



UNIVERSITI  
TEKNOLOGI  
PETRONAS

# **BINTANG HATI**

## **MULTIMEDIA LEARNING FOR AUTISM**

by

Dayang Siti Hafizah Ariffah Bt Haji Ahmad Mahyuddin

A project dissertation submitted to the  
Information & Communication Technology Programme  
Universiti Teknologi PETRONAS  
in partial fulfillment of the requirement for the  
**BACHELOR OF TECHNOLOGY (Hons)**  
**INFORMATION & COMMUNICATION TECHNOLOGY**  
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Universiti Teknologi PETRONAS

Bandar Seri Iskandar,

31750 Tronoh

Perak Darul Ridzuan

**CERTIFICATION OF APPROVAL**

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Approved by,

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**(ASSOCIATE PROFESSOR DR ABAS B. MD SAID)**

UNIVERSITI TEKNOLOGI PETRONAS  
TRONOH, PERAK  
**JANUARY, 2014**

## **CERTIFICATION OF ORIGINALITY**

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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**DAYANG SITI HAFIZAH ARIFFAH BT HAJI AHMAD MAHYUDDIN**

## **ABSTRACT**

‘Multimedia Learning for Autism’ is a learning package which was designed especially for young autism children. This learning package is to develop an e-learning education and flash games which involves multimedia elements such as text, images, sound, and animation for kids. Games are means of entertainment and part of children’s lives which indirectly allows the children to think, use their imagination while playing games, improve visual perception and at the same time have fun while gaining knowledge. These introduce the learning engagement through interactivity buttons. ‘Multimedia Learning for Autism’ is not developed to replace the traditional method of learning but it is simply a learning package and teaching aid to be used by the kids and the teachers/guardian. Users can take the advantage from using this eLearning software as it allows them to use their imagination and visualization so that they will understand more to help them especially for the autism individuals who have cognition problem that is having difficulties in abstract thinking as well as preservative thinking and weakened capability to process figurative information so a game like computer version of Pictionary will be added. It will be the key features for this learning package to help with their cognitive skills. All of the contents are based on the books and games that are purposely made for them to make sure that the author will be providing the target audience with the right information. This learning package will be developed by using Adobe Flash CS3 and Actionscript 2.0. The author hopes that after user use and interacts with this application, they will be able to gain the knowledge and it will fully benefit the target audience.

## ACKNOWLEDGEMENTS

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# CHAPTER 1

## INTRODUCTION

### 1.0 Background of Study

#### **What is Multimedia?**

Multimedia can have many explanations. It can be symbolized through audio, video, and animation in addition to traditional media (i.e., text, graphics, drawings, images).

According to Cardiff School of Computer Science & Informatics, a good common meaning for **Multimedia** is the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (video), animation, audio, and any other media where each type of info can be represented, kept, transmitted and processed digitally while **Multimedia Application** is an application that uses numerous group of media sources e.g. text, graphics, images, sound/audio, animation and/or video.

#### **What is autism?**

In general, autism is a development syndrome characterized by impairments in three parts such as social, communication in addition to behaviors. It was in 1943 when American psychiatrist, Leo Kanner first defines autism that is believed to result from a brain disorder that takes place during the childhood years particularly in the first two and a half. Due to disability, this causes autistic children experience normal individual's world very differently even though they look like ordinary people. Individuals who could not understand them often see them as odd, slow as well as selfish. The reason behind this is lacking of social instincts of caring, sharing and pretending and it is normal for them to not communicate, play and hard to make friends. Thus, it affects their educational performance. Autism individuals exhibit different levels of

understanding, interaction, and reaction towards things or external environment that significantly interferes with the learning process in the following areas:

- Communication
- Social participation
- The repertoire of activities, interests, and imaginative growth
- Developmental rate and sequences
- Sensory processing
- Cognition

In this project, the author will identify and tackle on the cognition area to help the autistic kids to improve their interest to learn. In order to get their attention, one of the ways is to implement the interactive multimedia as their learning tool.

Apart from that, the learning package can be used as a motivating tool or strategy to increase their independence as well as strategies to grab their attention to interact. Indirectly, it can facilitate participation in activities, improve memory and attract and focus their attention.

Furthermore, feasible approach by using ICT through the use of multimedia learning needs to be tackled to help develop the life of autism children.

## 1.1 Problem Statement

There has been a considerable increase in the efforts toward improving the awareness of autistic children. According to two experts from the National Autism Society of Malaysia (NASOM), Kuala Lumpur that were interviewed, they confirmed that the lack of relevant knowledge in society is the main reason for autistic children being left out. The lack of awareness is because people do not understand about autism in general and how to recognize the symptoms. There are few causes that contribute to this such as lack of knowledge, not enough awareness or information given by the authorities, lack of expertise, facilities provided by the government, etc.

The lack of awareness is the primary domain that needs to be tackled and a viable approach is using ICT or multimedia learning. Multimedia learning is the process of learning – usually in a classroom or similarly structured environment – through the use of multimedia presentations and teaching methods.

In addition, the technology can provide a level of independence to the learners; the purpose is so that the learner will not fully dependent on the teacher to be responsible for their learning. Depending on the technology, the learner can be provided with control over the lesson by being given the freedom to pick or choose his lesson. Overall, the use of technology can have an encouraging impact on providing education to the learner with special needs.

For years, different modes of technology have been used to improve the quality of life of people who have various developmental disabilities. However, the diverse use of technology for children with autism continues to receive limited attention, despite the fact that technology tends to be a high interest area for many of these children so with this learning package that are going to be developed, it is hope that they can make use of this technology as a tool that can facilitate the learning of

students so people will be alert on how to communicate with those who are less fortunate for the reason of equal opportunity and rights.

## **1.2 Significance of the project**

The learning package is to create approachability for autistic children to learn by using the software application as a learning tool to improve their cognitive skills. The proposed project also indirectly for the parent and teachers to monitor the kids at early stage so they can improve their communication skills as well as create awareness of autism by trying to understand on how the kids think. Moreover, the proposed project can be used anywhere at any time as long as user have laptop or personal computer to play the application.

## **1.3 Project Aims**

The main aim for this project is to develop a multimedia-based software program to support and enhance the educational and cognitive development of young learners with autism. A fully functional animated prototype is developed which can be used by the kids, parents and the teacher in both classroom and home environments to assist the development of cognition skills of the autistic individuals.

## **1.4 Project Objectives**

### **Objectives:**

- To broaden their knowledge by using technology.
- To develop a multimedia-based software to support and enhance the educational and cognitive development of young learners with autism.

## 1.5 Scope of Studies

The proposed project can only be played on Windows platform as this is only the first project done by the developer. Once this project is success, the developer can enhance to different platform in the future. The learning package can act as multimedia learning tool for the autistic kids especially and indirectly for the people surround them. While seeing the children play the application, they as people who are close to them can get better understanding or observe the way the kids think and see what technology can do to improve their cognitive skills.

A research area on this learning package consists of identifying and determining the most suitable design to be applied for developing the system, logic as well as interface. Towards the end, User Acceptance Test will be conducted to know the feedback from the user apart from the usability and effectiveness of the application.

The primary scope of this learning package is to allow users to view content that focuses on e-Storybooks and education games. This is because the developer wants to tackle the cognition skills of the autistic kids that have abnormalities with their memory, planning skills, problem solving skill as well as in generalizing the object. The application will include:

- e-Storybooks: to view and listen to the contents narrating the stories to the kids.
- Education games: matching words and matching objects.
- Social Stories: Body parts and senses and Word Tour.







## 1.6 Relevancy of the Project

As we all know, technology grows rapidly nowadays. People can grab the opportunity to learn and get more information faster and easier with technology so the learning package can help give benefits to users as almost everyone nowadays know how to use the technology especially the youngsters. Furthermore, the application that were developed and available on the internet is way too advanced for small kids to play and learn so the developer really hope the package can really help the young autism kids to improve their cognitive skill by playing the application regularly.

## 1.7 Specification Descriptions

### 1.7.1 Technical Feasibility

The following are software and hardware that are and will be used in this project:

-  Adobe Photoshop:
  - For editing images.
-  Adobe Illustrator:
  - For drawing.
-  Adobe Flash:
  - For creating the visualization and providing interactions.
-  Audio Editor (Soundforge):
  - For editing sounds.
- Computer with CD/DVD writer: To install the application.

Basically, the author already has all the software that is needed to develop the system except the audio editor as well Adobe Illustrator.

### 1.7.2 Economic Feasibility

This application development will not spend a lot of expenses as the developer already have the software packages that needed to build the application except for few software that need to be bought. It will be worth the penny as this application later can increase awareness as well as to help improve the communication skills for the kids and people surround them.

### 1.7.3 Organizational Feasibility

	Roles	Enhancement Techniques
<b>Developer</b> <ul style="list-style-type: none"> <li>❖ Developer</li> </ul>	<ul style="list-style-type: none"> <li>❖ Application developer</li> <li>❖ Launch or sell the application</li> </ul>	<ul style="list-style-type: none"> <li>❖ Define objective of the project and proposed the benefits of using the application for users</li> <li>❖ Develop prototype to demonstrate the value and importance of this application</li> <li>❖ To improve the application, User Acceptance Test will be conducted so feedback from the user can be noted.</li> </ul>
<b>User</b> <ul style="list-style-type: none"> <li>❖ Autistic Kids(3 years old to 11 years old)</li> <li>❖ Normal people</li> </ul>	<ul style="list-style-type: none"> <li>❖ Gain benefit by using the application</li> <li>❖ Decide and define whether the application is a success or failure.</li> </ul>	<ul style="list-style-type: none"> <li>❖ The prototype will be tested by selected users</li> <li>❖ Give feedback for UAT to make improvement on the system</li> </ul>

Table 1: Organizational Feasibility

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.0 Autism and Causes**

In 1943, Leo Kanner observed a group of unique children who all had some common characteristics. These characteristics comprised of extremely limited language abilities, inability to form interpersonal relationships and aggravation in response to changes in environment or routine (Gresham, Beebe-Frankenberger & MacMillan, 1999). Grandin, 1995 stated that around the same time, Hans Asperger noticed alike set of characteristics in a group of children who were not as severely impaired as Kanner's group. Since then, due to the complexity of autistic disorders, it made many doctors, researchers and families confused and frustrated. These disorders are acknowledged as autistic spectrum disorders.

Today, the Diagnostic and Statistical Manual of Mental Disorders (2000) labels autistic disorder as markedly weakened or abnormal development of social and communication combined with a restricted repertoire of activities and interests. This symptom is considered as a pervasive, life-long progressive disorder in which the child affected familiarities severe and pervasive impairment in several development parts.

As stated by Grandin, 1995 that since these disorders are alike but differ in severity and which development parts are affected, they are also measured to be portion of a single spectrum of disorders. For a child to be identified with autism, he or she must display at least a total of six appearances in three main classes that is social interaction impairment, communication impairment and stereotyped patterns of behavior. According to the individuals with Disabilities Education Act, autism is recognized as a developmental disability significantly affecting verbal and non-

verbal communication and social interaction, normally before age 3, which harmfully upsets the child's educational performance.

According to American Psychiatric Association, 2000, Signs are obvious in the children prior to age three and are sometimes informed by parents to be present from birth. There are four main theories that assume autism causes in the youngsters with autism namely genetic predisposition, adverse reaction to childhood vaccines, environmental toxin or nutritional and biology or neurochemical (Feinberg & Vacca, 2000). Janzen, 1996 mentioned that children with a predisposition to autism can produce symptoms as a result of anything that roots abnormal development of the central nervous system.

Over the past two decades, autism detects have been mounting to near widespread levels. Autistic children show a diversity of symptoms in unpredictable severity degrees. Singular kids will demonstrate unique behavior patterns (Janzen, 1996). A kid's intellectual ability, the attendance of additional disabilities, community, family and education experiences all give to how the autism will manifest in the individual (Janzen, 1996). The child may have limited non-verbal communication including flat facial expressions and an absence of gesture use. A child with autism will initiate communication less frequently than a normally developing child (Janzen, 1996). When a child with autism does initiate verbal interaction, it will often be stereotyped and repetitive (American Psychiatric Association, 2000). If he or she has the ability to speak, the child will have an unusual rhythm or abnormal intonation in his or her speech (Janzen, 1996).

A child with autism may also express abnormalities in relating to both people and his or her environment. These behaviors types could consist of being unresponsive to verbal communication, making little or no eye contact, seeking attention in abnormal ways, being content when left alone for abnormally long periods of time, and inability or unwillingness to take turns during play (Janzen, 1996).

American Psychiatric Association, 2000 also mentioned that these types of behaviors as impairments in the use of non-verbal behaviors that help regulate their social interaction, failure to grow friendships, and failure to spontaneously share positive events with the others. The skills of the child in various areas can either be very advanced or substantially delayed. Moreover, they might also extent to developmental milestones or learn skills out of normal sequence. For example, autism children may be capable of memorizing facts but never learn to tie a shoe. This also means that the kids' non-verbal abilities are stronger than their verbal abilities.

As said by Happe & Frith, seventy-five percent of autistic children have IQs that are in the mental retardation level with far fewer autistic children having normal intelligence and it can range from mild to profound. Further incapacities that are often connected with the disorder are down syndrome, tuberous sclerosis and cerebral palsy.

There is no recognized cause or treatment that has been recognized for autism, working with or training an autistic child can be very tough. Several programs and interventions have been recommended since Leo Kanner first identified the disorder in 1943. Autism is such a upsetting disorder, that over the course of its history people were keen to attempt anything that could “cure” the condition. In the past, some therapies that have been tried which includes sensory integration training, facilitated communication, and auditory integration training and so on.

The diagnosis of children with Autism Spectrum Disorders (ASD) has greater than before at an alarming rate both in United States and throughout the world. There are both an emerging body of research and promising practices using technology-based supports to target the main-challenges that is communication, socialization and motivation for individuals with ASD. These core challenges have a critical effect on participating effect on participation in home, school and community life. Many of these challenges are being addressed successfully through technology.

Advancements in technology also have supported access to in technology also have supported access to information, tools, strategies, education and training for practitioners and families of the persons.

The behaviour of the Autism students is fixed and declines changes. They are difficult to accept new interesting activity. The computers own the predictable characteristic. Therefore, the autism students can memorize the multimedia information by the computers.

The teachers can use the computer to assist the Autism student to help increase their concentration, patience apart from to stabilize the Autism students' motion and to improve the fixed behaviour mode. The kids can also gain the enjoyment and achievement from the learning process.

According to Bondy and Frost, the picture Exchange Communication System (PECS) is a technique of boosting communication in non-verbal kids as it eliminates requirements of other communication interventions such as imitation, make eye contact and etc. Dr. Temple Grandin also describes that when a word or phrase is vocalized she creates a mental model with a picture.

As mentioned previously, autistic children have a fondness towards visual learning styles. Among the elements include gaining attention, informing the objective, encouraging learning, presenting information and etc. There are increasing numbers of software and technology solutions in the last two decades focused on helping and educating people with autism.

Assistive technology, direct instruction, and modeling techniques are often used to demonstrate communication and skill attainment in that kids do not reach typical developmental milestones. Feasible approach by using ICT or Multimedia learning by using multimedia presentations and methods for teaching that needs to be tackled

to help develop the life quality of people who have various developmental disabilities.

Overall, it is an advantage in teaching the child by the use of pictorial speech worked so the author will apply it by using multimedia approach.

## **2.1 Cognitive Disabilities**

The autism spectrum disorders occur at all intelligence levels. It is normal to have uneven developed cognitive skills for them even kids with normal to high intelligence. Typically, they can do well on tasks involving immediate memory or visual skills but have problem in tasks involving symbolic or abstract. The kids may possibly exhibit the difficulties in processing the thinking as well as in generalizing. The problems in abstract thinking, awareness and judgment may be exist as well as preservative thinking and impaired capability to process symbolic information.

According to Andrea Kuszewski, a behavior therapist and consultant for autistic kids spectrum said that she train autistic kids who had cognitive disabilities levels. Her occupation was to teach the kids in any and entire areas that were deficient as well as to ensure them as close to working at the same level of their peers as possible.

She also mentioned that a little autism boy with Pervasive Developmental Delays began therapy with her and tested his IQ. The boy scored in the low 80-s which measured borderline mental retardation. Then, he improved after being retested and score of his IQ was well over 100 (that is “average” for normal person) after she gave teaching in reading, social functioning, play skills and leisure activities in few years. It really show a prove that by using technology to have proper training on the brain, it is believed and possible for the kids to increase their cognitive functioning, she had seen it with her own eyes through her occupation as a therapist.

## **2.2 Why create Windows-based application**

One of the greatest misunderstood manners of autistic kids is the meltdown. This is the result of some sort of overwhelming stimulation of which foundation is often a mystery to parents, caregivers and teachers. It can suddenly come up and catch everyone by surprise. The kids tend to undergo from sensory overload issues which can create meltdowns. Children who have neurological disorders other than the autistic kids can suffer from meltdowns. Contrasting from temper tantrums, these kids are conveying a need to withdraw and slowly collect themselves at their own pace. They are actually looking for attention. Apart from that, they have the capability to know that they are trying to manipulate the behavior of the others, caregivers or their peers. This perspective taking or "theory of mind" is completely alien to the kids who has no clue that others cannot "read" their mind or feelings naturally. This incompetence is to recognize other human beings have dissimilar thoughts and perspectives from them are an eternal root of frustration.



## **CHAPTER 3**

### **METHODOLOGY**

#### **3.0 Research Methodology**

There are four(4) different types of data collection that will be used in this project namely:

- Literature Review
- Survey/Questionnaire
- Interview
- Observation

##### **3.0.1 Literature Review**

The author has done some reading through the articles, forums, magazines, books, research paper, journals, websites, case studies and brochure which are relevant to the topics of research. The area of studies includes the understanding of Autism and the problem, ways to help and reduce Cognitive Impairment problem, the behavior of the autistic kids, Multimedia learning and Windows-based Application.

##### **3.0.2 Survey/Questionnaires**

Besides that, the author had also used methods like surveys and questionnaires to obtain feedback relating to the application that the author going to develop as well as to gain extra knowledge about Autism. The surveys/questionnaires that had been carried out consist of written set of questions where respondents choose the answers from options given. The purpose of the results collected is to increase the knowledge of the autistic children particularly from the schools that the author observes.

### **3.0.3 Interview**

In addition, several interviews had been conducted with Special Education Needs Assistant teachers (SENA) who are specialized in this area in different locations of Autism Centre/Schools in Tutong, Negara Brunei Darussalam. The purpose of this interview sessions is to increase the knowledge of the author about the research topic apart from getting feedbacks on the methods that are used in the application. The author could not ask questions from the kids itself as they have impairments in three areas that is Social, Behavior and Communication. It is very hard to communicate with the kids so the author just asks the teachers what they expect towards the application to improve the cognitive skills of the children. These interviews give a better view about the used method as it is very fast to get the feedback and the information is more accurate than other methods.

### **3.0.4 Observation**

In order to get well thoughtful and view about the actions and way the kids interact, the author also had to come to the Autism Centre and Schools. This is a very useful method for the authors as it enable her to see the nonverbal expression of feelings, determine how the kids interact and with whom, grasp how the kids communicate with each other and also see how much time the kids spent on different types of activities.

## **3.1 System Development**

Here in the section, discussion is focused on the method used to develop the Windows-based application. The name of the method that is used for developing the application is called Throw away or Rapid Prototyping Methodology which consists of five(5) main stages namely (i) Planning, (ii) Analysis, (iii) Design and (iv) Implementation (v) Testing.

A prototyping based methodology shown in Figure 1, carry out design and implementation where the coding is executed. Both of this phase are done concurrently in a cycle up to the system prototype (the application) is completed. Each of these phase play roles that will be discussed below.

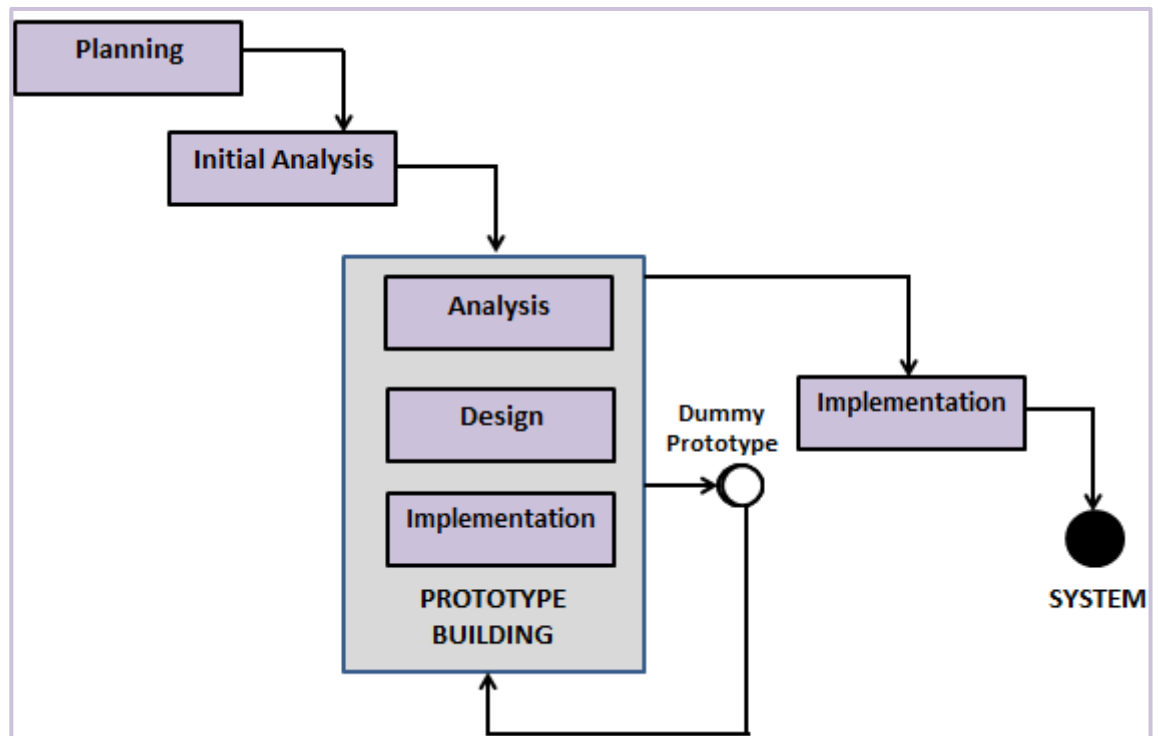


Figure 1: Throw away or Rapid Prototyping Methodology Diagram

### **3.1.1 Planning Stage**

#### **Data Gathering**

This stage helps the author to determine the basis for all future decisions to reduce many mistakes done because lack of proper planning at the beginning of this stage. This stage is also important to get essential information for this research as it helps the author to identify related autistic problems and also to find possible solutions by conducting several investigations. Apart from that this stage is also define the scope and objectives of the research. Then, research and data gathering is done focusing on the title. After proposing a title to Supervisor and agreed for the author to proceed with the title named as Multimedia Learning for Autism. Moreover, the author also determined what software and hardware can be used in order to make the application. Lastly, the author uses this planning stage to identify the task for the system development and developed a Gantt chart to show all the tasks that need to be done through the project lifecycle that is represented in **Appendix A**.

### **3.1.2 Analysis Stage**

#### **Data Analysis**

The analysis phase is conducted to carry out the requirement of user after all the information has been gathered. This phase is very important as the purpose is to determine the requirement and needs of the software application. This phase includes the interviews conducted from normal person who actively join to assist the autism association in Brunei to get more understanding the behavior of the kids as well as the challenges to tackles the attention of the kids to learn and communicate.

### **3.1.3 Design Stage**

#### **Application Development**

Next stage is the design phase. This phase determine how the application should be working as learning tools to help the kids. Here, prototype of the software application is developed. This allows the usability testing of the product such as validation and verification of the application so that any lacking of the application can be added for improvement until it can satisfy the developer.

Furthermore, developer will test the application category by category. This is to make it easier for the developer to know which part should be improved for example category of storybook, activities and etc. The developer wants the user to try whether the story line is in order, can hear the audio clearly, speed of loading the pictures didn't take so much of their time and so on. The developer can do the testing to anybody even though from normal person.

### **3.1.4 Implementation Stage**

Later when everything is done such as the prototype of the application can be played smoothly and it reach the goal that the developer aim to achieved in terms of the performance as well as the execution of the system, implementation then can be done and test can be conducted to the target user and people who are involved with them. The function is to ensure that the application really meet the needs and is useful for the kids as well as their guardian.

The system specification is turned into a working system and lastly become an application. User manual will be written-up after the design of interface as well as after the coding is written. The purpose is to assist new users on how to use the Educational Multimedia Learning with step-by-step instruction.

As being said above, this phase includes the implementation of the system prototype and real system. When the real system is completed, it is expected that it can be implemented in Autism Centre/Schools particularly where the data gathering was conducted and to any Centre/Schools that need this application.

## Evaluation

Testing the application and giving questionnaire to provide feedback on the application. The developer will identify and tackle on cognition area in order to make this application a success as the author will only have few months to develop the application so it is better to put boundary and choose only one area that is manageable as well as can give benefits to the user as the autism individuals exhibit different levels of understanding, interaction and reaction towards things that can give interferes with their learning process.

### 3.2 System Architecture

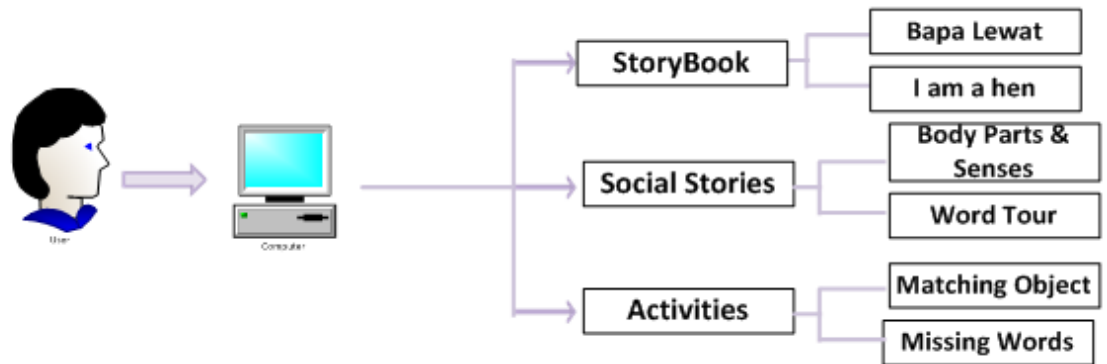


Figure 2: System Architecture for 'BINTANG HATI'

From the proposed system architecture shown above, it presents the whole design of the application. The system starts from the user where user will download and install the application in their Personal Computer/Laptop. The application is designed for the autistic kids below twelve(12) years old but can also be used by their teachers and guardian to monitor and see the improvement of the kids.

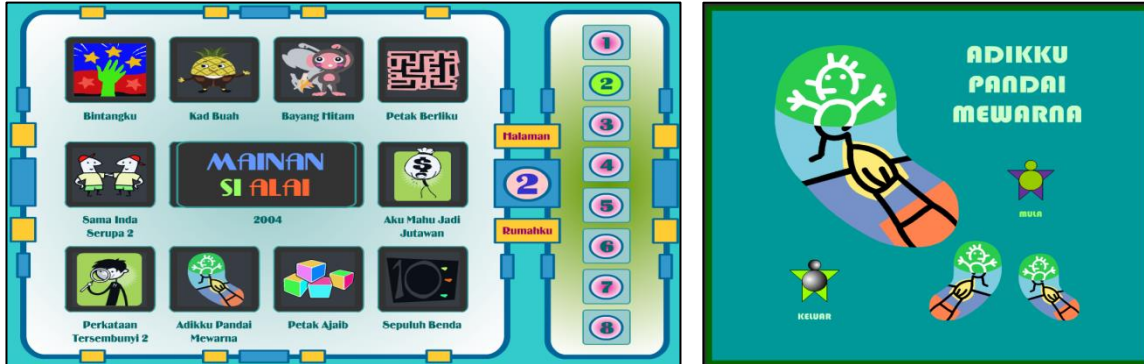
The developer has her own reason why such activities in included in the application. Details of the activities with reason can be found in the findings section.

### **3.3 Related Work**

The author did some research on other applications with similar concept and analyzed their strengths and weaknesses.

## RESEARCH AND ANALYSIS OF THE COMPETITION RELATED MULTIMEDIA WORKS

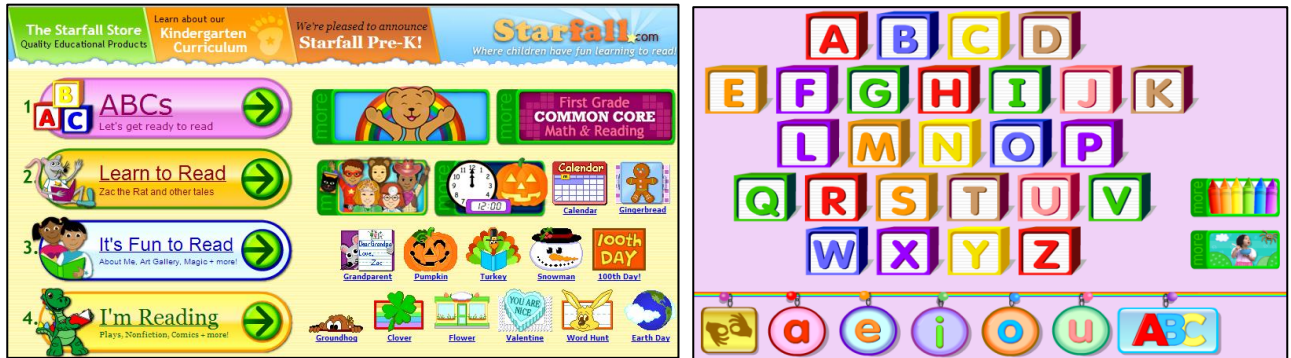
### 3.3.1 Competition related Multimedia works : 1



<b>Source</b>	Cikgu Suhaili Bin Md Yusof, Ministry Of Education (Brunei)
<b>Target Audience</b>	<ul style="list-style-type: none"> <li>Special Needs Children</li> </ul>
<b>Description</b>	<p>Content developed using Flash in Malay Language</p> <p>Games include:</p> <ul style="list-style-type: none"> <li>Logo Kebangsaan</li> <li>Pasang Kad (Card Matching)</li> <li>Puzzle Bergambar (Picture Puzzle)</li> <li>Adikku pandai mewarna (colouring)</li> <li>Mencari benda tersembunyi (Find the hidden objects)</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>Many choices of game</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>Crowded interface</li> <li>Main menu not properly organised</li> <li>The use of sound can be distracting to autistic children</li> <li>Small font size</li> <li>The use of colour is not attractive</li> </ul>
<b>Local / International</b>	<ul style="list-style-type: none"> <li>International : Brunei</li> </ul>



### 3.3.2 Competition related Multimedia works : 2



<b>Source</b>	<a href="http://www.starfall.com/n/level-k/index/load.htm?f">http://www.starfall.com/n/level-k/index/load.htm?f</a>
<b>Target Audience</b>	<ul style="list-style-type: none"> <li>Pre-school, kindergarten, first grade, second grade, special education, home-school, and English language development</li> </ul>
<b>Description</b>	<p>A free public package to encourage children to read with phonics.</p> <p>Starfall is a learning alternative to other entertaining choices for kids.</p> <p>The lesson plans encourage kindergarten children by creating an atmosphere of fun and enthusiasm, offer opportunities for child-directed instruction, and aiding the needs of English language learners and struggling readers learning together with their peers.</p>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>Colourful and good interface/theme</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>Too much use of sound</li> <li>Takes time to load</li> <li>Contents are advanced therefore challenging for intended target audience.</li> </ul>
<b>Local /International</b>	<ul style="list-style-type: none"> <li>International: United States</li> </ul>

### 3.3.3 Competition related Multimedia works : 3

[Click here for the ROUND THE HOUSE module!](#)

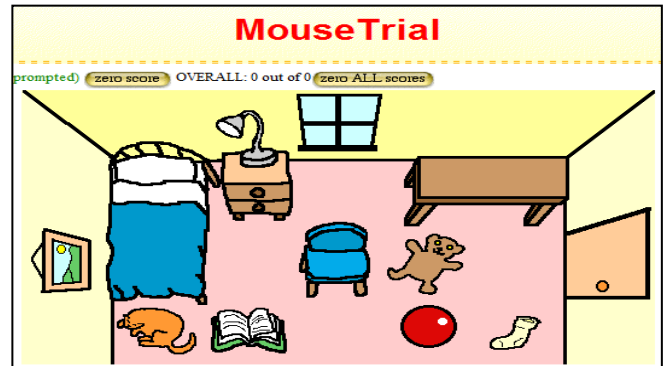
**NEW!** - Six different submodules featuring various household objects and parts of the house. In four of the modules you must click on the correct part of a picture of a room or the picture of the whole house. The other two feature a variable sized array of items to click, with a choice of large or small icons.

[Click here for the ANIMALS module!](#)

Nine different submodules about animals. There are six different categories of animal: Pets, Farm animals, Aquatic animals, Birds, Zoo animals, and Small animals & creepy-crawlies. Or you can play one of the "All together" submodules where ALL of the above are available to choose from, using either the usual big icons or smaller ones to fit more on the screen. There's also a game for picking the right animal by the noise it makes.

[Click here for SIZE, SHAPE & COLOUR!](#)

Six different submodules for developing vocabulary and comprehension about size, shape and colour. The easier trials simply ask the player to select the right choice from an array of different shapes or colours. The more sophisticated ones mix the concepts together so that the player might be asked to pick a "small green triangle" from a diverse array of big and little shapes of various colours.



<b>Source</b>	<a href="http://www.mousetrial.com/">http://www.mousetrial.com/</a>
<b>Target Audience</b>	<ul style="list-style-type: none"> <li>Autistic children</li> </ul>
<b>Description</b>	<p>MouseTrial Autism Software is the website that caters to those with autism abilities.</p> <p>The website allows them to play around and select the menu option to play the games provided.</p> <p>MouseTrial enables the autistic children to boost <b>vocabulary, concentration, cooperation and literacy.</b></p>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>It is an inexpensive and low-stress way of getting started with early intervention activities for autism</li> <li>It can help to "maintain" vocabulary that have already been developed and can help as an alternative way of encouraging new language.</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>The sound is not really clear</li> <li>The use of colour is not attractive</li> </ul>
<b>Local / International</b>	<ul style="list-style-type: none"> <li>International</li> </ul>

With these related work research and analysis done, it gave the author some ideas on what features to add to the project. With all the ideas, the author will start the design stage for the next level. During this design stage, the author will hopefully manage to create the layout of the project, prepared the program flow, the flow chart, the wireframe, storyboard, and the functional specification of the project.

### 3.4 Project Activities and Key Milestone

No	Deliverables/Activities	Schedule
1	Progress Report	Week 5
2	System Complete	Week 11
3	Pre-Sedex	Week 11
4	Usability Testing	Week 12
5	Dissertation(1 <sup>st</sup> Draft)	Week 12
6	Online Submission of Technical Report and Dissertation	Week 13
7	Viva	Week 15
8	Final Dissertation	Week 16

Table 2: Project Activities

## CHAPTER 4

### RESULT AND DISCUSSION

#### 4.0 Result and Discussion

In this chapter, the author will explain about the current implementation of her project. Section 4.2.1, show the interview results conducted with the Special Education Needs Assistant (SENA) Teachers as well as guardian of the kids. In the next section explains about the design and architecture of the application. Finally in section 4.4, the system interface is shown ad explained.

#### 4.1 System Design

##### 4.1.1 Use Case Diagram

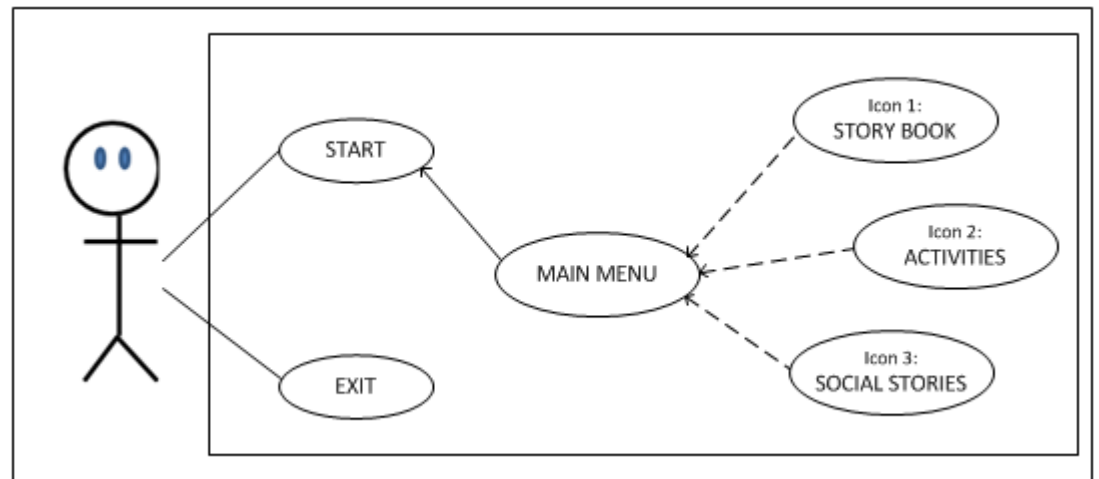
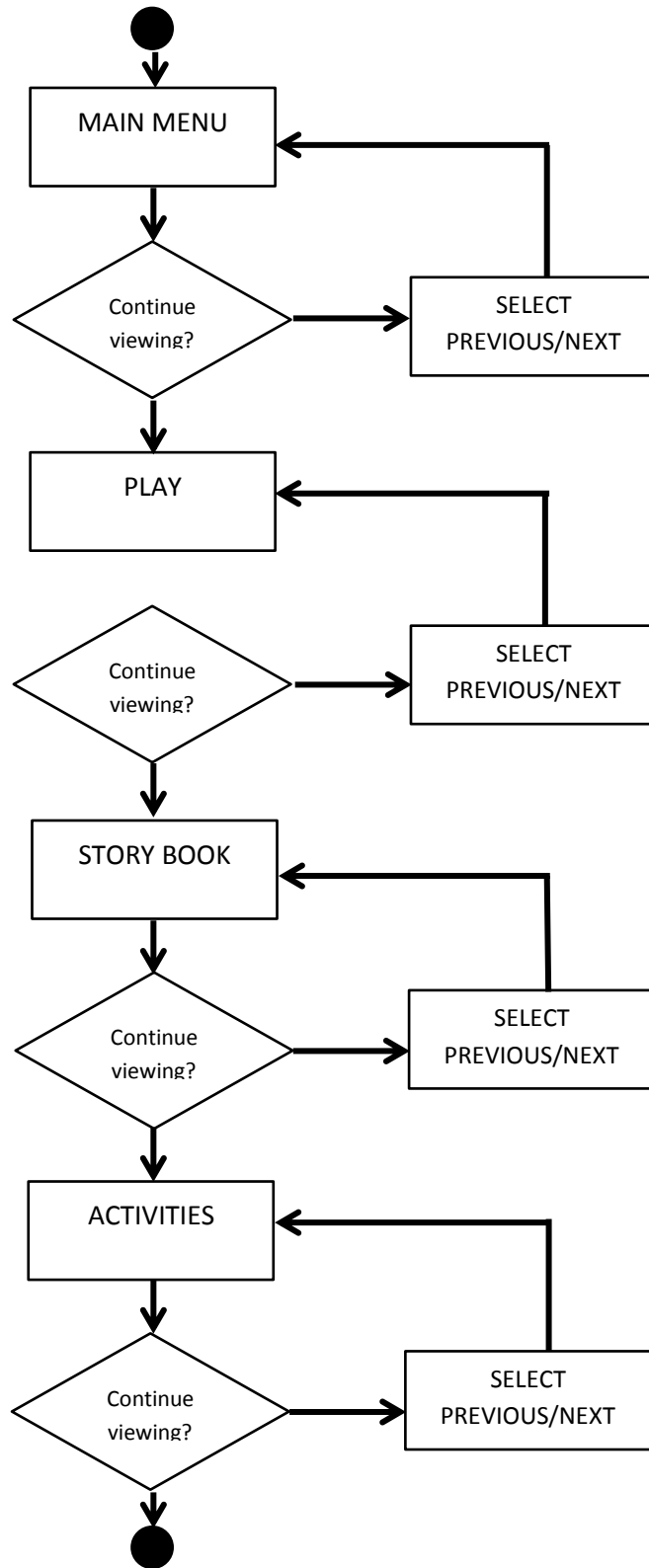


Figure 3: Use Case Diagram

### 4.1.2 Activity Diagram



## **4.2 Discussion of findings**

Interviews and surveys had been conducted with several representatives from Student Education Needs Assistant(SENA) officers that handle autistic children from two different primary schools namely Sengkarai Primary School and Keriam Primary School(Centre for Autistic Kids) as well as from public; the guardian of the kids. The objectives of the interview are:

- To find out their difficulties of attracting the kids to study
- To discover the relevancy of the project proposed and the importance of Multimedia to engaged the students with educational activities.
- To know what activities can be include in the application in order to improve the cognitive skills of the kids
- To identify activities that they like to do.

### **4.2.1 Summary of findings**

The respondents have stated that the current application that they have been using only have one chapter for each application. For example, in the application only have parts of body chapter. In order for them to open new chapter, they need to use another application. Thus, the developer going to put the entire chapter in the application so this learning package can be opened once to make the user easier to just choose the chapter they want from the options provided.

Apart from that, most of the tools used by the teachers/assistant of SENA are just manila card and Velcro because at the moment they only have 2 applications for them to teach the students. By doing the learning package, the author really hope that it can contribute them to attract the students to learn through observations and play and the developer try to attract the students by using colourful graphics that are designed by Adobe Illustrator.

The SENA officers also suggest the developer to include :

### **1. Matching text, objects, shapes**

The targeted skills are matching and math readiness. This enables the students

- ✓ to identify items as same or different
  - ✓ allow the kids to match the items of the same colour
  - ✓ sort the items by colour
  - ✓ sort items by shape
  - ✓ match identical items/pictures
- The goal of including the games in the package is for the kids to complete the task independently without prompting or assistance from another person.

### **2. Reading & listening**

The targeted skills are listening, recognition of word. This enables the students to:

- ✓ Match the pictures to sentences describing the pictures
- ✓ Sort characters and settings (in pictures or word form)
- ✓ Match words
- ✓ Listen what the sentences try to explain with the aid of pictures
- ✓ Assist with behavior management

### **3. Learn new word**

The targeted skills are pre-reading, recognition of items/word. This enables the students to:

- ✓ Improve vocabulary
- ✓ Remember words more easily
- ✓ Teach routines
- ✓ Describe any social situation

- Note that, for all the activities, level of understanding and improvement of their cognition skills varies depends to the unique abilities of each kid.

From all the interviews, surveys as well as observations conducted by the author, she have come up with the storyboard. The purpose is for the supervisor to know the plan what types of activities will be included in the package and flow of the application so the cognition skills of the students can be improved. The author also been told by the teachers involved that the visual material is better than traditional method of learning to illustrate points as the kids tend to learn more effectively from symbols and pictures



Figure 4: Interview session and observe the kid play games





Figure 5: Taking pictures with the teachers and SENA officers.

The author also been told by the teachers involved that the visual material is better than traditional method of learning to illustrate points as the kids tend to learn more effectively from symbols and pictures despite their verbal strengths. Games/Activities that need to be included in the application are rates by the SENA teachers/officers as they have experience in handling the kids as well as from their observations. As a result, chart below are the rates that been given by them for each activities/games.

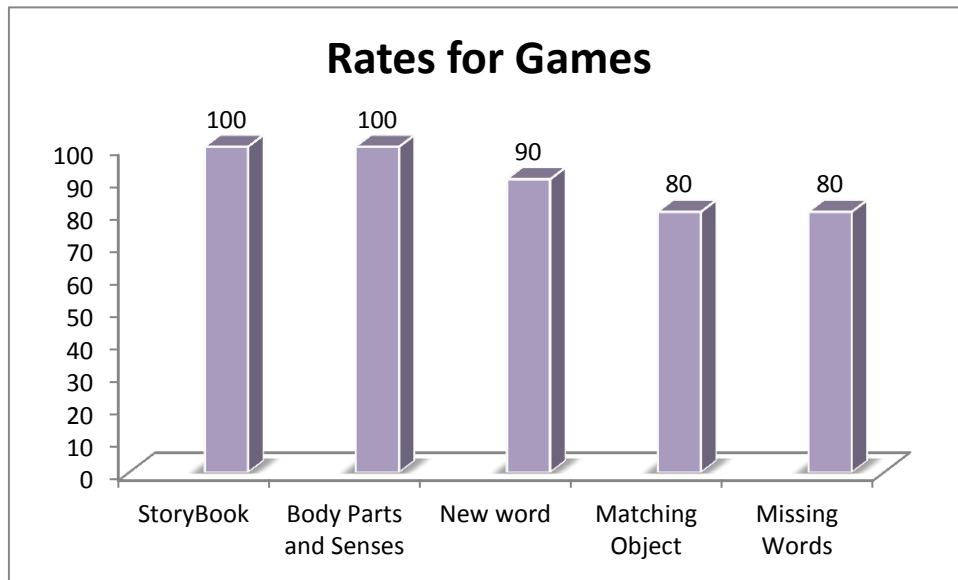


Figure 6: Rate or games that can aid the cognitive skills of the children

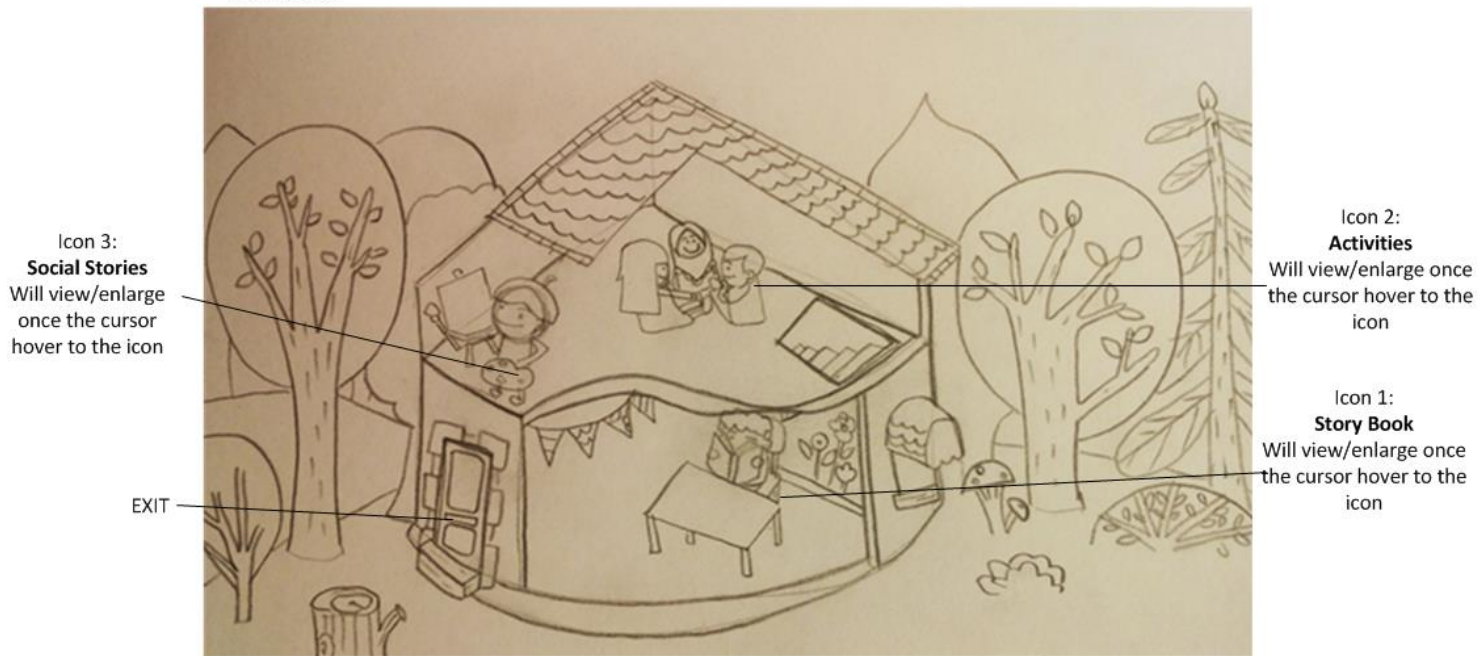
Figure 6 states the rating of each method based on interview session from different schools. All the SENA teachers/Officers agree that StoryBoook and Body Parts and Senses must be included in the application as it is the most appropriate activities

Interviews and surveys had been conducted with several representatives from Student Education Needs Assistant (SENA) officers that handle autistic children from different primary schools. Lastly, 80% of the respondents agree the usefulness of the missing words and missing object to be included too. The purpose is to know the understanding of the kids of what they have learned from the activities that they did.

Based on the results chosen, the games or activities are all use to improve the development of cognitive skills of the children. This is also the reason why the author focus on Cognition rather than other areas such as Communication, Social Participation, The repertoire of activities, interest and imaginative development, Developmental rate and sequences and lastly Sensory Processing. Moreover, AP Dr Abas Bin Md Said, the supervisor of the developer also advised the author to focus only on one area as it can benefit the specific kids who have cognitive problem. This is because exist games on the internet did not focus only on one area.

### 4.3 Initial Storyboard

Main Menu:



There will only be four(4) icons including Exit, namely Social Stories, Activities, Story Book.

When user hovers to **icon 1**: there will be a voice over “**Story Book**”.

When the kids hit the icon, it will bring the kids to a library.



Options available in every page

There will only be 2 stories : malay and English.

In this example: user choose the malay story named “Bapa sudah lewat”



“Activities”

When user hover to **icon 2**: there will be a friendly voice over “**Activities**”.

When user hits the “Activities” icon, there will be 2 options for them to choose whether to **play games** or try the **quizzes**.

For games,

- Matching object
- Matching text



“Social Stories”

The last icon named “Social Stories” will enable the kids to learn:

- Parts of the body and senses.
- New object

Example parts of the body section:




These are my eyes.

I see with my eyes.



Example of learn new object:

In class room situation,

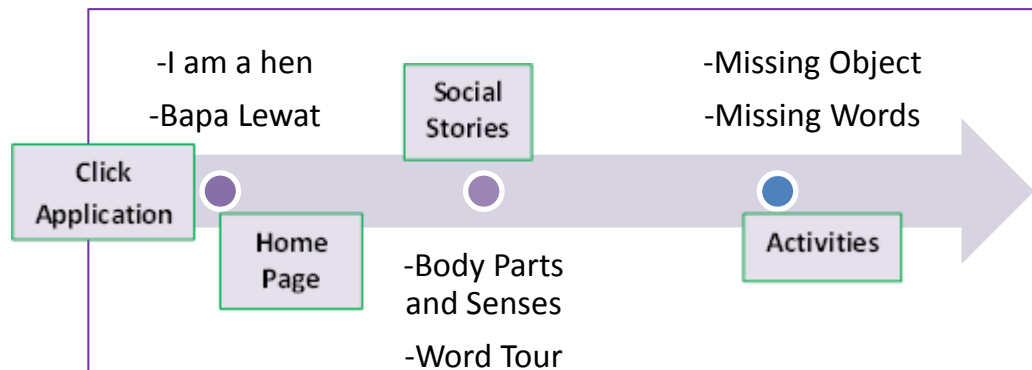
When user hit this icon  ,

A pop-up window will appear and tell the user what the item is.

## 4.4 System Design

### 4.4.1 Process Flow

In detailed system design, system model and conceptual design is very crucial in designing the system. A system model gives detail guideline of the system. A system model is a system abstraction that being studied rather than the alternative system representation. Below show the basic flow of the system.



## 4.5 System Interface

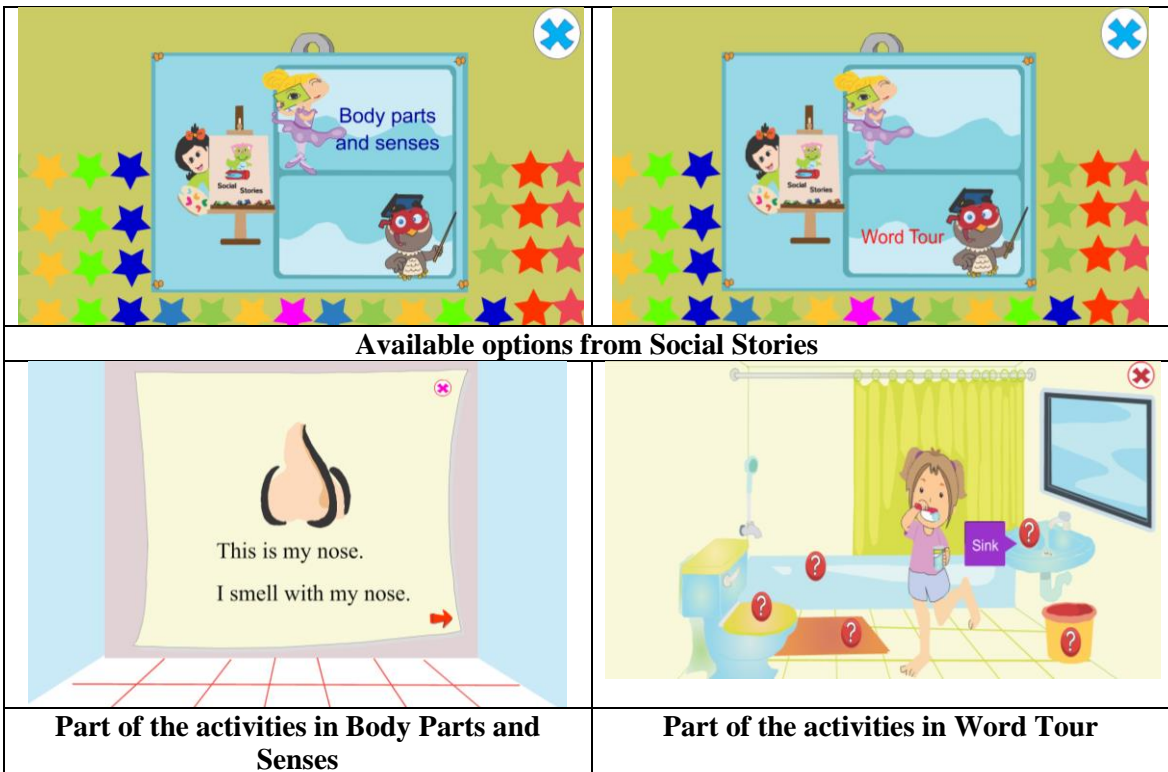
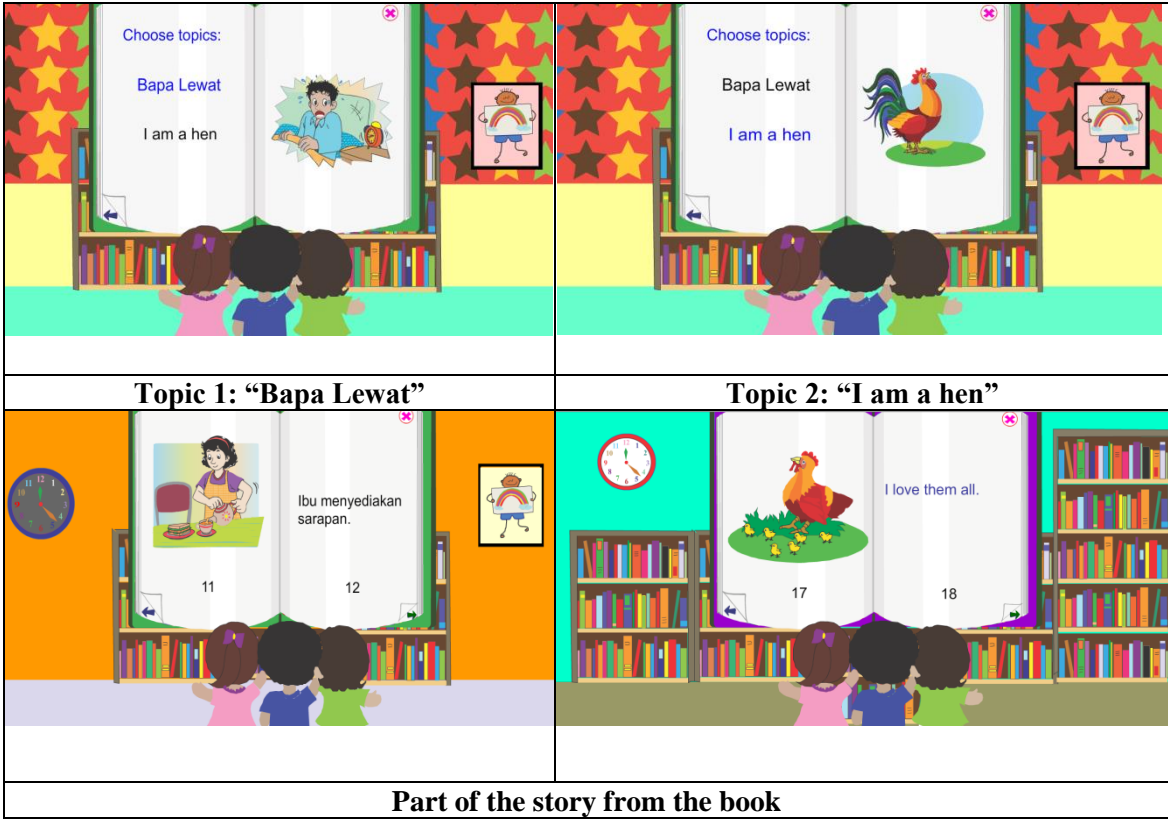
Below are the interfaces of Multimedia Learning for Autism: Bintang Hati.



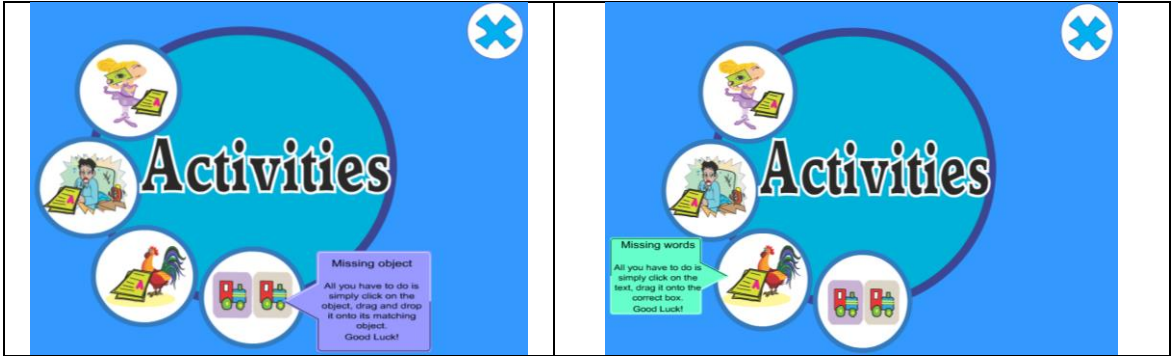
Screen 1: Home Page

	<p><b>Button to Story Book</b></p>		<p><b>Button to Social Stories</b></p>
	<p><b>Button to Activities</b></p>		<p><b>Button to exit</b></p>

Story Book Section:







Choices available from the 'Activities' for the kids to choose.



Part of the games in Matching Object



Part of the games in Matching Words

## 4.6 User Testing Results

Refer to **Appendix B** for the User Testing Feedback Form.

Testing for users are divided into two parts which is for the teachers in the first part and the other part is for the parents of the kids. The developer can't ask the kids to do the feedback as the teacher and their guardian is enough to see the improvement of the kids from their observations.

### 4.6.1 User Testing Results from Respondents

User Testing was conducted with 14 respondents consists of SENA officers, teachers, parents and guardian of the kids. After the testing took place, the feedback towards the project is evaluated. The feedback results from respondents as per below:

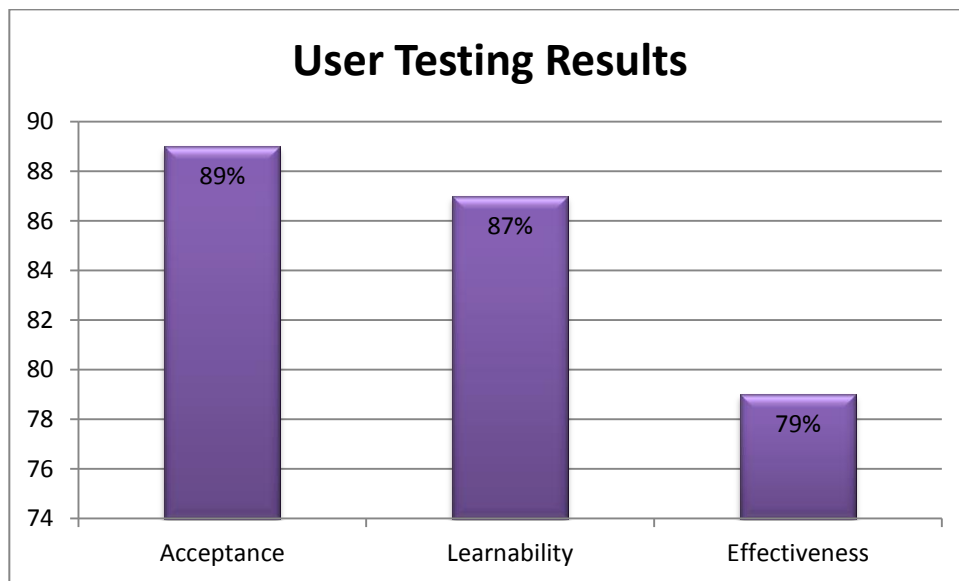


Figure 7: Testing results given by SENA officers, teachers, parents and caregiver of the kids.

The result above shows that 87% of respondents agree that the learning package is easy to learn and understandable. Learnability bar defines that users are able to use without a lot of instructions. We can also see that 89% of respondents agree that this application is acceptable. Acceptance bar state that they are agree that the application is acceptable and can be used as alternatives way for the kids to have entertainment and at the same time to gain knowledge. Lastly, for effectiveness, 79% of respondents agree that this application is very effective and activities as well as games in this application can be used to aid the developmental of cognitive skills of the kids without replacing the traditional way of learning.

#### 4.6.2 Evaluation Analysis of level of Satisfaction

After the testing takes place, then the satisfaction of the same respondents towards the application will be evaluated. The evaluation of satisfaction will be analyzed using graph below:

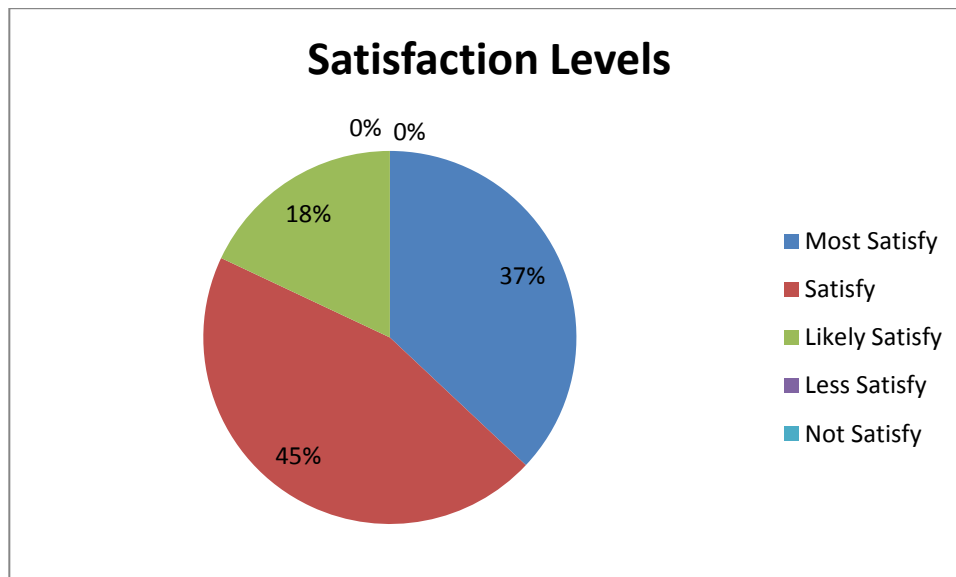


Figure 8: Evaluation Analysis users' Satisfaction level

From the result above, we can say that the group of respondents is mostly satisfied with the performance of the application. So, from the chart above, it shows that only 37% of respondents are most satisfied with the application which they think that this application has met the overall objectives.

Apart from that, 45% of respondents are satisfied with this application which means that there are the application can be upgraded for improvement. Lastly, 18% of respondents are likely satisfied with the application which they think that this application is good and more features of the system can be included for future enhancement.

Therefore, from the Figure above, it express the efficiency of the application. The application had satisfied the user but it still need to be improved to aid the learning.

## CHAPTER 5

### CONCLUSION

#### 5.0 Relevancy to the objectives

Referring to Chapter 1, in Section 1.4, it was stated that this project has 4 unique objectives. It can be concluded that, all objectives are achieved as explained below:

- For objective number 1:

**To broaden their knowledge by using technology**

The application was designed in English but got one topic in Storybook is in Malay version. In addition, the kids can broaden their knowledge by using technology as part of the application consist of teaching the kids on how to read, learn new word, teach parts of their body and its function and so on. This means that this objective is achieved.

- For objective number 2:

**To develop a multimedia-based software to support and enhance the educational and cognitive development of young learners with autism.**

This application provide a better and flexible way of learning by developing a Multimedia based software as well as grab the attention of the kids by promoting a software that can sustain engagement, build skills for cooperative play. Kids like to play especially when it involves with technology. This application can be used to aid the autistic kids at the same time help them to improve the cognitive skill development. Moreover, the application has also been modified from the comments and feedback given from respondents after prototyping has been done. This is to ensure that the application is accepted by user as well as the teachers/guardian.

## **5.1 Suggested future work for continuation**

The developed application is based on the needs on how to improve the cognitive skills of the children and implementation. Early testing on the prototype of the system has been done and improved in the real system. From the interview, visits as well as observation of the autistic kids at the schools and autism Centre in Negara Brunei Darussalam gained a lot of benefit for the developer to understand more on the learning techniques so it can be applied on the technology and at the same time fulfilled the needs of them step by step in the future.

For future enhancement, the author would like to suggest that the research area and the features of the system to be expanded. The research areas should include point for the quizzes done by the kids as well as a put some more activities so that if the kids did all of the games they can proceed to the next part.

Apart from that, the author also suggests the application to be upgraded. For example add other areas of autism such as an application that can focus more to improve the communication, social participation or any five of the areas. By imposing suggested aid, user can practice a lot and can see the result whether they are improving or need extra exercise.

The author also recommends that the interface of this application should maintain its user friendly and attractive environment for children. Therefore, it is hope that this application can be accepted by all the autistic kids and their guardian particularly in Negara Brunei Darussalam and to get an official collaboration with people involved with Autism like SENA teachers in the Centre as well as schools that offer the children to study there.

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# APPENDICES

## Appendix A: Gantt Chart

WEEKS																												
ACTIVITIES	FYP 1															FYP 2												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Planning Phase																												
Problem Identification & feasibility study	█																											
Initial background study	█																											
Literature Review		█																										
Analysis Phase																												
Interviews			█																									
Data Gathering		█	█																									
Data Analyzing				█	█																							
Design Phase																												
Interface sketch and design						█	█																					
Prototype design						█	█	█																				
Implementation																												
System Development																█	█	█										
System testing																												
Usability Testing																		█	█									
Tabulation of usability data & feedback																		█	█	█								
Improvement of prototype																					█	█	█					

## Appendix B: User Testing Questionnaire

### MULTIMEDIA LEARNING FOR AUTISM – BINTANG HATI:USER TESTING FEEDBACK FORM

The objectives of this feedback form is to record the feedback from teachers or guardian of the children in order to improve the functions and effectiveness of this application.

Your opinions are very important for this project and thank you for your time to share your view for this project. Please rate 1-4 for question below				
	Strongly Agree	Agree	Disagree	Strongly Disagree
<b>Learnability</b>				
1. The application has user-friendly Graphical User Interface (GUI).	4	3	2	1
2. It is easy to use and understand how the method in this application works	4	3	2	1
3. The information provided is simple and easy to understand.	4	3	2	1
<b>Effectiveness</b>				
1. The application will help the kids in learning especially to aid the development of their cognitive skills	4	3	2	1
2. The methods in this application works well and suitable for the autistic kids below 12 years old	4	3	2	1
4. The words been used in the application is suitable and can help them improve their knowledge	4	3	2	1

<b>Acceptance</b>				
1. You are interested to use this application.	4	3	2	1
2. I will recommend this application to be use by stutterers and pathologist	4	3	2	1

<b>Level of Satisfaction</b>	<b>Most Satisfy</b>	<b>Satisfy</b>	<b>Likely Satisfy</b>	<b>Less Satisfy</b>
Rate	4	3	2	1