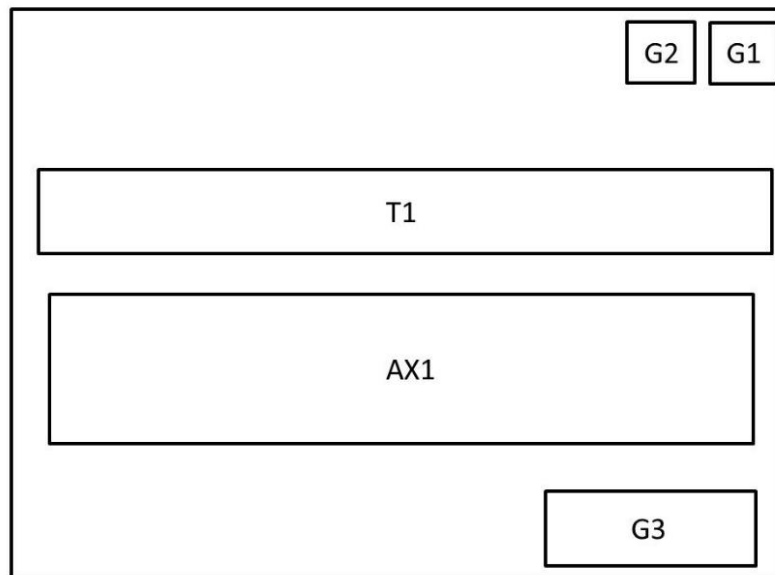


Figure 3-9: Multiplication interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the learning module.
G3	This graphic element represents as a next button which will link to the next coin.
T1	This text element represents the explanation or instruction given to the users.
AX1	This animation element represents the teaching content to the users.

Table 3-8: Storyboard of multiplication

3-2-9 Division

No. of Storyboard	: 9
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Division
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the division

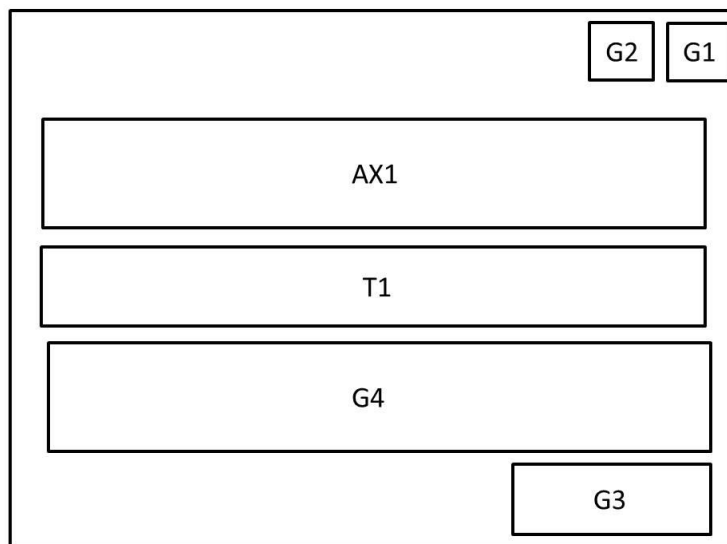


Figure 3-10: Division interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the learning module.
G3	This graphic element represents as a next button which will link to the next coin.
G5	This graphic element represents monkey that will get the banana divided
T1	This text element represents the explanation or instruction given to the users.
AX1	This animation element represents the banana that will be divided to the monkeys.

Table 3-9: Storyboard of division

3-2-10 Time

No. of Storyboard	: 10
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Time
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the time

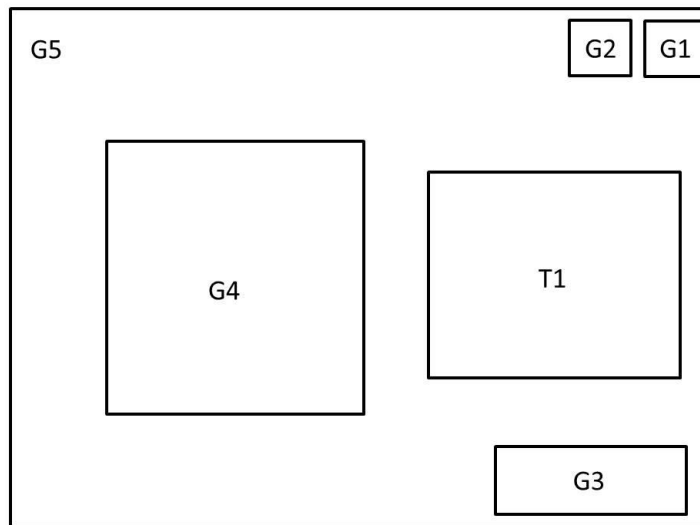


Figure 3-11: Time interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the learning module.
G3	This graphic element represents as a next button which will link to the next coin.
G4	This graphic element represents as a clock
G5	This graphic element represents as the background picture.
T1	This text element represents the explanation or instruction given to the users.

Table 3-10: Storyboard of time

3-2-11 Shape

No. of Storyboard	: 11
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Time
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the time

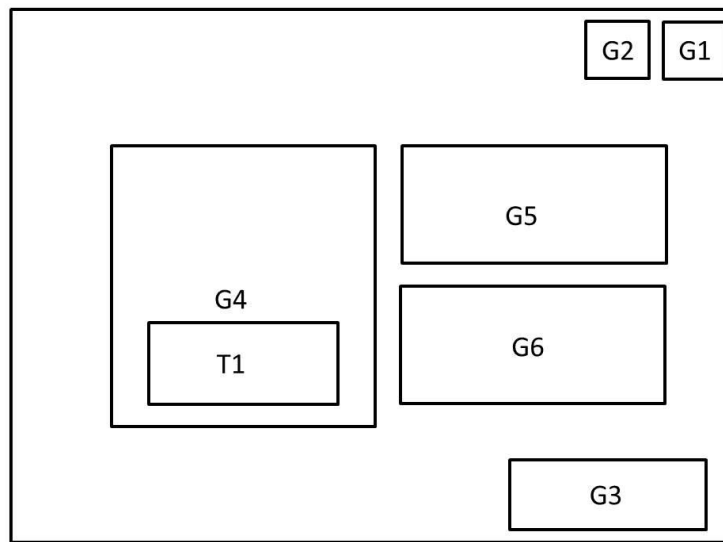


Figure 3-12: Shape interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the learning module.
G3	This graphic element represents as a next button which will link to the next coin.
G4	This graphic element represents as the shape.
G5	This graphic element represents as the example object of the shape.
G6	This graphic element represents as the example object of the shape.
T1	This text element represents as the name of the shape

Table 3-11: Storyboard of shape

3-2-12 Quiz Module

No. of Storyboard	: 12
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Time
Internal Link Page	: Main Menu, Counting Quiz, Time Quiz, Addition Quiz, Subtraction Quiz, Multiplication Quiz, Division Quiz, Shape Quiz,
Description	: This storyboard shows the design of the time

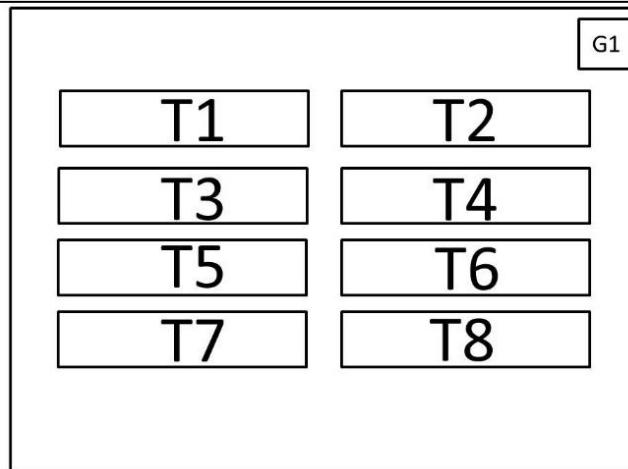


Figure 3-13: Quiz module

Label	Description
G1	This graphic element represent as a home button which will link to the main menu
T1	“Counting” text which will link to the Counting.
T2	“Time” text which will link to the Time.
T3	“Addition” text which will link to the Addition.
T4	“Subtraction” text which will link to the Subtraction.
T5	“Multiplication” text which will link to the Multiplication.
T6	“Division” text which will link to the Division.
T7	“Coin” text which will link to the Coin.
T8	“Shape” text which will link to the Shape.

Table 3-12: Storyboard of quiz module

3-2-13 Counting Quiz

No. of Storyboard	: 13
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Addition Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the counting quiz

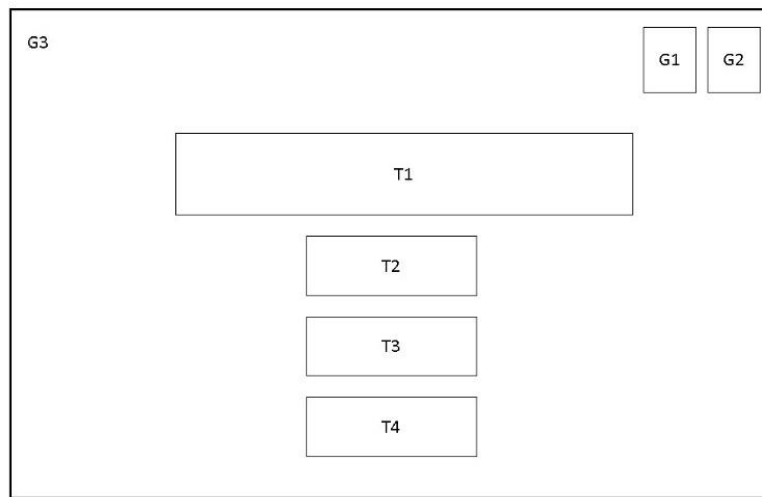


Figure 3-14: Counting quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
T1	This text element represents the question shown to the users
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.
T4	This text element represents one of the options of answer.

Table 3-13: Storyboard of counting quiz

3-2-14 Time Quiz

No. of Storyboard	: 14
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Time Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the time quiz

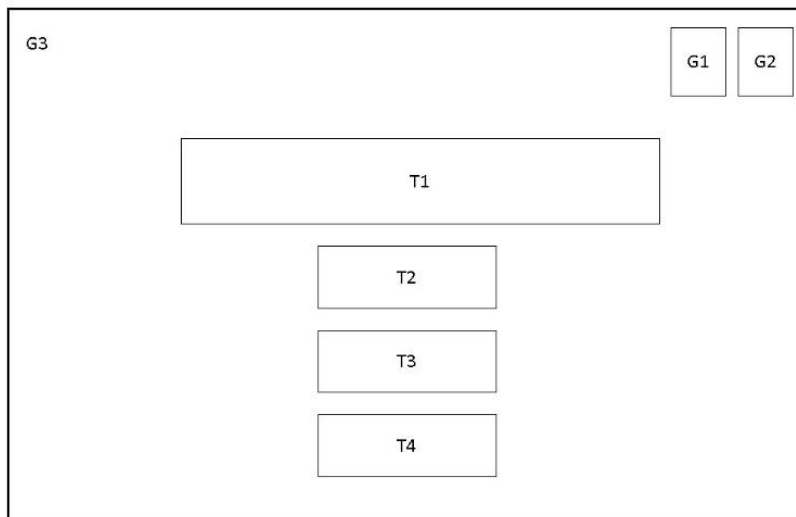


Figure 3-15: Time quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
G4	This graphic element represents as a clock.
T1	This text element represents one of the options of answer.
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.

Table 3-14: Storyboard of time quiz

3-2-15 Addition Quiz

No. of Storyboard	: 15
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Addition Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the addition quiz

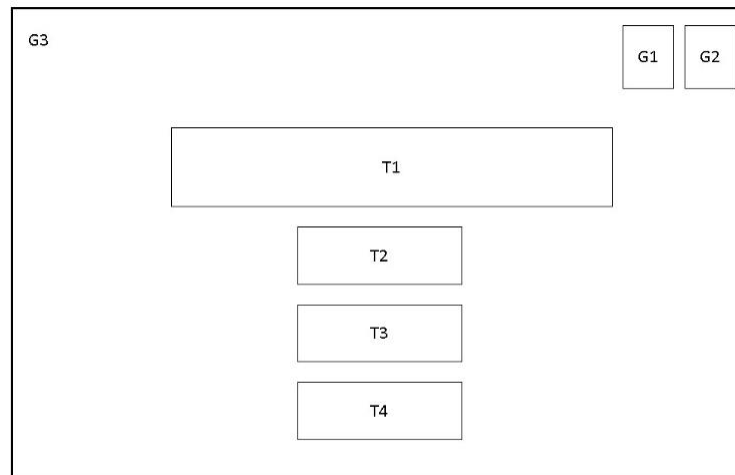


Figure 3-16: Addition quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
T1	This text element represents the question shown to the users
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.
T4	This text element represents one of the options of answer.

Table 3-15: Storyboard of addition quiz

3-2-16 Subtraction Quiz

No. of Storyboard	: 16
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Subtraction Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the subtraction quiz

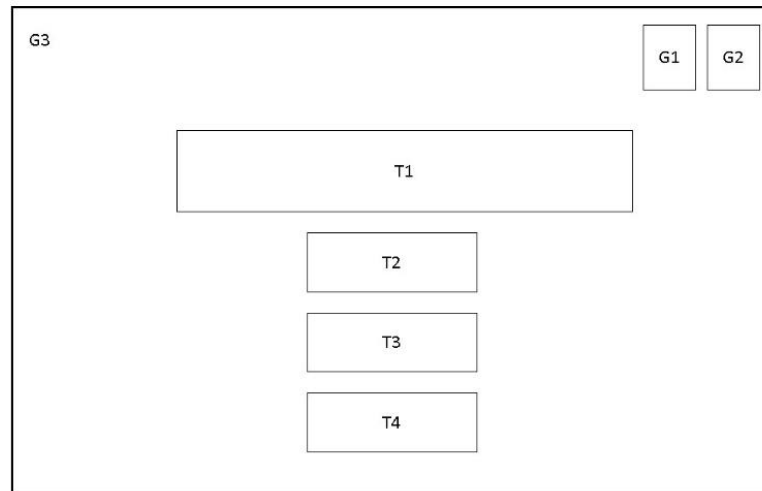


Figure 3-17: Subtraction quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
T1	This text element represents the question shown to the users
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.
T4	This text element represents one of the options of answer.

Table 3-16: Storyboard of subtraction quiz

3-2-17 Multiplication Quiz

No. of Storyboard	: 17
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Multiplication Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the multiplication quiz

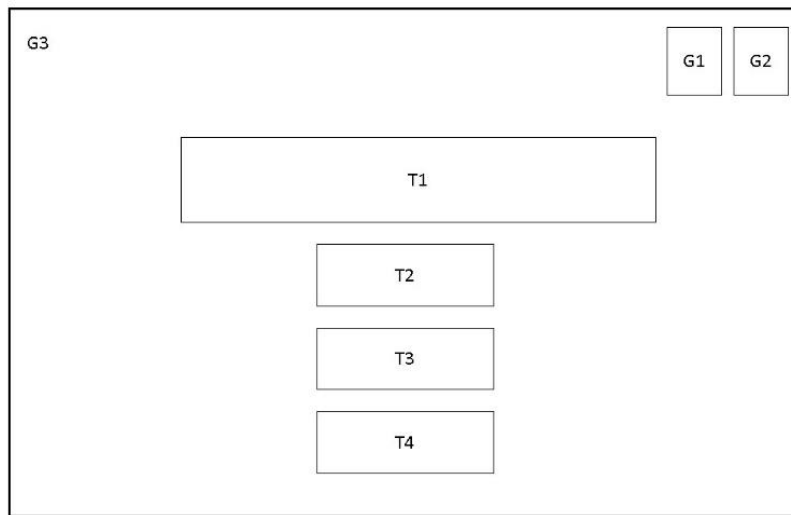


Figure 3-18: Multiplication quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
T1	This text element represents the question shown to the users
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.
T4	This text element represents one of the options of answer.

Table 3-17: Storyboard of multiplication quiz

3-2-18 Division Quiz

No. of Storyboard	: 18
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Division Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the division quiz

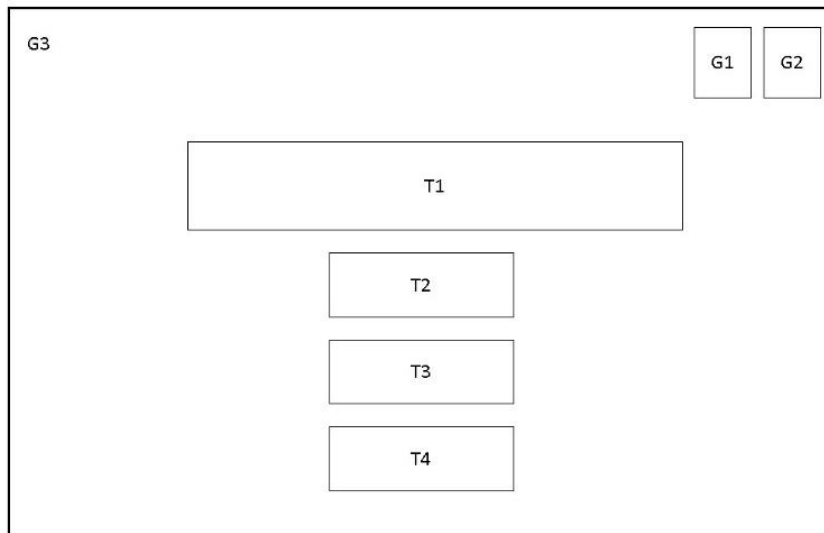


Figure 3-19: Division quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
T1	This text element represents the question shown to the users
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.
T4	This text element represents one of the options of answer.

Table 3-18: Storyboard of division quiz

3-2-19 Coins Quiz

No. of Storyboard	: 18
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Coins Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the coins quiz

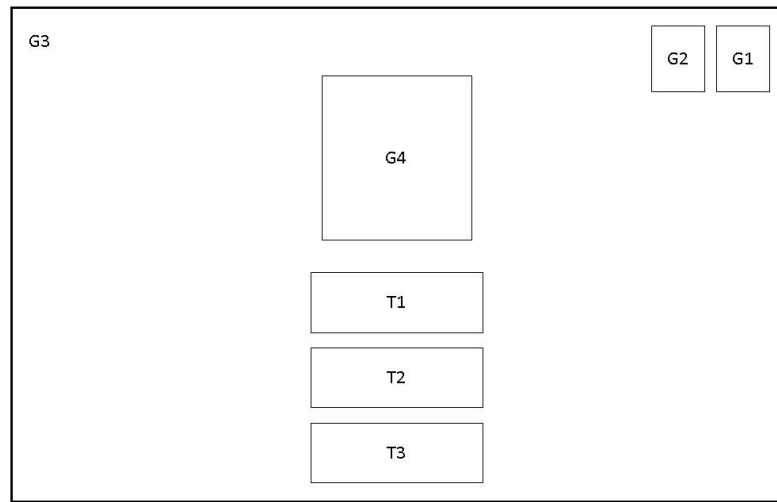


Figure 3-20: Coins quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
G4	This graphic element represents as coin.
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.
T4	This text element represents one of the options of answer.

Table 3-19: Storyboard of coins quiz

3-2-20 Shape Quiz

No. of Storyboard	: 20
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Shape Quiz
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the shape quiz

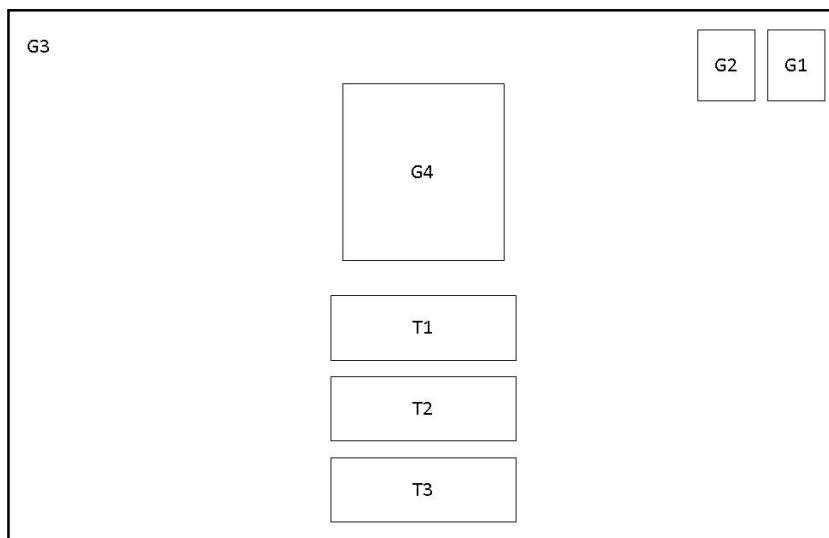


Figure 3-21: Shape quiz

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
G4	This graphic element represents as questions to the users.
T1	This text element represents one of the options of answer.
T2	This text element represents one of the options of answer.
T3	This text element represents one of the options of answer.

Table 3-20: Storyboard of shape quiz

3-2-21 Correct Answer

No. of Storyboard	: 21
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Description	: This storyboard shows the design of the interface when the users get correct answer

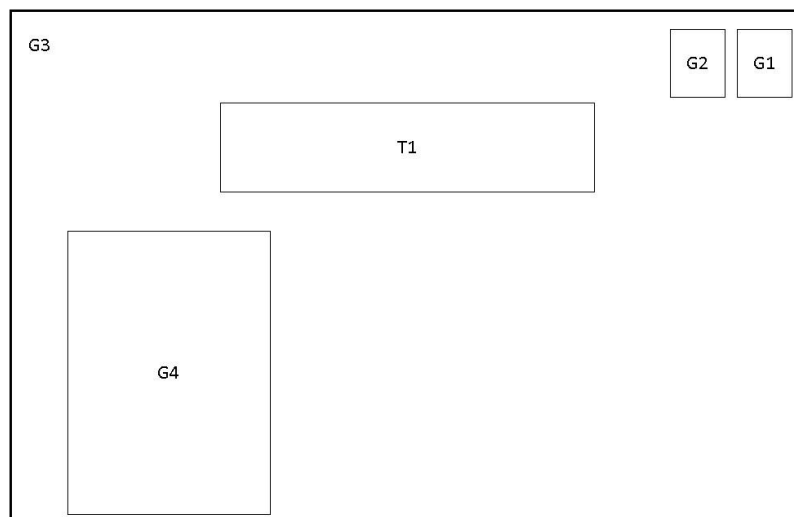


Figure 3-22: Correct answer interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
G4	This graphic element represents a character with thumbs up.
T1	This text element represents “Well Done!”

Table 3-21: Storyboard of correct answer

3-2-22 Wrong Answer

No. of Storyboard	: 22
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Description	: This storyboard shows the design of the interface when the users get wrong answer

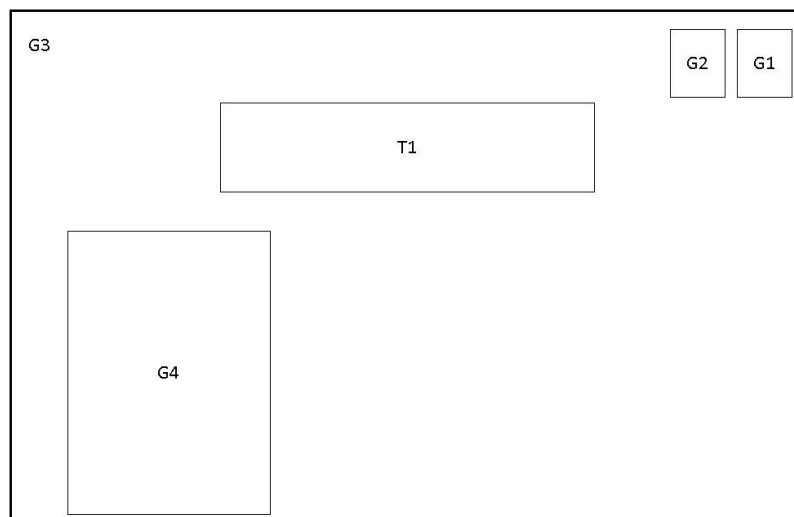


Figure 3-23: Wrong answer interface

Label	Description
G1	This graphic element represents as a home button which will link to the main menu.
G2	This graphic element represents as a back button which will link to the quiz module.
G3	This graphic element represents as a background.
G4	This graphic element represents a character with crying emotion.
T1	This text element represents “oh no”

Table 3-22: Storyboard of correct answer

3-2-23 Game Module

No. of Storyboard	: 23
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Game Module
Internal Link Page	: Main Menu, Learning Module
Description	: This storyboard shows the design of the shape quiz

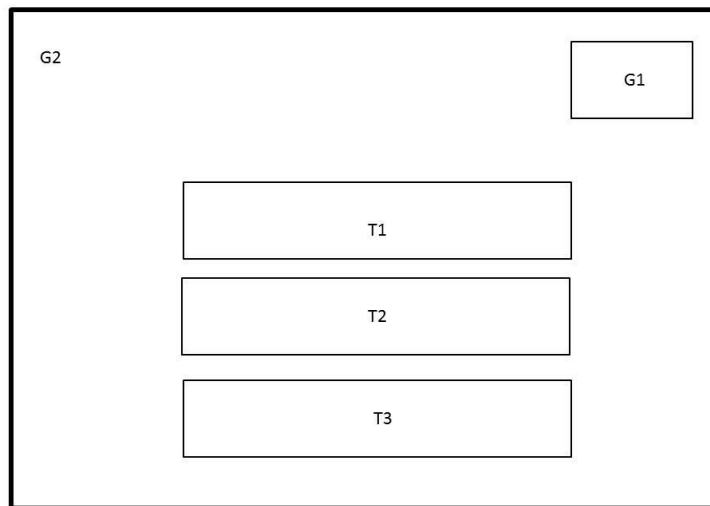


Figure 3-24: Game module

Label	Description
G1	This graphic element represents as a home button which will link to the main menu
G2	This graphic element represents the background
T1	“Easy” text will link to Easy Game.
T2	“Medium” text will link to Medium Game
T3	“Hard” text will link to Hard Game

Table 3-23: Storyboard of game module

3-2-24 Game Interface

No. of Storyboard	: 24
Title of Project	: An interactive multimedia courseware for kids to learn Mathematics
Page Name	: Easy Game, Medium Game, Hard Game
Internal Link Page	: Main Menu, Game Module
Description	: This storyboard shows the design of game interface

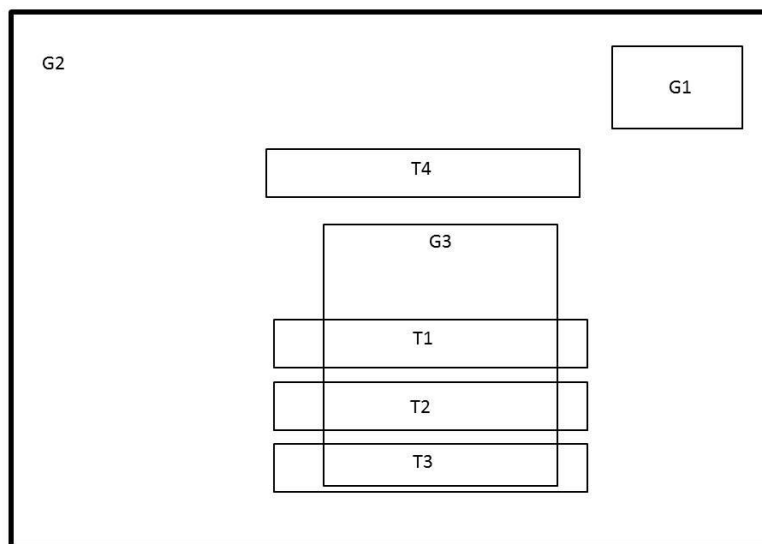


Figure 3-24: Game interface

Label	Description
G1	This graphic element represented as a home button which will link to the main menu.
G2	This graphic element represented the background.
G3	This graphic element represented as a monster.
T1	This text element represented one of the options.
T2	This text element represented one of the options.
T3	This text element represented one of the options.

Table 3-24: Storyboard of game interface

4-1 Methodology

The chosen design methodology is ADDIE methodology. According J. McGriff (2017), ADDIE model is an iterative process where the designer may need to go back to the previous phase based on the evaluation of each phase. The figure 3-1-1 below showed how ADDIE model works. In ADDIE model, each phase is related and interacting with one another (Aldoobie, 2015).

There were a few reasons why ADDIE model was chosen:

- **ADDIE model represented a flexible and dynamic guideline as a performance support tools.**

Generally, this model was used by instructional designers and training developers (Instructionaldesign.org, n.d.). This model is flexible and dynamic is because evaluation phase is occurred after every phase. So, if there are any errors, the designer can easily go back to the previous phase.

- **ADDIE model provided step-by step sequence of events (Rodriguez, 2012).**

By this, ADDIE model able to define the objectives or the tasks of the project clearly since it is a step-by step framework. A clear objective and task enable to produce a better quality of product.

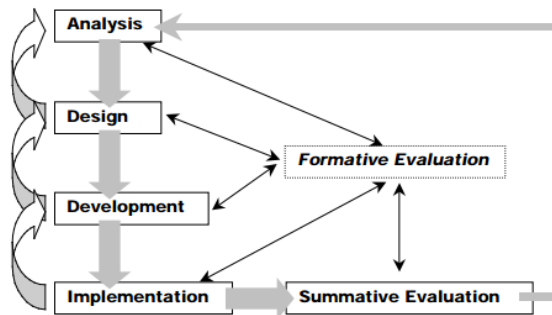


Figure 3-1: ADDIE model (Source : J. McGriff, 2007).

4-1-1 Analysis Phase

During analysis phase, the problem had been defined. Three problems identified were the children's ability to learn was underestimated, children have shorter attention span and it was difficult to cater every kid's needs due to their different learning pace. The objectives of this project also developed in analysis phase. Target audience for this project also was decided which was kindergarten students. Timeline was also developed for this project in analysis phase through Gantt chart.

4-1-2 Design Phase

During design phase, the outputs of analysis phase were used as the inputs of the design phase. The standard and content of Mathematics that will be using in the courseware was decided in this phase. Besides, the media elements and developing tools were also chosen in this phase. The modules that will be included in courseware also were introduced. Besides the media element, the interface of each module was also designed in this phase. Besides interfaces, the look and feel was also considered and designed according to the setting of the courseware. Next, the storyboards of the courseware were produced.

4-1-3 Development Phase

In this phase, the courseware was developed based on outputs from analysis and design phase. Each interface was developed according to the storyboards created. The content of the multimedia courseware was written during this phase. Besides, each module was also integrated into one program. Testing and bug fixing also occurred in this phase.

4-1-4 Implementation Phase

During implementation phase, some kids were invited to use the multimedia courseware developed. Their moods, reaction and using behaviors were observed for the project's further enhancement. The effectiveness and efficiency of the project delivery

need to be ensured to maximize the users' satisfaction. The errors or bugs that were found by the users will be fixed and solved in this phase.

4-1-5 Evaluation Phase

There are two types of evaluation in ADDIE model which are formative evaluation and summative evaluation. Formative evaluation was a type of evaluation which occurred after every phase in the model. This type of evaluation was to prevent any error in the previous stage or to fix the error bugs immediately before precede to the next phase. Meanwhile, summative evaluation was done after the final version of the multimedia courseware is implemented. This type of evaluation is to ensure the overall effectiveness of the courseware.

4-2 Tools

4-2-1 Adobe Director

Adobe director was chosen to deliver the multimedia courseware. Adobe director was used to publish the interactive content and it was easier to get started. It was used to create animation and video. One of the reasons that Adobe Director was chosen is because it supported many graphic, audio and video formats which brought lots of convenience. Furthermore, it also supported scripting language which is Lingo language. Lingo language can used to perform certain task which cannot be done by using drag-and drop method.

4-2-2 Microsoft PowerPoint

Microsoft PowerPoint was used to create the some of the text elements that were required by the multimedia courseware. Numbers of styles can be found within Microsoft PowerPoint.

4-2-3 Meitu Xiu Xiu

Meitu Xiu Xiu was used to edit the pictures. For examples, it was used to crop the pictures so that the graphic will look nice when import to Adobe Director. This software is also used to create the multimedia elements that needed for the courseware such as button.

4-2-4 Balabolka

Balabolka allows the users to type in some texts and it will read out the text. Then, the users can save the audio file. Therefore, this system has been used to make the narrator sound.

4-3 Requirement Specification

4-3-1 User Requirement

User requirement is what the multimedia courseware developed should do to satisfy user's needs. There were a few user requirement need to be achieved in this project. First, the courseware should be **provide a lot of graphic and color** in order to attract the attention of kids and made them feel interested in the courseware. Besides, **there shouldn't be containing too many words** as it may cause boredom to the children and eventually lose the interest towards the courseware. In other words, text should be reduced or replaced by graphics. Furthermore, the courseware should **provide clear instruction and navigation** to guide the children on how to use the courseware and the instruction or navigation should be available at all the time.

4-3-2 Functional Requirement

Functional requirement is the requirement that define the function of a system and what it can perform in the certain condition. Several function requirements are proposed for the multimedia courseware for kids to learn Mathematics:

- i. User can learn basic Mathematics in the learning module.

- ii. User can do the exercise in the quiz module.
- iii. User can play and learn Mathematics in the game module.

4-3-3 Non-Functional Requirement

Non-functional requirement is to define whether the system meet the specific criteria and measurement. The following are the proposed non-functional requirement for the multimedia courseware:

- i. Performance
 - The system should be able to respond to the requests of users quickly with no delay.
- ii. Interactivity
 - The level of interactivity of the system should be high so that the kids will engage themselves while learning Mathematics through the multimedia courseware.
- iii. Ease of use
 - Since the target user of the multimedia courseware is kindergarten students, the system should be easy and simple to use so that they can learn how to use the system easily.
- iv. Reliability
 - The system developed should be reliable that no error should occurred when the users are using the courseware.

4-4 System Requirement

4-4-1 Minimum Hardware Requirement

Hardware	Specification
RAM	1 GB RAM or higher
Processor	1 GHz Processor or higher
Graphic Card	32-bit graphic card or higher
Sound Card	32-bit sound card or higher
Free Disk Space	1GB or free disk space or higher

Table 5-1: Hardware requirement specifications

4-4-2 Software Requirement

Software	Requirement
Operating system	-Windows XP, 7, 8 or 10 -32-bit or 64-bit

Table 5-2: Software requirement specifications

4-5 Verification Plan

To ensure a good quality of multimedia courseware, there were a few types of tests done to test the effectiveness, efficiency, accurate and reliable of the courseware. The types of the tests were unit testing, integration testing, system testing and acceptance testing.

4-5-1 Unit Testing

In unit testing, the tests were done separately and independently with the smallest testable parts of the application which was known as units. Usually, the tests only involved those characteristics which were important to the performance of the courseware. Through unit testing, the bugs or errors can be fixed and modified immediately as these changes may affect the functionality of the courseware as a whole (Rouse, 2017). Each function of the multimedia courseware will be tested in this phase.

4-5-2 Integration Testing

After unit testing, integration testing will be done. The units were integrated and starting to do the integration testing. It is to test each interfaces between different units that were linked and integrated. The requirement needed to be validated to check whether the requirements were implemented correctly or not (Roy, n.d.). After testing each function of the courseware, the functions will be integrated and tested again to ensure the quality of the courseware.

4-5-3 System Testing

System testing was done when there was a complete and integrated courseware to be tested. Through system testing, the courseware's compliance was evaluated with the specific requirements ("System Testing - Software Testing Fundamentals", n.d.). Black-box testing will be used in this phase. Black-box testing is one of the testing techniques where the tester tests the software without refer to the internal structure of the system (Software Testing Fundamentals, n.d.).

4-5-4 Acceptance Testing

Acceptance testing can be considered as pure functional testing (Software Testing Class, n.d.). In acceptance testing, the courseware needed to be tested whether it met the users' needs and requirement. The acceptance criteria needed to be checked so that the courseware was acceptable to the users.

- **Alpha testing**

In alpha testing, the courseware will be tested by the developer. There will be no user involvement for this method of testing (ISTQB Exam Certification 2015). Alpha testing will be done before the final and actual courseware published.

4-6 Project Timeline

4-6-1 Final Year Project I

	Task Name	Start	Finish
1	▸ Multimedia Courseware (FYP 1)	Mon 29/05/17	Sat 17/06/17
2	▸ Analysis Phase	Mon 29/05/17	Tue 13/06/17
3	Develop problem statement	Mon 29/05/17	Wed 31/05/17
4	Develop project scope	Mon 29/05/17	Wed 31/05/17
5	Develop project objectives	Mon 29/05/17	Wed 31/05/17
6	Define impact, significance and contribution	Wed 31/05/17	Wed 31/05/17
7	Define background information	Thu 01/06/17	Thu 01/06/17
8	Literature review	Fri 02/06/17	Tue 13/06/17
9	Critical remark of previous work	Sat 10/06/17	Tue 13/06/17
10	▸ Design Phase	Sat 10/06/17	Wed 28/06/17
11	Select develop tools	Wed 14/06/17	Wed 14/06/17
12	Design User Requirement	Thu 15/06/17	Thu 15/06/17
13	Develop verification plan	Fri 16/06/17	Sat 17/06/17
14	Develop system flow diagram	Sun 18/06/17	Mon 19/06/17
15	Develop storyboards	Tue 20/06/17	Wed 28/06/17
16	▸ Development Phase	Thu 29/06/17	Fri 25/08/17
17	Collect multimedia elements	Thu 29/06/17	Wed 05/07/17
18	Develop system prototype	Thu 06/07/17	Fri 25/08/17

Figure 4-1: Timeline of FYP1

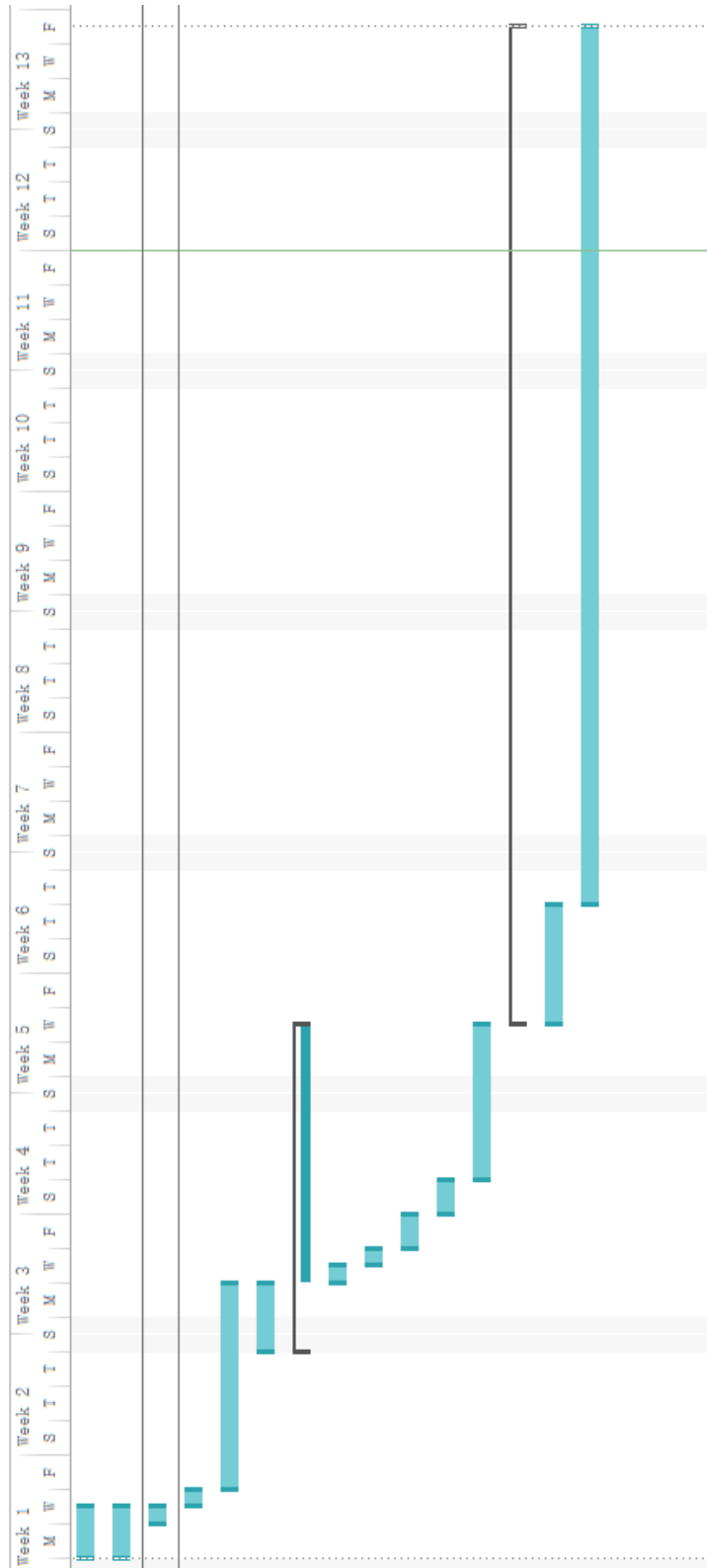


Figure 4-2: Gantt Chart of FYP1

4-6-2 Final Year Project II

	Task Name	Duration	Start	Finish
1	 Multimedia Courseware (FYP 2)	166 days	Sun 13/08/17	Mon 02/04/18
2	 Development Phase	30 days	Mon 15/01/18	Fri 23/02/18
3	Develop each module	13 days	Mon 15/01/18	Wed 31/01/18
4	Write the code for module needed	7 days	Thu 01/02/18	Fri 09/02/18
5	Testing each module	1 day	Sat 10/02/18	Sat 10/02/18
6	Fix bugs	3 days	Sat 10/02/18	Tue 13/02/18
7	Integrate all modules	1 day	Wed 14/02/18	Wed 14/02/18
8	Testing the courseware	3 days	Thu 15/02/18	Mon 19/02/18
9	Fix bugs	4 days	Tue 20/02/18	Fri 23/02/18
10	 Implementation Phase	7 days	Mon 26/02/18	Tue 06/03/18
11	Invite kid to use the courseware	1 day	Mon 26/02/18	Mon 26/02/18
12	Observe how the kid use the courseware	1 day	Mon 26/02/18	Mon 26/02/18
13	Collect feedback	1 day	Mon 26/02/18	Mon 26/02/18
14	Fix bugs and further enhancement	5 days	Tue 27/02/18	Mon 05/03/18
15	Test the courseware	1 day	Tue 06/03/18	Tue 06/03/18
16	 Evaluation Phase	19 days	Wed 07/03/18	Mon 02/04/18
17	Evaluate the courseware	1 day	Wed 07/03/18	Wed 07/03/18
18	Further enchacement	18 days	Thu 08/03/18	Sat 31/03/18
19	Submission of the courseware	1 day	Mon 02/04/18	Mon 02/04/18

Figure 4-3: Timeline of FYP2

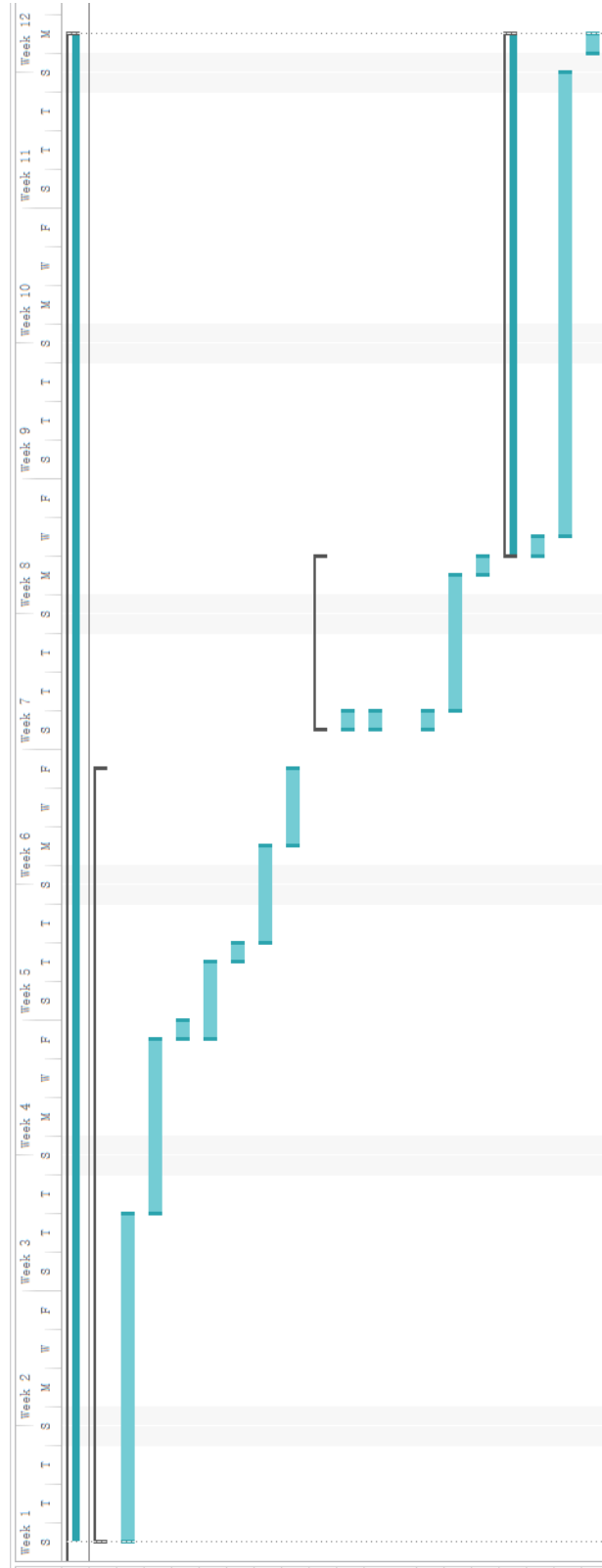


Figure 4-4: Gantt Chart of FYP2

5-1 Pre-Authoring Process

Multimedia elements such as graphic, text, audio and animation were designed and created in pre-authoring process.

5-1-1 Graphic

As the target users of this multimedia courseware are kids, the graphics used should be attractive and colourful.

5-1-1-1 Trimming



Figure 5-1: Trimming – Step 1(a)

The software used to trim the white space of the graphic is Meitu XiuXiu. The first step was to open the graphic that needed to be trimmed.



Figure 5-2: Trimming – Step 2

After selecting the graphic, pressed the cutout button which is marked on Figure 5-2. This button provided the function to trim the places that is not needed.



Figure 5-3: Trimming – Step 3

The next step was to draw on the part that is needed.



Figure 5-4: Trimming – Step 4

After step 3, chose to save the graphic in PNG format as PNG format supports transparent background. Then, the graphic is done trimming.

5-1-1-2 Button

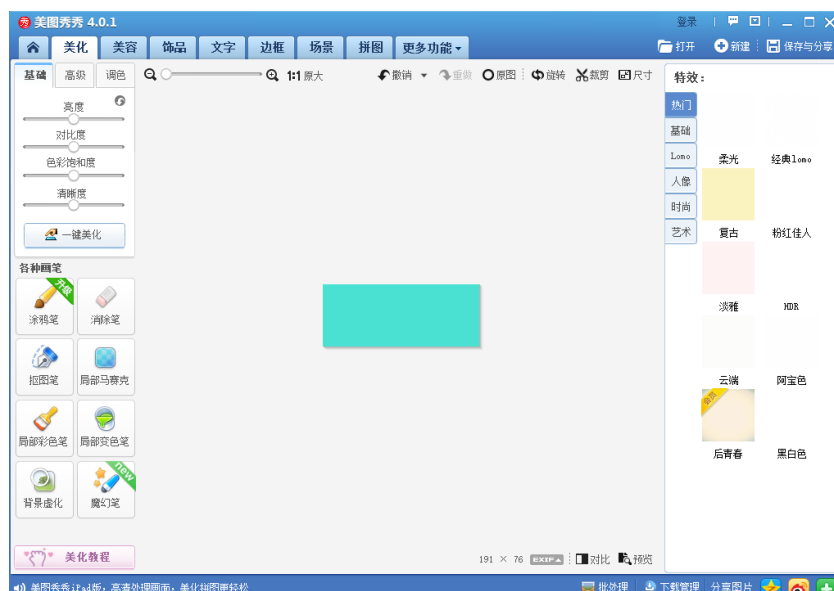


Figure 5-5: Creating Button – Step 1

To create a button, the first step is to draw a rectangle using the software. This step is to create the “back” of the button.

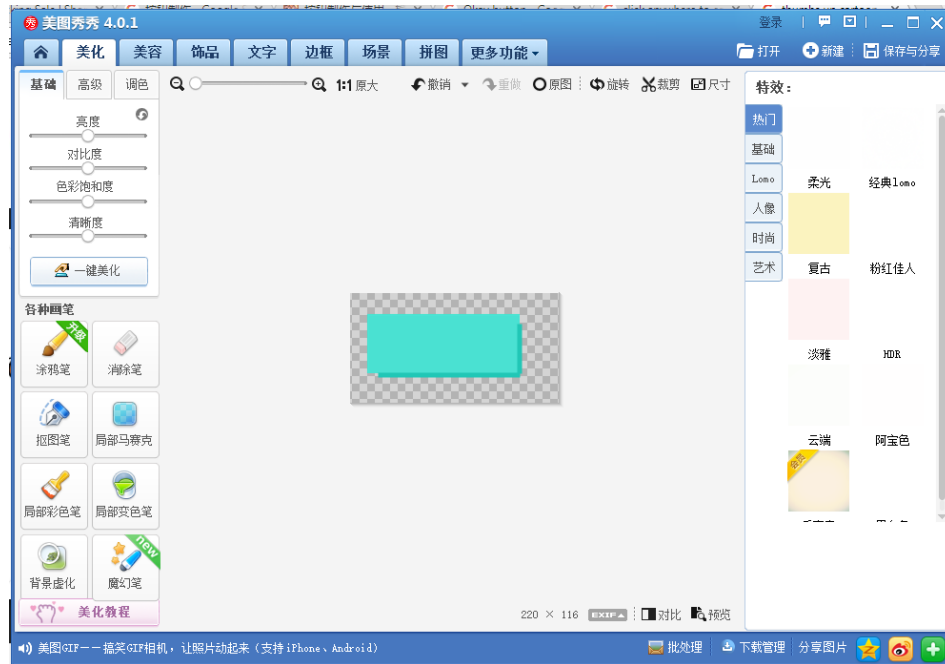


Figure 5-6: Creating button – Step 2

Next, chose a darker colour and added to the bottom and left of the rectangle. This to avoid the button looks too flat for the users.

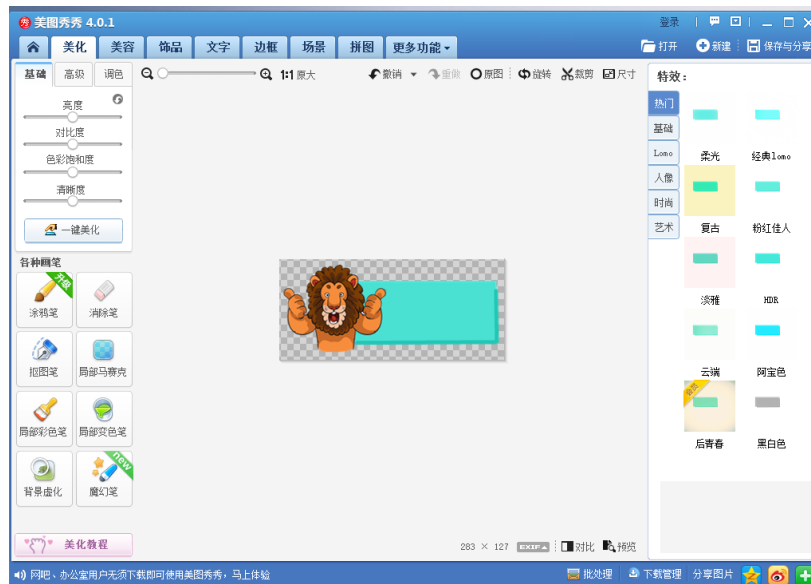


Figure 5-7: Creating button – Step 3

Next, a graphic was added in front of the rectangle. Since the application is designed for kids, the graphic should be more colourful. Therefore, a cartoon graphic was added in order to grab the attention of kids.

5-1-2 Text

Text element was also a vital element in multimedia courseware. It was important because text played a role to deliver information and knowledge to the users.



Figure 5-8: Creating text – Step 1

The text was created using cooltext which was an online text generator. The result can be seen at the top which was labeled as “1” in the figure above. The content of the text can be change at Logo Text which was labeled as “2” in the figure above. Then, the text size also can be adjusted at Text Size which was label as “3” in the figure above.

Easy Text Generator

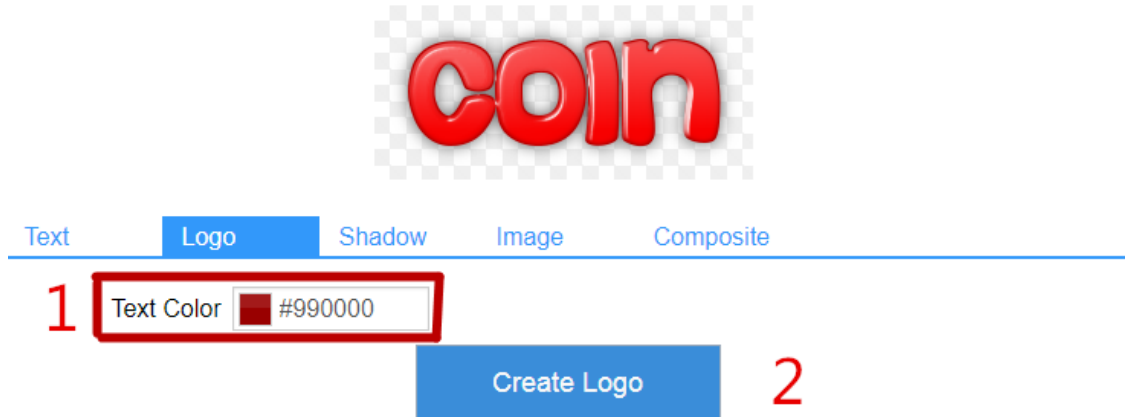


Figure 5-9: Creating text – Step 2

After selecting the text size, the colour of the text can be changed at Text Color which was labeled as “1” in the figure above. Next, pressed to create logo button which was labeled as “2” in the figure above to generate the text.

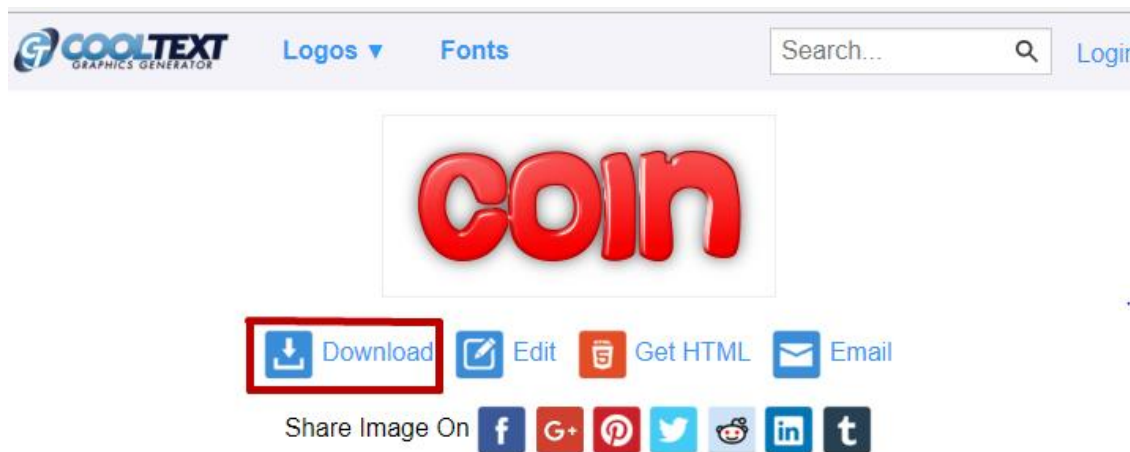


Figure 5-10: Creating text – Step 3

After generating the text, it can be downloaded as a PNG file which means the text generated is in transparent background.

5-1-3 Audio

In order to improve the courseware, sound was needed to be embedded into the application. In this multimedia courseware, sound was used as sound effect, narrator and background music.

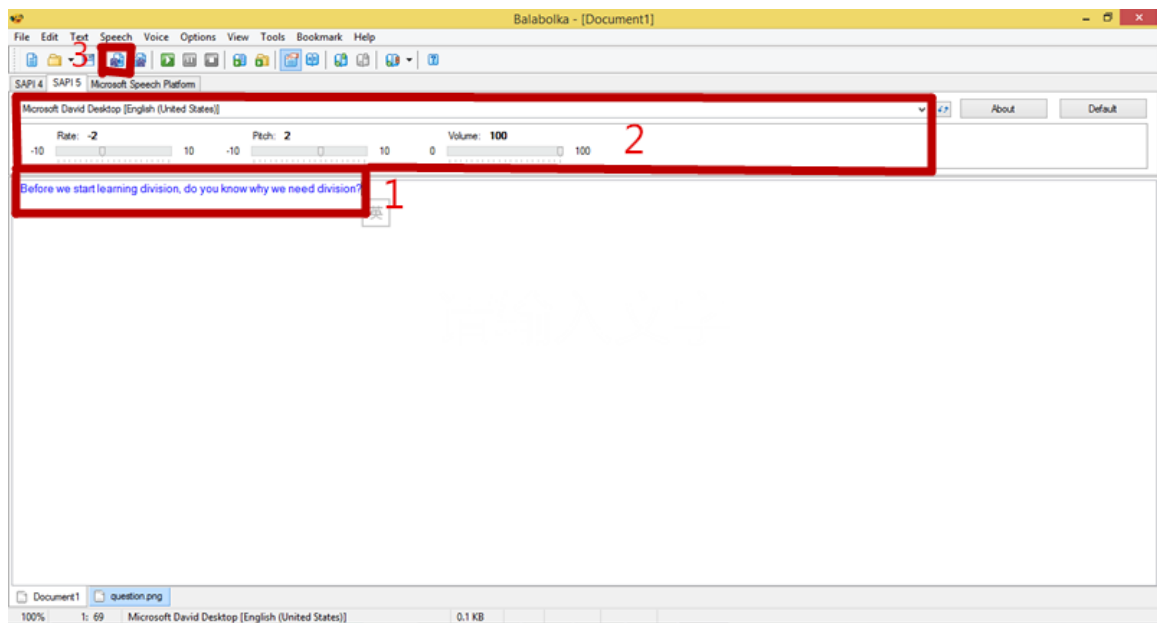


Figure 5-11: Creating narrator

The software used to create audio is Balabolka. First, type the content in that text box which was label as “1”. Then, the setting can be adjusted in the area which was labeled as “2”. Since the target users are kids, the rate was slowed down and the pitch was increased in order to attract the attention of children. After finish setting the audio, the audio was saved in MP3 format by pressing the save audio button which was labeled as “3” in the figure above.

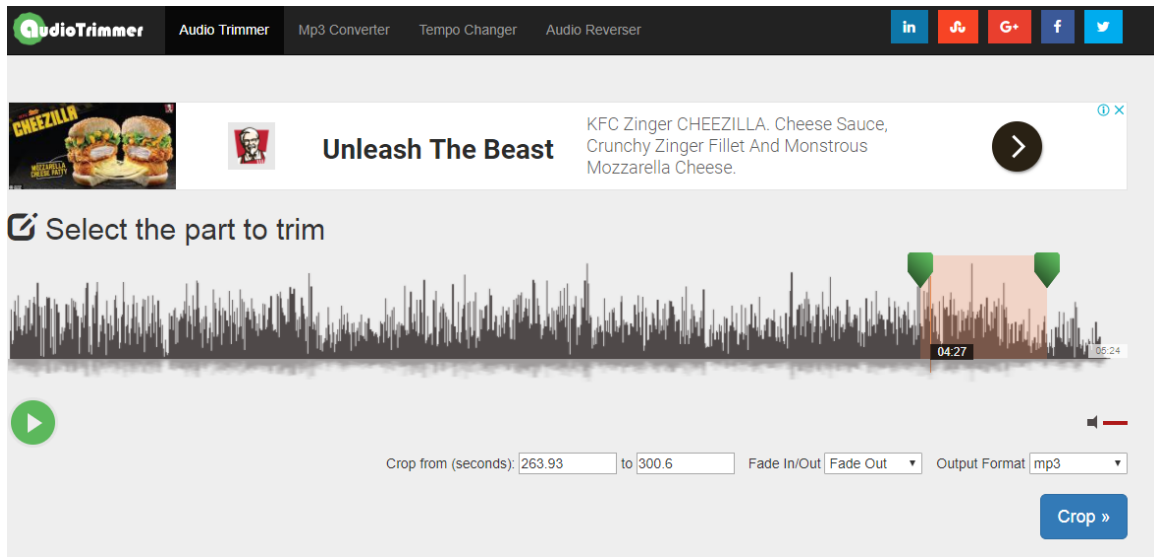


Figure 5-12: Cutting audio

The next method to create the audio element is by cutting the audio file. The software used to cut the audio is audioTrimmer which was an online audio trimmer. First, the audio file that needed to be cut was uploaded to the audioTrimmer. Then, the required part was selected by moving the arrow or changing the seconds. Next, the effect which was fade out was selected and chose the appropriate output format. Then, cropped the audio and saved the audio file in MP3 format.

5-1-4 Animation

Animation was different from the graphic where graphic was a static image while animation was a series of dynamic image. It means the users were able to see a moving graphic in the courseware. Animation will help in making the courseware more interesting and helped in seeking the attention from children.

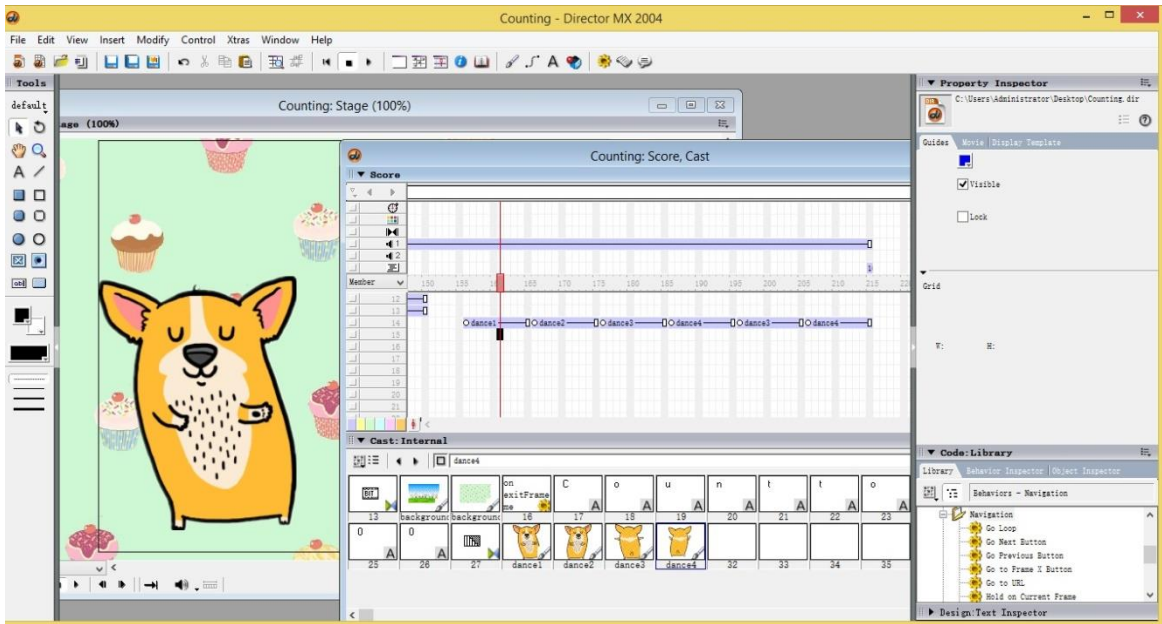


Figure 5-13: Creating animation – Step 1

First, import a series of graphics into Macromedia Director. Then, arranged the element in order and made sure it was moved smoothly as we moved the timeline.

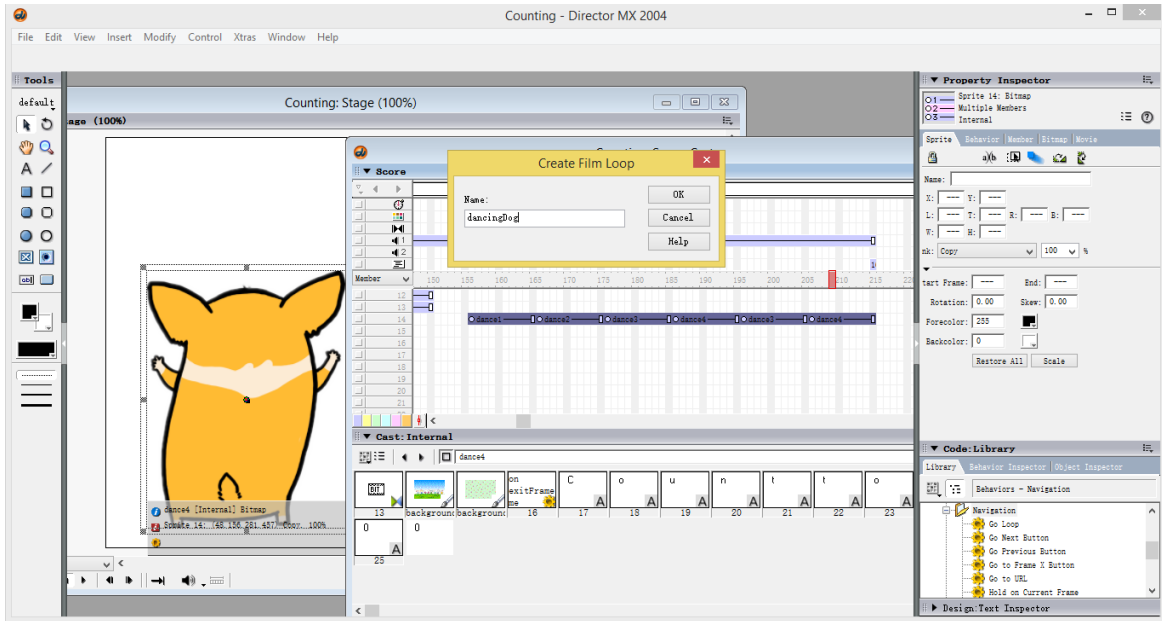


Figure 5-14: Creating animation – Step 2

Next, select all the elements that were arranged in the timeline earlier. Next, create a film loop so and named it properly that it will become an animation.

5-2 Authoring Process

Authoring process was navigating and controlling the cast members which were also known as contents in the courseware. The purpose of authoring process was to build up the connections between the cast members of the courseware. Macromedia Director was used to operate the authoring process of the multimedia courseware proposed. This software provides stage so that the multimedia elements prepared can be arranged, navigated and controlled from frame to frame. Interactivity can be added by using the drag and drop function or lingo script can be written to enhance the interactivity of the courseware.

5-2-1 Main Menu



Figure 5-15: Main menu

Label	Description
1	Name of the multimedia courseware.
2	<p>Menu of the courseware. Users can select what module he/she wants to go.</p> <p>Behaviour used: Rollover Cursor Change, Rollover Member Change, Play Sound, Play Frame X</p> <p>Lingo script used:</p> <ul style="list-style-type: none"> • <code>sprite(x).visible = 1, sprite(x).visible = 0</code> -To allow the application to show the appropriate animation. • Go to frame X, go to the frame -To allow users stay in the main menu page before select any of the options • on MouseDown me <code>open "LearningModule.exe"</code> <code>halt</code> <code>end</code> -To allow the users to go to learning module.
3	<p>Animation element that will changed according to the mouse's rollover action.</p> <p>Lingo script used:</p> <ul style="list-style-type: none"> • <code>sprite(x).visible = 1, sprite(x).visible = 0</code> -To allow the animation changed when users point to different options.

Table 5-3: Development of main menu

5-2-2 Exit Page



Figure 5-16: Exit page

Label	Description
1	Text element that asking the users whether are they sure they want to exit. This was to confirm with the users that they were not press the exit button accidentally.
2	<p>Yes button. This button will close the application.</p> <p>Behaviour used: Rollover Cursor Change, Rollover Member Change, Play Sound</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • halt <p>-To close the application.</p>
3	<p>No button. This button will prevent the user from closing the application.</p> <p>Behaviour used: Rollover Cursor Change, Rollover Member Change, Play Sound, Play Frame X</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • Go to frame X <p>-To bring the user back to the main menu.</p>

Table 5-4: Development of exit page

5-2-3 Learning Module



Figure 5.17: Learning module

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>

2	<p>Menu of the Learning Module. Users can select what module he/she wants to go.</p> <p>Behaviour used: Rollover Cursor Change, Rollover Member Change, Play Sound</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • <code>sprite(x).visible = 1, sprite(x).visible = 0</code> <p>-To allow the application to show the appropriate animation.</p> <ul style="list-style-type: none"> • <code>on MouseDown me</code> <pre style="margin-left: 40px;"> open "xxx.exe" halt end </pre> <p>-To allow the users to go places they want.</p>
3	<p>Animation element that will change according to the mouse's rollover action to briefly show what the option is about.</p> <p>Lingo script used:</p> <ul style="list-style-type: none"> • <code>sprite(x).visible = 1, sprite(x).visible = 0</code> <p>-To allow the animation changed when users point to different options.</p>

Table 5-5: Development of learning module

5-2-4 Counting



Figure 5.18: Counting

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>

2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	<p>Menu of the Learning Module. Users can select what module he/she wants to go.</p> <p>Behaviour used: Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-6: Development of counting

5-2-5 Coin

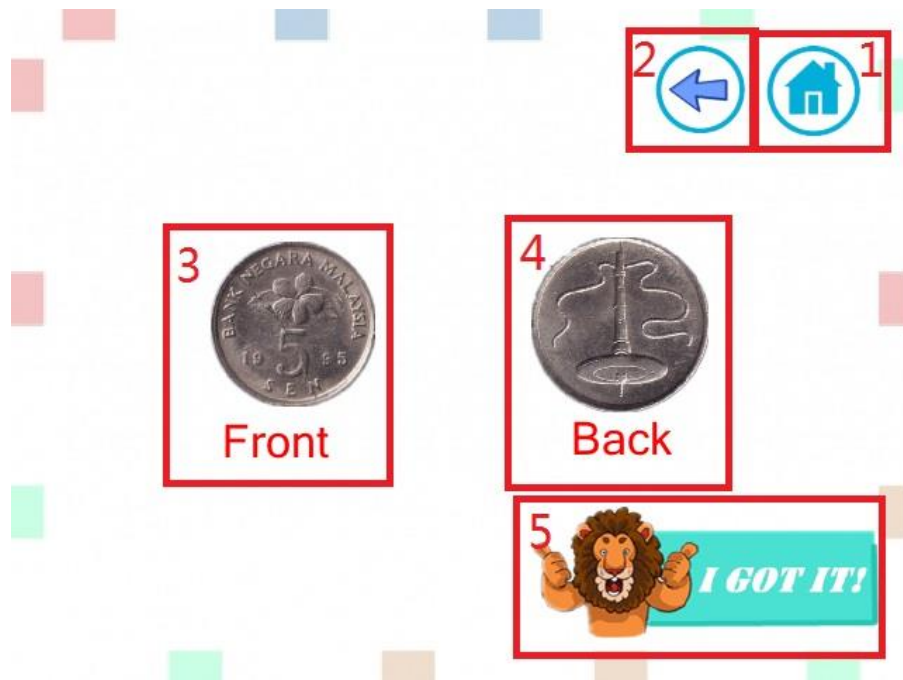


Figure 5.19: Coin

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	<p>The graphic element shows the front side of the coin and the text element tell the users this is the front side.</p>
4	<p>The graphic element shows the back side of the coin and the text element tell the users this is the back side.</p>
5	<p>This button allows the users to continue the application</p> <p>Behaviour used: Play Frame X, Rollover Member Change, Rollover Cursor Change, Play Sound</p>

Table 5-7: Development of coin

5-2-6 Addition(a)



Figure 5-20: Addition(a)

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>

2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me $\text{open "LearningModule.exe"}$ halt end <p>To allow the users to go back to the learning module.</p>
3	<p>This text element shows the explanation to the users.</p>
4	<p>This button allows the users to continue the application</p> <p>Behaviour used: Play Frame X, Rollover Member Change, Rollover Cursor Change, Play Sound</p>

Table 5-8: Development of addition(a)

5-2-7 Addition(b)

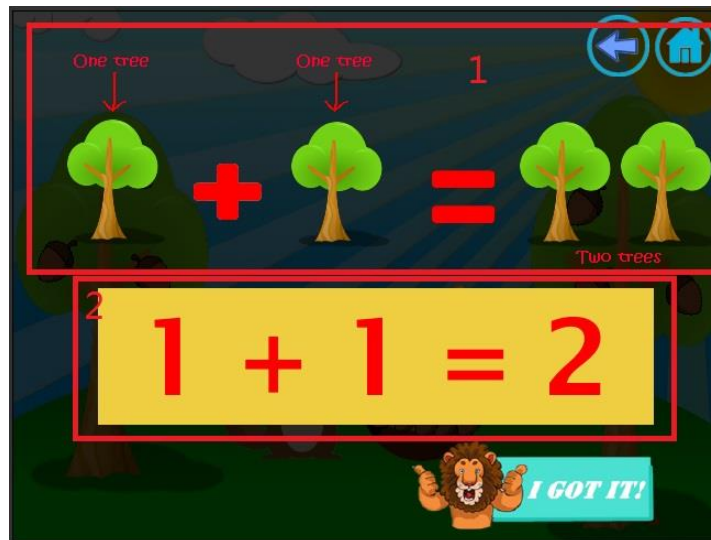


Figure 5-21: Addition(b)

Label	Description
1	The graphic elements showed the explanation to the users. Behaviour used: Wipe right
2	The graphic element and text element showed the explanation to the users. Behaviour used: Dissolve, bits

Table 5-9: Development of addition(b)

5-2-8 Subtraction

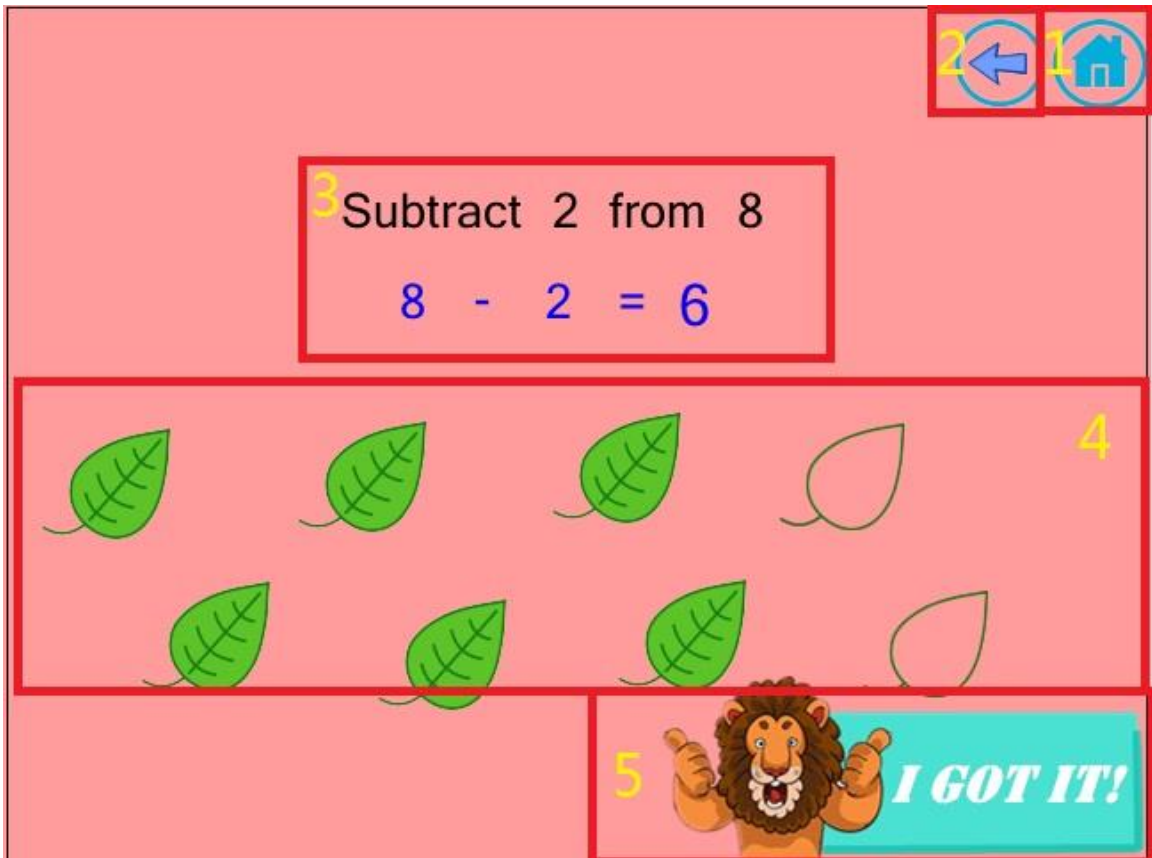


Figure 5-22: Subtraction

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This text element shows the explanation to the users.
4	This graphic element shows the explanation to the users.
5	<p>This button allows the users to continue the application</p> <p>Behaviour used: Play Frame X, Rollover Member Change, Rollover Cursor Change, Play Sound</p>

Table 5-10: Development of subtraction

5-2-9 Multiplication

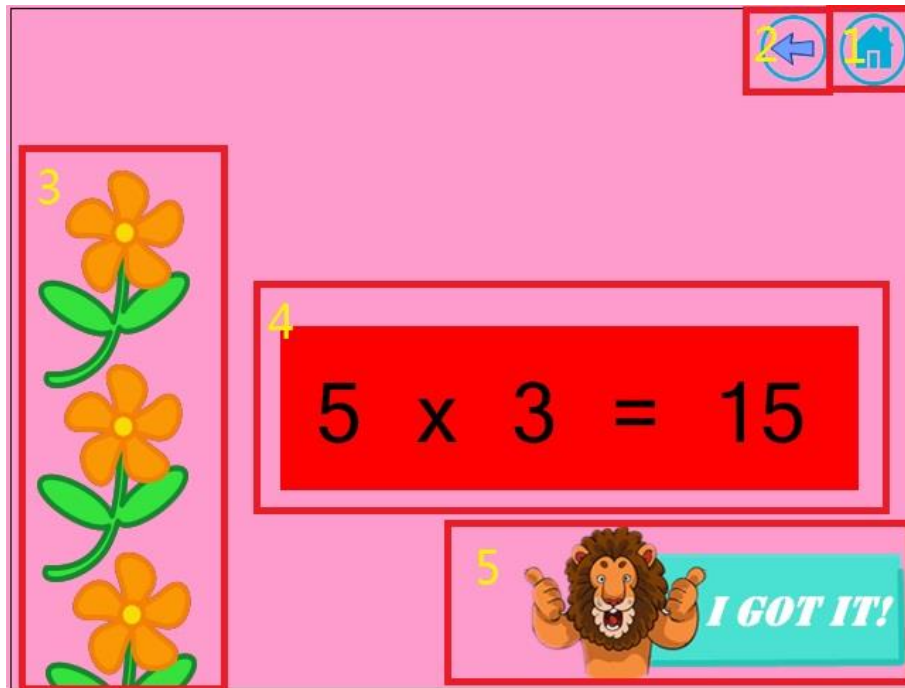


Figure 5-23: Multiplication

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p>

	<p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <pre> open "LearningModule.exe" halt end </pre> <p>To allow the users to go back to the learning module.</p>
3	This graphic element shows the explanation to the users.
4	This text element shows the explanation to the users.
5	<p>This button allows the users to continue the application</p> <p>Behaviour used: Play Frame X, Rollover Member Change, Rollover Cursor Change, Play Sound</p>

Table 5-11: Development of multiplication

5-2-10 Division

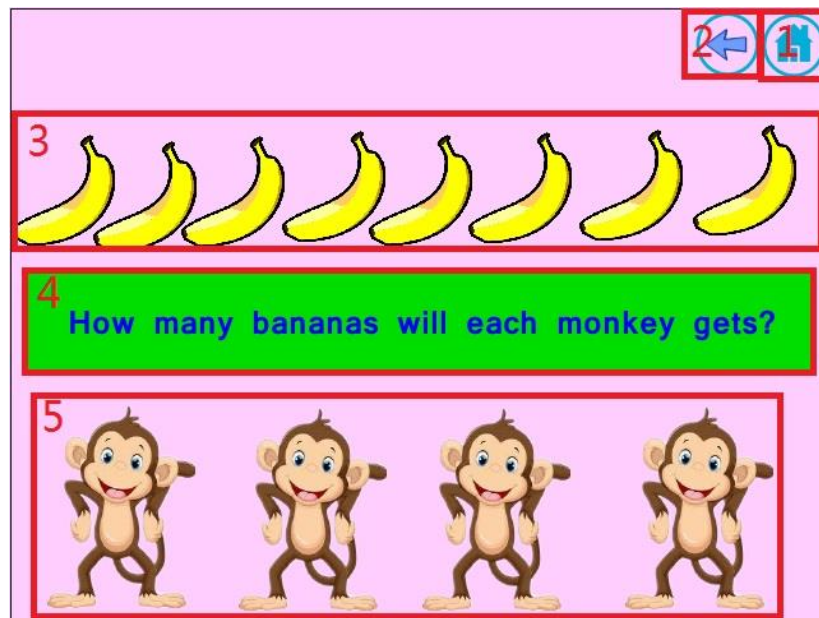


Figure 5-24: Division

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This graphic element shows the explanation to the users.
4	This text element shows the questions to the users.
5	This graphic element shows the explanation to the users.

Table 5-12: Development of division

5-2-11 Time



Figure 5-25: Time

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p>

	<p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <pre> open "LearningModule.exe" halt end </pre> <p>To allow the users to go back to the learning module.</p>
3	This graphic element represented as a clock to help to users to visualize clock.
4	This text element shows the explanation to the users.
5	<p>This button allows the users to continue the application</p> <p>Behaviour used: Play Frame X, Rollover Member Change, Rollover Cursor Change, Play Sound</p>

Table 5-13: Development of time

5-2-12 Shape

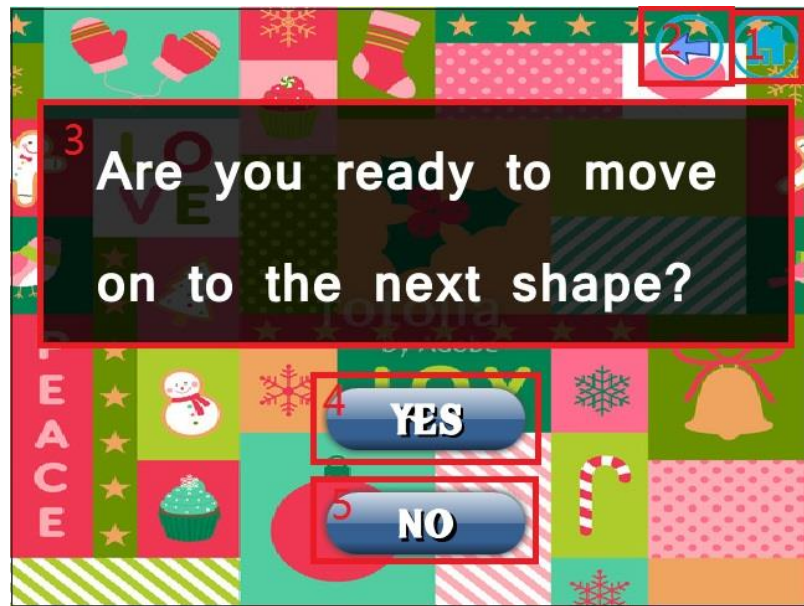


Figure 5-26: Shape

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	<p>This text element was to ask the users whether they are ready to continue or not.</p>
4	<p>Yes button for users to continue.</p> <p>Behaviour used: Play Frame X, Play Sound, Rollover Member Change, Rollover Cursor Change</p>
5	<p>No button for users to repeat the current content.</p> <p>Behaviour used: Play Frame X, Play Sound, Rollover Member Change, Rollover Cursor Change</p>

Table 5-14: Development of shape

5-2-13 Quiz Module



Figure 5-27: Quiz module

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>

2	<p>Menu of the Quiz Module. Users can select what module he/she wants to go.</p> <p>Behaviour used: Rollover Cursor Change, Rollover Member Change, Play Sound</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me open "xxx.exe" halt end <p>-To allow the users to go places they want.</p>
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Table 5-15: Development of quiz module

5-2-14 Counting Quiz

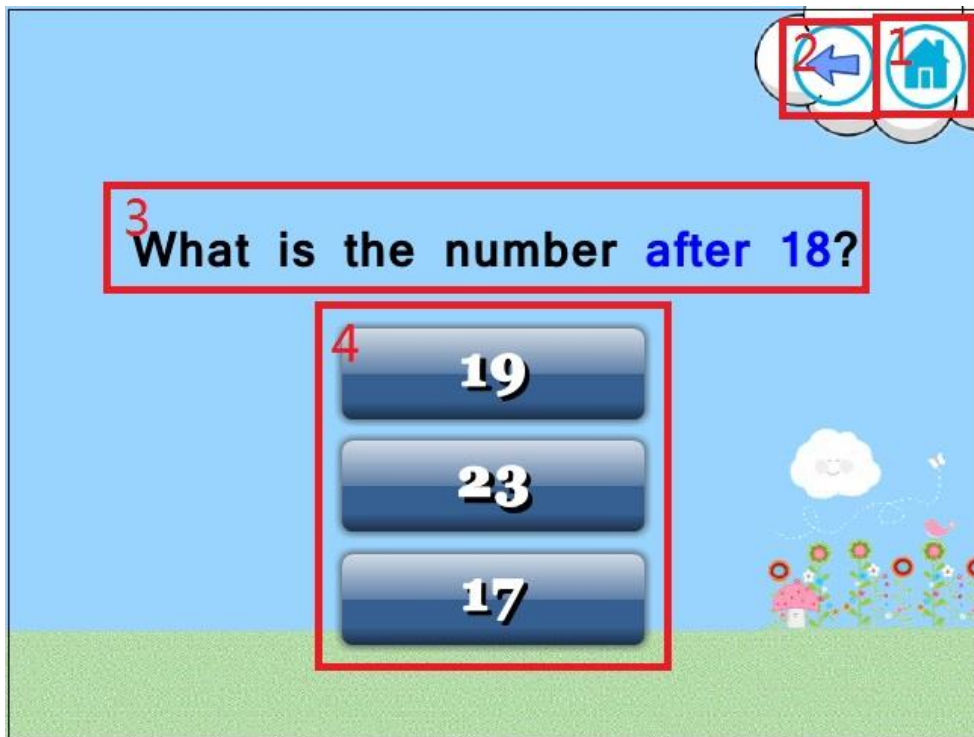


Figure 5-28: Counting quiz

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This text element represented the questions shown to the users
4	<p>Options of the answer.</p> <p>Behaviour used: Play Frame X, Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-16: Development of counting quiz

5-2-15 Coin Quiz

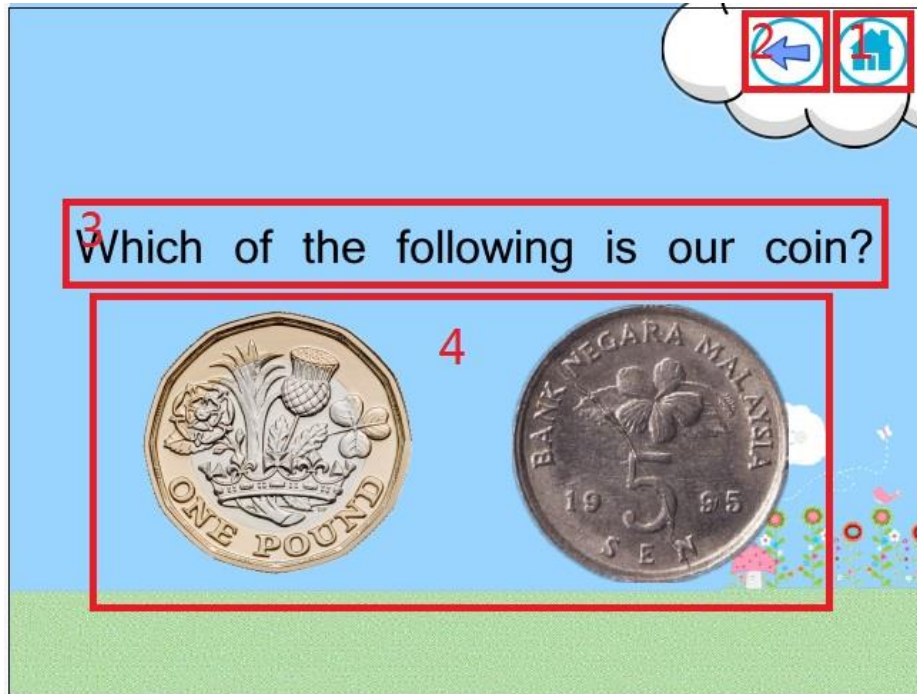


Figure 5-29: Coin quiz

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p>

	<p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This text element represented the questions shown to the users.
4	<p>This graphic element represented as the options of answer.</p> <p>Behaviour used: Play Sound, Rollover Member Change, Rollover Cursor Change, Play Frame X</p>

Table 5-17: Development of coin quiz

5-2-16 Addition Quiz

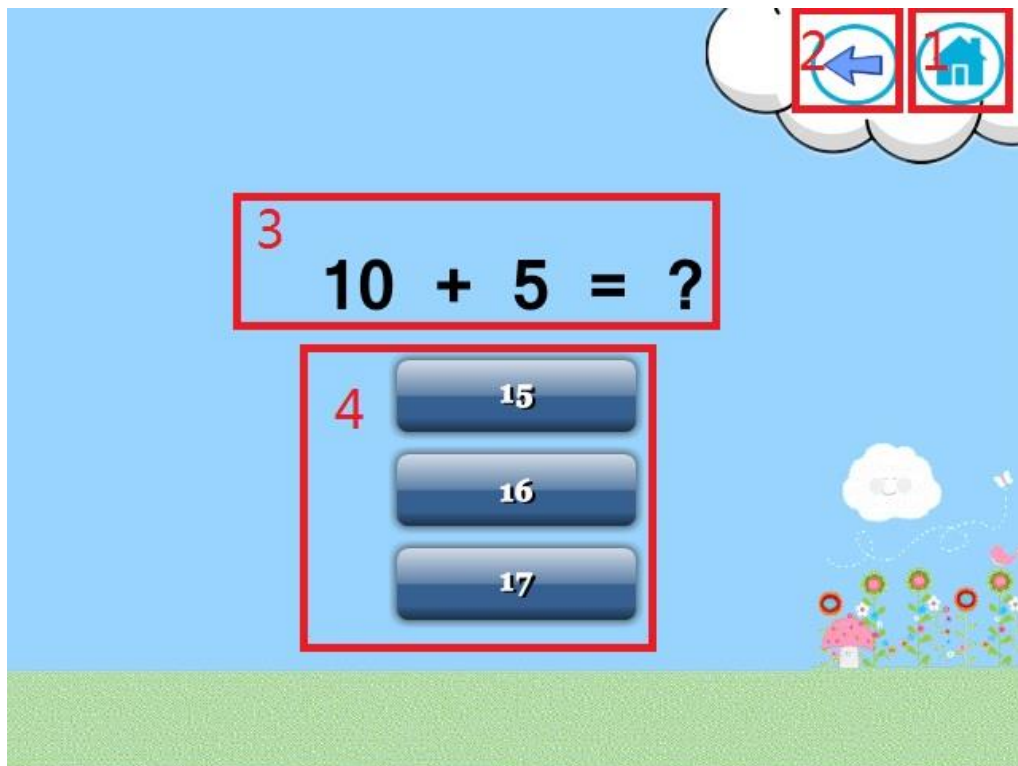


Figure 5-30: Addition quiz

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This text element represented the questions shown to the users
4	<p>Options of the answer.</p> <p>Behaviour used: Play Frame X, Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-18: Development of addition quiz

5-2-17 Subtraction Quiz

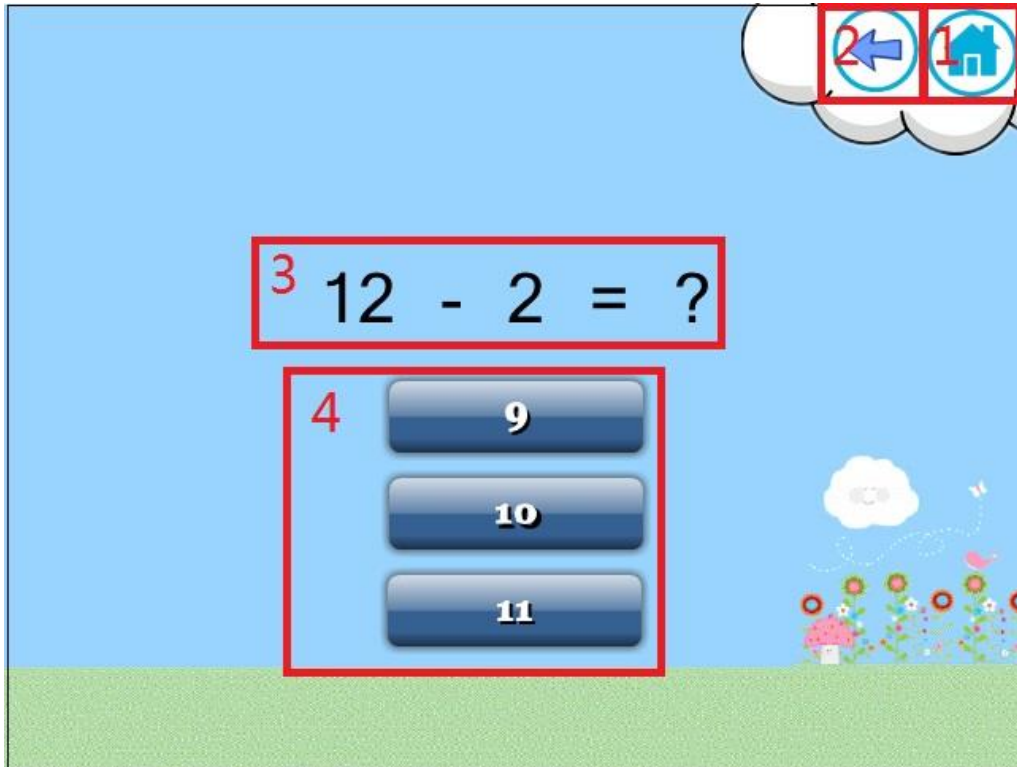


Figure 5-31: Subtraction quiz

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	Back button which allows the users to go back to the learning module.

	<p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This text element represented the questions shown to the users
4	<p>Options of the answer.</p> <p>Behaviour used: Play Frame X, Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-19: Development of subtraction quiz

5-2-18 Multiplication Quiz

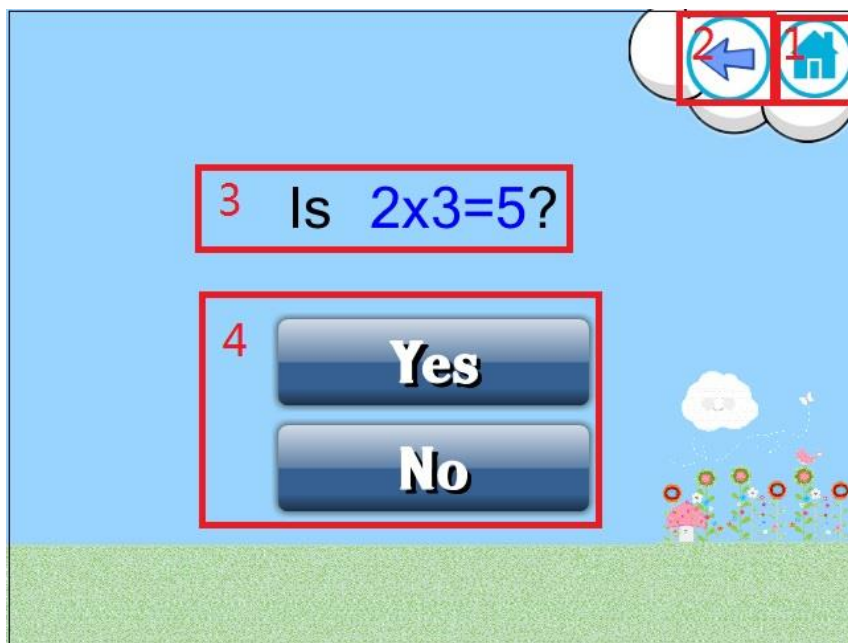


Figure 5-32: Multiplication quiz

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This text element represented the questions shown to the users
4	<p>Options of the answer.</p> <p>Behaviour used: Play Frame X, Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-20: Development of multiplication quiz

5-2-19 Division Quiz

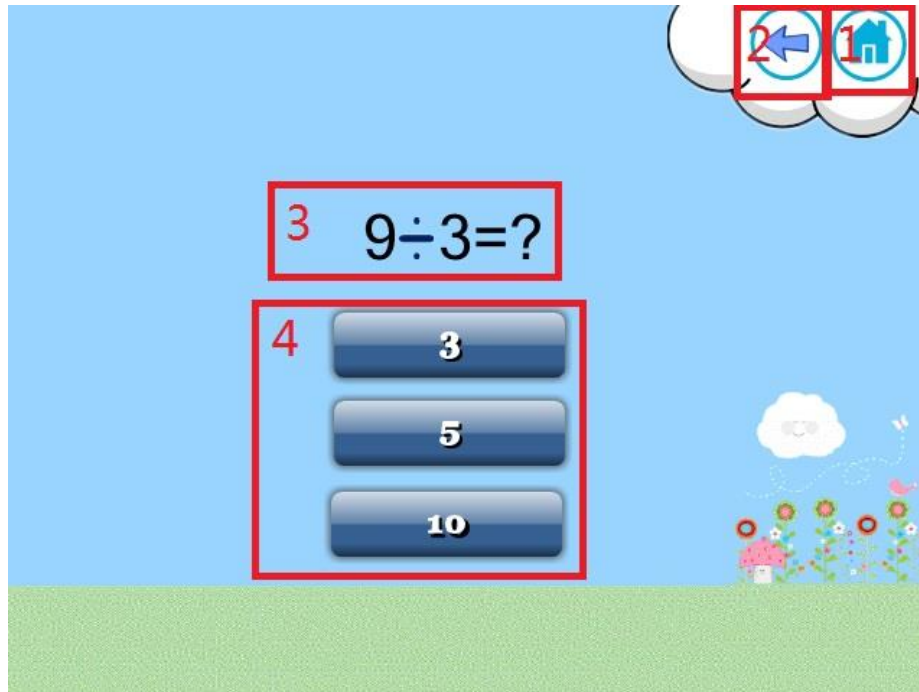


Figure 5-33: Division quiz

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p>

	<p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <pre> open "LearningModule.exe" halt end </pre> <p>To allow the users to go back to the learning module.</p>
3	This text element represented the questions shown to the users
4	<p>Options of the answer.</p> <p>Behaviour used: Play Frame X, Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-21: Development of division quiz

5-2-20 Time Quiz

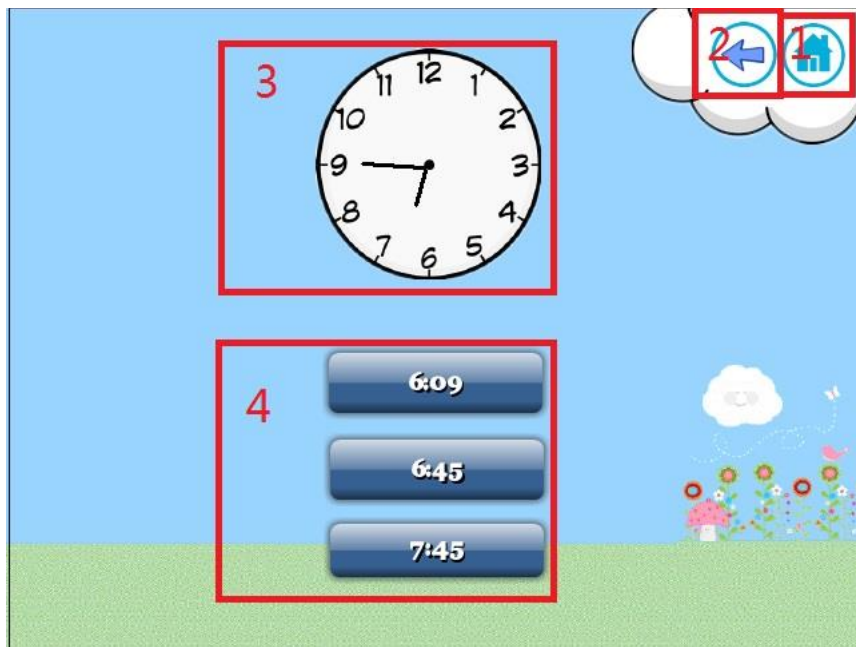


Figure 5-34: Time quiz

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	<p>This graphic element represented the clock shown to the users</p>
4	<p>Options of the answer.</p> <p>Behaviour used: Play Frame X, Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-22: Development of time quiz

5-2-21 Game Module

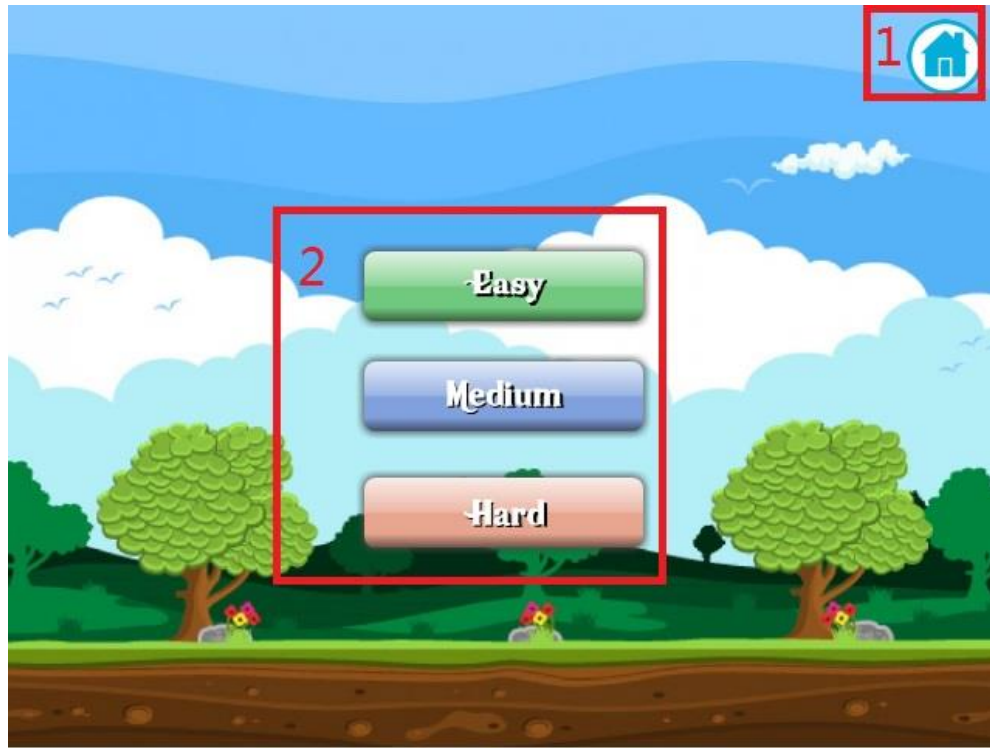


Figure 5-35: Game module

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	Menu of Game Module. Users can select what module he/she wants to go.

<p>Behaviour used: Rollover Cursor Change, Rollover Member Change, Play Sound</p> <p>Lingo Script used:</p> <ul style="list-style-type: none">• on MouseDown me <pre>open "xxx.exe"</pre> <pre>halt</pre> <pre>end</pre> <p>-To allow the users to go places they want.</p>

Table 5-23: Development of game module

5-2-22 Game Introduction



Figure 5-36: Game introduction

Label	Description
1	Skip button which allows the users to skip the introduction of game Behaviour used: Rollover Cursor Change, Play Frame X
2	The text element represented as the subtitle.

Table 5-24: Development of game introduction

5-2-23 Game Interface

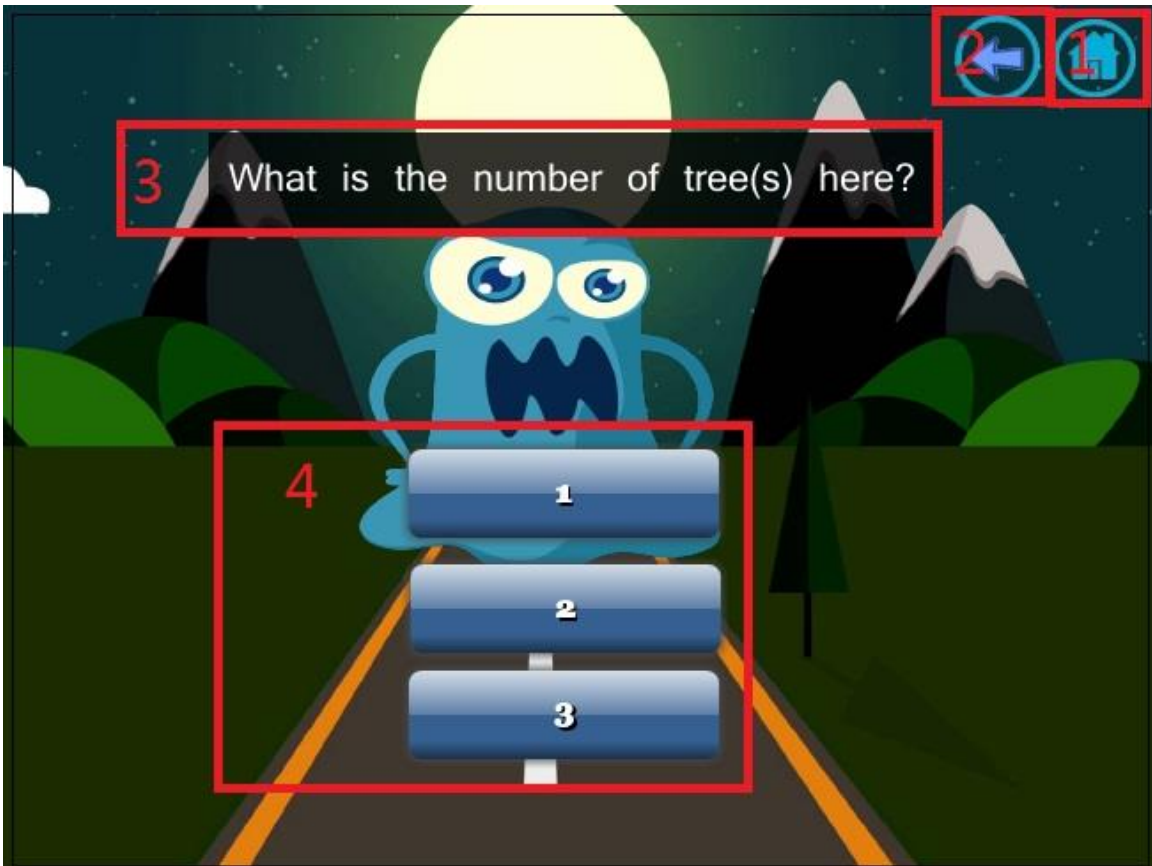


Figure 5-37: Game interface

Label	Description
1	<p>Home button which allows the users to go back to the main menu.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "FinalYearProject.exe" halt end <p>-To allow the users to go back to the main menu</p>
2	<p>Back button which allows the users to go back to the learning module.</p> <p>Behaviour used: Rollover Cursor Change</p> <p>Lingo Script used:</p> <ul style="list-style-type: none"> • on MouseDown me <ul style="list-style-type: none"> open "LearningModule.exe" halt end <p>To allow the users to go back to the learning module.</p>
3	This text element represented the questions shown to the users
4	<p>Options of the answer.</p> <p>Behaviour used: Play Frame X, Rollover Cursor Change, Rollover Member Change, Play Sound</p>

Table 5-25: Development of game interface

5-3 Post-Authoring Process

Post authoring process is to deliver the final product (multimedia courseware) to the users. The final product was develop in .exe format.

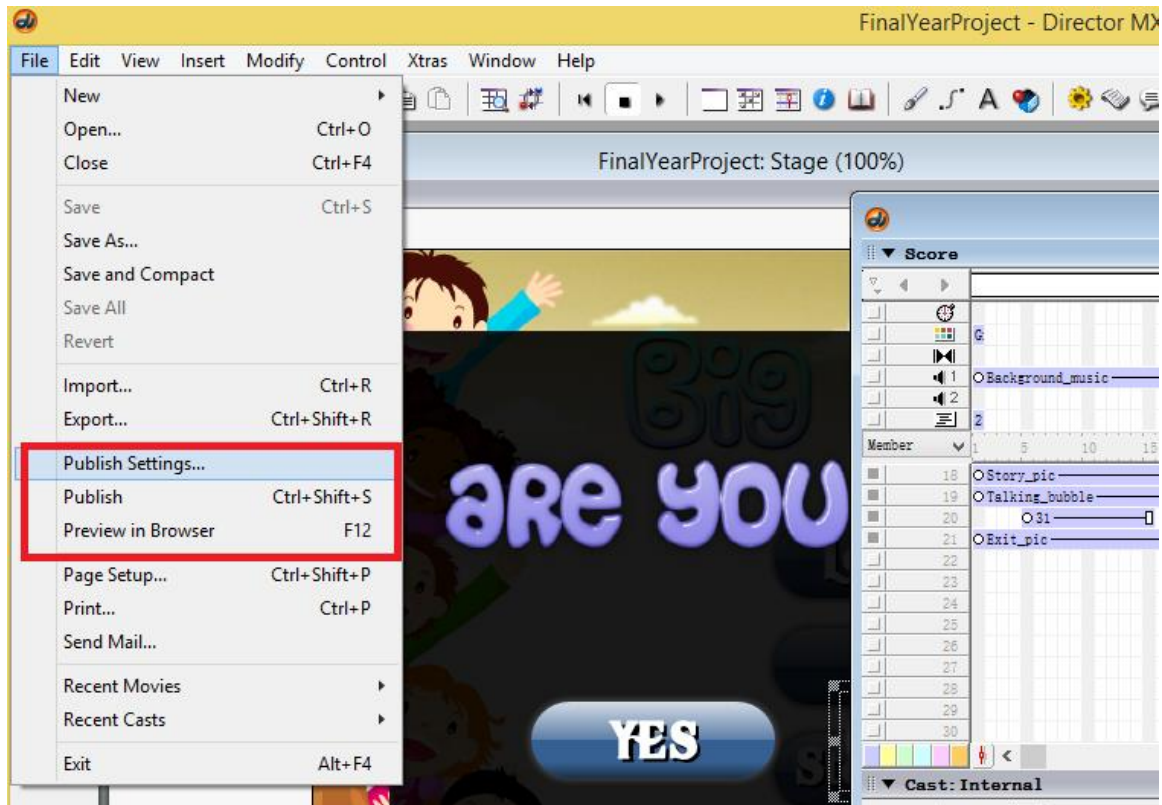


Figure 5-38: Publishing – Step1

First, click the publish setting to do some setting before the final publication of the project.

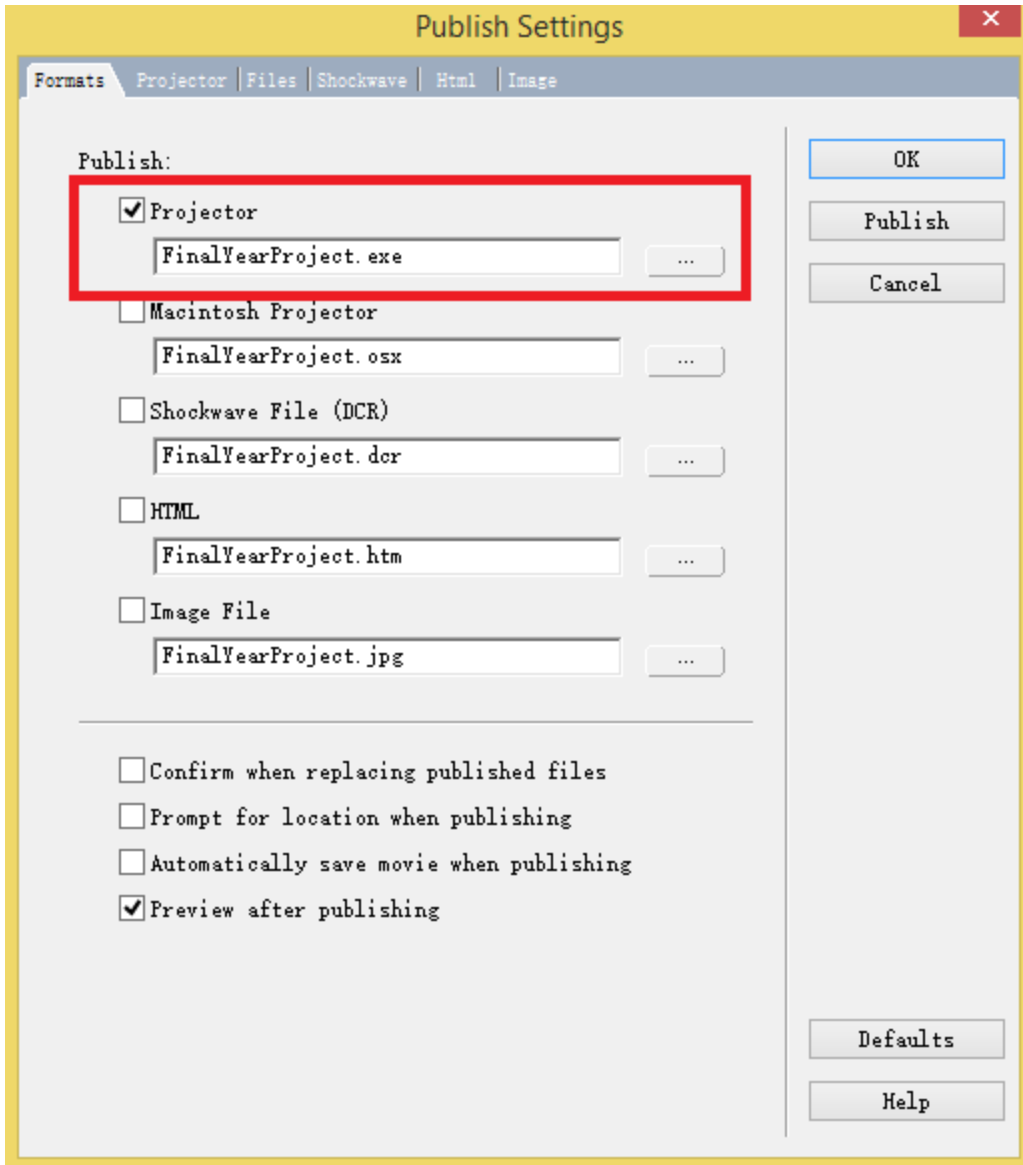


Figure 5-39: Publishing – Step2

Next, tick on the project option in order to deliver the system in .exe format.

6-1 Alpha Testing

Alpha testing was conducted for the “Big Math” multimedia courseware. Alpha testing will not involve any users. In fact, this testing will be done by the developer to check if there is any error on the software. The reason to conduct this test is to check whether the system consists of any errors or bugs.

6-1-1 Unit Testing

6-1-1-1 Main Menu

No.	Test Case	Expected Results	Actual Results	Action
1.	Click on “Learning” button	play the “click” sound and go to the Learning Module	Success	-
2.	Click on “Quiz” button	play the “click” sound and go to the Quiz Module	Success	-
3	Click on “Game” button	play the “click” sound and go to the game module	Success	-
4	Rollover on “Learning” button	Play “rollover” sound and animation changed accordingly	Success	-
5	Rollover on “Quiz” button	Play “rollover” sound and animation changed accordingly	Success	-
6	Rollover on “Game” button	Play “rollover” sound and animation changed accordingly	The animation didn’t show up	“visible” method was added
7	Click on “Exit” button	Play the “click” sound and go to the exit page	Go to the exited page but didn’t	Change the “click” sound

			“click” sound	channel to 4
8	Rollover on “Exit” Button	Play “rollover” sound and animation changed accordingly	Success	-

Table 6-1: Unit testing on main menu

6-1-1-2 Exit Page

No.	Test Case	Expected Results	Actual Result	Action
1	Click on “Yes” button	Close the application and play the “click” sound	Fail to close the application	“Halt” was added to the Lingo Script.
2	Click on “No” button	Link the system back to the main menu and play the “click” sound	Success	-
3	Rollover on “Yes” button	Play “rollover” sound	Success	-
4	Rollover on “No” button	Play “rollover” sound	Success	-
5	Click and rollover on main menu button	No action should be perform	Fail	Delete the behaviour

Table 6-2: Unit testing on exit page

6-1-1-3 Learning Module

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on	Play “rollover” sound and	Success	-

CHAPTER 6: TESTING

	“Counting” button	show the counting animation at the bottom		
4	Click on “ Counting” button	Play “click” sound and go to counting page	Success	-
5	Rollover on “Coins” button	Play “rollover” sound and show the counting animation at the bottom	Success	-
6	Click on “Coins” button	Play “click” sound and go to coins page	Success	-
7	Rollover on “Addition” button	Play “rollover” sound and show the addition animation at the bottom	Success	-
8	Click on “Addition” button	Play “click” sound and go to addition page	Success	-
9	Rollover on “ Subtraction” button	Play “rollover” sound and show the addition animation at the bottom	Success	-
10	Click on “Subtraction” button	Play “click” sound and go to subtraction page	Success	-
11	Rollover on “Multiplication” button	Play “rollover” sound and show the multiplication animation at the bottom	Showed both subtraction and multiplication animation at the same time	Sprite(x).visible = 0 method was added
12	Click on “Multiplication” button	Play “click” sound and go to multiplication page	Success	-
13	Rollover on	Play “rollover” sound and show the division	Success	-

CHAPTER 6: TESTING

	“Division” button	animation at the bottom		
14	Click on “Division” button	Play “click” sound and go to division page	Success	-
15	Rollover on “Time” button	Play “rollover” sound and show the time animation at the bottom	Success	-
16	Click on “Time” button	Play “click” sound and go to time page	Success	-
17	Rollover on “Shape” button	Play “rollover” sound and show the shape animation at the bottom	Success	-
18	Click on “Shape” button	Play “click” sound and go to shape page	Success	-

Table 6-3: Unit testing on learning module

6-1-1-4 Counting

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Rollover on “1~10” button	Colour of the font changed and play sound effect	Success	-
6	Click on “1~10”	Play sound effect and go	Success	-

CHAPTER 6: TESTING

	Button	to the content that teaching 1 to 10		
7	Rollover on “Repeat” button (1~10)	Colour of the font changed and play sound effect	Success	-
8	Click on “Repeat” button(1~10)	Play sound effect and go to the content that teaching 1 to 10	Success	-
9	Rollover on “Next” button(1~10)	Colour of the font changed and play sound effect	Success	-
10	Click on “Next” button(1~10)	Play sound effect and go to the content that teaching 11 to 20	Success	-
11	Rollover on “11~20” button	Colour of the font changed and play sound effect	Success	-
12	Click on “11~20” Button	Play sound effect and go to the content that teaching 11 to 20	Success	-
13	Rollover on “Repeat” button (11~20)	Colour of the font changed and play sound effect	Success	-
14	Click on “Repeat” button(11~20))	Play sound effect and go to the content that teaching 11 to 20	Success	-
15	Rollover on “Next” button(11~20))	Colour of the font changed and play sound effect	Success	-
16	Click on “Next” button(11~20))	Play sound effect and go to the content that teaching 21 to 30	Success	-
17	Rollover on “11~20”	Colour of the font changed	Success	-

CHAPTER 6: TESTING

	button	and play sound effect		
18	Click on “11~20” Button	Play sound effect and go to the content that teaching 11 to 20	Success	-
19	Rollover on “Repeat” button (21-30)	Colour of the font changed and play sound effect	Success	-
20	Click on “Repeat” button(21-30)	Play sound effect and go to the content that teaching 21 to 30	Success	-
21	Rollover on “Next” button(21-30)	Colour of the font changed and play sound effect	Success	-
22	Click on “Next” button(21-30)	Play sound effect and go to the content that teaching 31 to 40	Success	-
23	Rollover on “31-40” button	Colour of the font changed and play sound effect	Success	-
24	Click on “31-40” Button	Play sound effect and go to the content that teaching 31 to 40	Success	-
25	Rollover on “Repeat” button (31-40)	Colour of the font changed and play sound effect	Success	-
26	Click on “Repeat” button(31-40)	Play sound effect and go to the content that teaching 31 to 40	Success	-
27	Rollover on “Next” button(31-40)	Colour of the font changed and play sound effect	Success	-
28	Click on “Next” button(31-40)	Play sound effect and go to the content that teaching	Success	-

CHAPTER 6: TESTING

		41 to 50		
29	Rollover on “41-50” button	Colour of the font changed and play sound effect	Success	-
30	Click on “41-50” Button	Play sound effect and go to the content that teaching 41 to 50	Success	-
31	Rollover on “Repeat” button (41-50)	Colour of the font changed and play sound effect	Success	-
32	Click on “Repeat” button(41-50)	Play sound effect and go to the content that teaching 41 to 50	Success	-
33	Rollover on “Next” button(41-50)	Colour of the font changed and play sound effect	Success	-
34	Click on “Next” button(41-50)	Play sound effect and go to the content that teaching 51 to 60	Success	-
35	Rollover on “51-60” button	Colour of the font changed and play sound effect	Success	-
36	Click on “51-60” Button	Play sound effect and go to the content that teaching 51 to 60	Success	-
37	Rollover on “Repeat” button (51-60)	Colour of the font changed and play sound effect	Success	-
38	Click on “Repeat” button(51-60)	Play sound effect and go to the content that teaching 51 to 60	Success	-
39	Rollover on “Next” button(51-60)	Colour of the font changed and play sound effect	Success	-

CHAPTER 6: TESTING

40	Click on “Next” button(51-60)	Play sound effect and go to the content that teaching 61 to 70	Success	-
41	Rollover on “61-70” button	Colour of the font changed and play sound effect	Success	-
42	Click on “61-70” Button	Play sound effect and go to the content that teaching 61 to 70	Success	-
43	Rollover on “Repeat” button (61-70)	Colour of the font changed and play sound effect	Success	-
44	Click on “Repeat” button(61-70)	Play sound effect and go to the content that teaching 61 to 70	Success	-
45	Rollover on “Next” button(61-70)	Colour of the font changed and play sound effect	Success	-
46	Click on “Next” button(61-70)	Play sound effect and go to the content that teaching 71 to 80	Success	-
47	Rollover on “71-80” button	Colour of the font changed and play sound effect	Success	-
48	Click on “71-80” Button	Play sound effect and go to the content that teaching 71 to 80	Success	-
49	Rollover on “Repeat” button (71-80)	Colour of the font changed and play sound effect	Success	-
50	Click on “Repeat” button(71-80)	Play sound effect and go to the content that teaching 71 to 80	Success	-

CHAPTER 6: TESTING

51	Rollover on “Next” button(71-80)	Colour of the font changed and play sound effect	Success	-
52	Click on “Next” button(71-80)	Play sound effect and go to the content that teaching 81 to 90	Success	-
53	Rollover on “81-90” button	Colour of the font changed and play sound effect	Success	-
54	Click on “81-90” Button	Play sound effect and go to the content that teaching 81 to 90	Success	-
55	Rollover on “Repeat” button (81-90)	Colour of the font changed and play sound effect	Success	-
56	Click on “Repeat” button(81-90)	Play sound effect and go to the content that teaching 81 to 90	Success	-
57	Rollover on “Next” button(81-90)	Colour of the font changed and play sound effect	Success	-
58	Click on “Next” button(81-90)	Play sound effect and go to the content that teaching 91 to 100	Success	-
59	Rollover on “91-100” button	Colour of the font changed and play sound effect	Success	-
60	Click on “91-100” Button	Play sound effect and go to the content that teaching 91 to 100	Success	-
61	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
62	Click on “Repeat”	Play sound effect and go	Success	-

	button	to the frame 1 of counting		
63	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
64	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
65	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
66	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-4: Unit testing on counting

6-1-1-5 Coins

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Rollover on “5 cents” button	Font colour changed and play sound effect	Success	-
6	Click on “5 cents” button	Play sound effect and go to “5 cent”	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-

CHAPTER 6: TESTING

8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “10 cents” button	Font colour changed and play sound effect	Success	-
10	Click on “10 cents” button	Play sound effect and go to “10 cent”	Success	-
11	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
12	Click on “I got it button”	Continue the content	Success	-
13	Rollover on “20 cents” button	Font colour changed and play sound effect	Success	-
14	Click on “20 cents” button	Play sound effect and go to “20 cent”	Success	-
15	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
16	Click on “I got it button”	Continue the content	Success	-
17	Rollover on “50 cents” button	Font colour changed and play sound effect	Success	-
18	Click on “50 cents” button	Play sound effect and go to “50 cent”	Success	-
19	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
20	Click on “I got it button”	Continue the content	Success	-
21	Rollover on “Repeat”	Colour of the font changed	Success	-

	button	and play sound effect		
22	Click on “Repeat” button	Play sound effect and go to the frame 1 of coin	Success	-
23	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
24	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
25	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
26	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-5: Unit testing on coins

6-1-1-6 Addition

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
6	Click on “I got it button”	Continue the content	Success	-

7	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
8	Click on “Repeat” button	Play sound effect and go to the frame 1 of addition	Success	-
9	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
10	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
11	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
12	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-6: Unit testing on addition

6-1-1-7 Subtraction

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
6	Click on “I got it button”	Continue the content	Success	-

7	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
8	Click on “Repeat” button	Play sound effect and go to the frame 1 of subtraction	Success	-
9	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
10	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
11	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
12	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-7: Unit testing on subtraction

6-1-1-8 Multiplication

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
6	Click on “I got it	Continue the content	Success	-

CHAPTER 6: TESTING

	button”			
7	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
8	Click on “Repeat” button	Play sound effect and go to the frame 1 of multiplication	Success	-
9	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
10	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
11	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
12	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-8: Unit testing on multiplication

6-1-1-9 Division

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-

CHAPTER 6: TESTING

5	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
6	Click on “I got it button”	Continue the content	Success	-
7	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
8	Click on “Repeat” button	Play sound effect and go to the frame 1 of division	Success	-
9	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
10	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
11	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
12	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-9: Unit testing on division

6-1-1-10 Time

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-

CHAPTER 6: TESTING

5	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
6	Click on “I got it button”	Continue the content	Success	-
7	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
8	Click on “Repeat” button	Play sound effect and go to the frame 1 of addition	Success	-
9	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
10	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
11	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
12	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-10: Unit testing on time

6-1-1-11 Shape

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-

CHAPTER 6: TESTING

4	Click on “Back” Button	Go to the learning module	Success	-
5	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
6	Click on “I got it button”	Continue the content	Success	-
7	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
8	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
9	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
10	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
11	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
12	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-11: Unit testing on shape

6-1-1-12 Quiz Module

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-

CHAPTER 6: TESTING

3	Rollover on “Counting” button	Play “rollover” sound and font colour changed	Success	-
4	Click on “ Counting” button	Play “click” sound and go to counting quiz page	Success	-
5	Rollover on “Coins” button	Play “rollover” sound and font colour changed	Success	-
6	Click on “Coins” button	Play “click” sound and go to coins quiz page	Success	-
7	Rollover on “Addition” button	Play “rollover” sound and font colour changed	Success	-
8	Click on “Addition” button	Play “click” sound and go to addition quiz page	Success	-
9	Rollover on “ Subtraction” button	Play “rollover” sound and font colour changed	Success	-
10	Click on “Subtraction” button	Play “click” sound and go to subtraction quiz page	Success	-
11	Rollover on “Multiplication” button	Play “rollover” sound and and font colour changed	Success	-
12	Click on “multiplication” button	Play “click” sound and go to multiplication quiz page	Success	-
13	Rollover on “Division” button	Play “rollover” sound	Success	-
14	Click on “Division” button	Play “click” sound and go to division quiz page	Success	-
15	Rollover on “Time” button	Play “rollover” sound and and font colour changed	Success	-

16	Click on “Time” button	Play “click” sound and go to time quiz page	Success	-
17	Rollover on “Shape” button	Play “rollover” sound and font colour changed	Success	-
18	Click on “Shape” button	Play “click” sound and go to shape quiz page	Success	-

Table 6-12: Unit testing on quiz module

6-1-1-13 Counting Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-
6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it	Continue the content	Success	-

	button”			
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-13: Unit testing on counting quiz

6-1-1-14 Coin Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-

CHAPTER 6: TESTING

6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-14: Unit testing on coin quiz

6-1-1-15 Addition Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home”	Go to the main menu page	Success	-

CHAPTER 6: TESTING

	button			
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-
6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-15: Unit testing on addition quiz

6-1-1-16 Subtraction Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-
6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-

13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-16: Unit testing on subtraction quiz

6-1-1-17 Multiplication Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-
6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat”	Play sound effect and go	Success	-

	button	to the frame 1 of shape		
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-17: Unit testing on multiplication quiz

6-1-1-18 Division Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-
6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-

CHAPTER 6: TESTING

7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-18: Unit testing on division quiz

6-1-1-19 Time Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-

CHAPTER 6: TESTING

4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-
6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-19: Unit testing on time quiz

6-1-1-20 Shape Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Back” Button	Cursor changes to “finger”	Success	-
4	Click on “Back” Button	Go to the learning module	Success	-
5	Click on correct answer	Play “correct” sound and link to well done page	Success	-
6	Click on wrong answer	Play “wrong buzzer” sound and link to oh no page	Success	-
7	Rollover on “I got it button”	Font colour changed and play sound effect	Success	-
8	Click on “I got it button”	Continue the content	Success	-
9	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
10	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
11	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
12	Click on “Back” Button	Play sound effect and go to the learning module	Success	-

13	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
14	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-20: Unit testing on shape quiz

6-1-1-21 Quiz Module

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Home” button	Cursor changes to “finger”	Success	-
2	Click on “Home” button	Go to the main menu page	Success	-
3	Rollover on “Easy” button	Play “rollover” sound and font colour changed	Success	-
4	Click on “ Easy” button	Play “click” sound and go to easy game page	Success	-
5	Rollover on “Medium” button	Play “rollover” sound and font colour changed	Success	-
6	Click on “ Medium” button	Play “click” sound and go to hard game page	Success	-
7	Rollover on “Hard” button	Play “rollover” sound and font colour changed	Success	-
8	Click on “ Hard” button	Play “click” sound and go to hard game page	Success	-

Table 6-21: Unit testing on quiz module

6-1-1-22 Easy Game

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Skip” button	Cursor changes to “finger”	Success	-
2	Click on “Skip” button	Skip the introduction of game	Success	-
3	Rollover on “Home” button	Cursor changes to “finger”	Success	-
4	Click on “Home” button	Go to the main menu page	Success	-
5	Rollover on “Back” button	Cursor changes to “finger”	Success	-
6	Click on “Back” button	Go to the game module page	Success	-
7	Click on the wrong answer	Go to the game over page	Success	-
8	Rollover on “Try Again” button	Play “rollover” sound and font colour changed	Success	-
9	Click on “Try Again” button	Play “click” sound and go back to game(stage 1)	Success	-
10	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
11	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
12	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
13	Click on “Main	Play sound effect and go	Success	-

	Menu”	to main menu		
14	Click on correct answer	Play “correct” sound and go to next stage	Success	-
15	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
16	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
17	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
18	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
19	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
20	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-22: Unit testing on easy game

6-1-1-23 Medium Game

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Skip” button	Cursor changes to “finger”	Success	-
2	Click on “Skip” button	Skip the introduction of game	Success	-
3	Rollover on “Home” button	Cursor changes to “finger”	Success	-
4	Click on “Home” button	Go to the main menu page	Success	-

CHAPTER 6: TESTING

5	Rollover on “Back” button	Cursor changes to “finger”	Success	-
6	Click on “Back” button	Go to the game module page	Success	-
7	Click on the wrong answer	Go to the game over page	Success	-
8	Rollover on “Try Again” button	Play “rollover” sound and font colour changed	Success	-
9	Click on “Try Again” button	Play “click” sound and go back to game(stage 1)	Success	-
10	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
11	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
12	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
13	Click on “Main Menu”	Play sound effect and go to main menu	Success	-
14	Click on correct answer	Play “correct” sound and go to next stage	Success	-
15	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
16	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
17	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
18	Click on “Back”	Play sound effect and go	Success	-

	Button	to the learning module		
19	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
20	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-23: Unit testing on medium game

6-1-1-24 Hard Game

No.	Test Case	Expected Results	Actual Result	Action
1	Rollover on “Skip” button	Cursor changes to “finger”	Success	-
2	Click on “Skip” button	Skip the introduction of game	Success	-
3	Rollover on “Home” button	Cursor changes to “finger”	Success	-
4	Click on “Home” button	Go to the main menu page	Success	-
5	Rollover on “Back” button	Cursor changes to “finger”	Success	-
6	Click on “Back” button	Go to the game module page	Success	-
7	Click on the wrong answer	Go to the game over page	Success	-
8	Rollover on “Try Again” button	Play “rollover” sound and font colour changed	Success	-
9	Click on “Try	Play “click” sound and go	Success	-

	Again” button	back to game(stage 1)		
10	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
11	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
12	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
13	Click on “Main Menu”	Play sound effect and go to main menu	Success	-
14	Click on correct answer	Play “correct” sound and go to next stage	Success	-
15	Rollover on “Repeat” button	Colour of the font changed and play sound effect	Success	-
16	Click on “Repeat” button	Play sound effect and go to the frame 1 of shape	Success	-
17	Rollover on “ Back” Button	Colour of the font changed and play sound effect	Success	-
18	Click on “Back” Button	Play sound effect and go to the learning module	Success	-
19	Rollover on “Main Menu”	Colour of the font changed and play sound effect	Success	-
20	Click on “Main Menu”	Play sound effect and go to main menu	Success	-

Table 6-24: Unit testing on medium game

6-1-2 Integration Testing

6-1-2-1 Main Menu

No.	Test Case	Expected Results	Actual Result	Action
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CHAPTER 6: TESTING

1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate with Game Module	Link the system to the Game Module	Success	-
4	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
5	Integrate background music	Play the background music once the application started	Success	-
6	Integrate with Exit Page	Link the system to the exit page	Success	-

Table 6-25: Integration testing on main menu

6-1-2-2 Learning Module

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
3	Integrate background music	Play the background music once the application started	Success	-

Table 6-26: Integration testing on learning module

6-1-2-3 Counting

No.	Test Case	Expected Results	Actual Result	Action
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CHAPTER 6: TESTING

1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate music	Play song when the user clicked into the module consisted	Success	-
5	Integrate with subtitle	Show the subtitle which is match with the narrator	Success	-

Table 6-27: Integration testing on counting

6-1-2-4 Coins

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button and when the word shown up	Success	-

Table 6-28: Integration testing on coins

6-1-2-5 Addition

No.	Test Case	Expected Results	Actual	Action
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			Result	
1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-29: Integration testing on addition

6-1-2-6 Subtraction

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-30: Integration testing on subtraction

6-1-2-7 Multiplication

CHAPTER 6: TESTING

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-31: Integration testing on multiplication

6-1-2-8 Division

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-32: Integration testing on division

6-1-2-9 Time

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-32: Integration testing on time

6-1-2-10 Shape

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Learning Module	Link the system to the Learning Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-33: Integration testing on shape

6-1-2-11 Quiz Module

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
3	Integrate background music	Play the background music once the application started	Success	-

Table 6-34: Integration testing on quiz module

6-1-2-12 Counting Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-35: Integration testing on counting quiz

6-1-2-13 Coin Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-36: Integration testing on coin quiz

6-1-2-14 Addition Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-37: Integration testing on addition quiz

6-1-2-15 Subtraction Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-38: Integration testing on subtraction quiz

6-1-2-16 Multiplication Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-39: Integration testing on multiplication quiz

6-1-2-17 Division Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-40: Integration testing on division quiz

6-1-2-18 Time Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-41: Integration testing on time quiz

6-1-2-19 Shape Quiz

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate with Quiz Module	Link the system to the Quiz Module	Success	-
3	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-

Table 6-42: Integration testing on shape quiz

6-1-2-20 Game Module

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Main Menu	Link the system to the Main Menu	Success	-
2	Integrate sound effect	Play sound effect when MouseUp and MouseDown a button	Success	-
3	Integrate background music	Play the background music once the application started	Success	-

Table 6-43: Integration testing on game module

6-1-2-21 Easy Game

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Game Module	Link the system to the Game Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-
6	Integrate subtitle	Show the subtitle according to the narrator	Success	-

Table 6-44: Integration testing on easy game

6-1-2-22 Medium Game

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Game Module	Link the system to the Game Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-

CHAPTER 6: TESTING

4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-
6	Integrate subtitle	Show the subtitle according to the narrator	Success	-

Table 6-44: Integration testing on medium game

6-1-2-23 Hard Game

No.	Test Case	Expected Results	Actual Result	Action
1	Integrate with Game Module	Link the system to the Game Module	Success	-
2	Integrate with Main Menu	Link the system to the Main Menu	Success	-
3	Integrate sound effect	Play sound effect when MouseUp, MouseDown a button	Success	-
4	Integrate narrator	Play narrator sound accordingly	Success	-
5	Integrate animation	Play the animation accordingly	Success	-
6	Integrate subtitle	Show the subtitle according to the narrator	Success	-

Table 6-45: Integration testing on hard game

6-1-3 System Testing

No.	System	Expected Results	Actual Result	Action
1	<ul style="list-style-type: none"> • Asus Laptop • Windows 8.1 • Intel CORE i5 processer • NVIDIA geforce 920M • 8GB RAM 	Run the courseware successfully without errors occurred	Success	-
	<ul style="list-style-type: none"> •Acer Desktop •Windows 10 Pro •Intel Pentium Processor •Microsoft Basic Display Adapter 	Run the courseware successfully without errors occurred	Success	-

Table 6-45: System testing

7-1 Future Enhancements

- Rating system

Rating system can be added into the project to further enhance the courseware. The system will be rated by the users. Thus, the users' will be observed and the courseware should be improved based on the rating. Since the users of the courseware are children, star rating system will be more suitable compared to the comment rating system as the kids might not have the ability to comment.

- Embedded courseware to website

Another enhancement of the project was embedded the courseware to the website. With this enhancement, this multimedia courseware able to reach to larger audience as the user just need to know the URL of the courseware in order to use it.

7-2 Problem Encountered

- **The way to represent the information**

The first issue faced was the way to represent the information or the content of the multimedia courseware. Since the target users of this multimedia courseware were kids, the analysis should be done to find out how to attract the kids' attention or how to make them feel interesting towards the multimedia courseware.

- **Transfer the content to users**

Consisting of the knowledge of how to transfer the content to the users was critical and important for the effective courseware development (Chow, Yap and Chan, 2015). It was important that the content was delivered effectively to the users so that the users able to gain knowledge through the courseware.

- **Lack of knowledge that needed to develop the content**

Another challenge was lack of the knowledge to develop the content for the multimedia courseware. When the knowledge required developing the project is not

available, it may delay the progress of the multimedia production as further researches need to be done in order to obtain the specific knowledge.

7-3 Learning Learnt

- Planning of project

Throughout the project, planning to develop a courseware from the beginning until the end was learnt and improved from time to time. The system was planned from idea stage and was developed as a final product. Therefore, project management skill was gained and improved throughout the project.

7-4 Conclusion

In order to deliver a quality multimedia courseware for kids to learn Mathematics, a lot of researches were done. Firstly, the problem statements were identified. The problem statement included children has shorter attention span, every kid has different learning pace and to attract the attention of kids which makes teaching become more difficult. These three problems are the reason why this multimedia courseware needs to be delivered. Besides, the project objectives also had been developed which were to produce a multimedia courseware that consisted a lot of multimedia element, able to adjust to kids' learning pace accordingly and had colourful layout. These three objectives should be achieved in order to deliver a good multimedia courseware.

Furthermore, the scope of the project had been clearly defined. The target user of this multimedia courseware is kindergarten students. In this case, the interfaces of the courseware should be colorful and contain lots of graphic to grab the attention of kids as well as make them feel interest towards the courseware. Besides, this courseware consists of three modules which were learning module, quiz module and game module. The learning module was aimed to teach the kids effectively. Meanwhile, quiz module is to test the understanding of them. Lastly, kids were able to learn while playing through game module.

CHAPTER 7: CONCLUSION

In a nutshell, the development of this courseware was able to let the kids to learn Mathematic in a fun way. Furthermore, the courseware was able to solve the problems stated in the problem statements by adjusting the interactivity.

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Faculty Of Information And Communication Technology

An Interactive Multimedia Courseware for Kids to Learn Mathematics

Introduction

- Deliver basic Mathematic knowledge for kindergarten students
- Allow the students to learn according to their learning pace
- Interactivity added to enhance the learning process

Objectives

- To produce a multimedia courseware that consisted a lot of multimedia elements
- To produce a multimedia courseware that can adjust to the kids' learning pace
- To produce a multimedia courseware that has colourful layout

Methodology

Conclusion

- Problems were identified and solutions were developed.
- Project scope was clearly defined which the target users are kindergarten students whose age ranged from 5 – 7 years old

Prepared By: Wong Sook Fang
Supervisor : Dr Khor Siak Wang

Plagiarism Check Result Summary

1-1 Problem Statement and Motivation

1-1-1 Problem Statement

- **Children have shorter attention span**

For a teacher or tutor, children are the most difficult for them due to the children's shorter attention span. It is almost impossible for kids to sit down and learning or studying for few hours. (Lauren Q Hill, 2015). Instead, children are more focusing on immediate here and now. Therefore, instead of learning from a static textbook, learning process should be designed to capture their immediate interest. Besides, the activities also should be designed to keep attention and interest alive (Fauziyah, 2015).

- **Every kid has different learning pace**

Based on Robin Smorenberg, he stated that everyone is at a different pace in a very different way, so it is impossible to cater everyone's learning needs (daily adventures, 2014). It is almost impossible or very difficult for a teacher to follow every student's learning pace especially when the class has a large number of students. For this case, student with slow learning pace may find difficulties to follow the lessons taught by the teachers. On contrary, kid who has faster learning pace may find the lessons are too boring for them and eventually they will lose their interest in the subject.

- **Attract the attention of kids**

The system developed required to be able to attract the attention of kids. Courseware that are too simple which does not has lots of graphics, animation and sound

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Programme / Course	BACHELOR OF INFORMATION SYSTEMS (HONS) BUSINESS INFORMATION SYSTEMS
Title of Final Year Project	AN INTERACTIVE MULTIMEDIA COURSEWARE FOR KIDS TO LEARN MATHEMATICS

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