CERTIFICATION OF APPROVAL

Interactive Courseware for

Attention Deficit Hyperactivity Disorder (ADHD) Children

By

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11284

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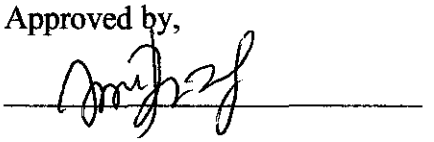
Approved by,



(Emelia Akashah Binti Patah Akhir)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2011

CERTIFICATE 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 by unspecified sources or persons.

(NUR ADEERA BINTI NOORAZMAN)

ABSTRACT

Courseware is a computer based learning tool to aid teacher in school and parents at home in educating their students and children. As education plays an important role in human knowledge and development, multimedia has reform the education system due to the rapid development of current science and technology. With the assistance of technology in education, it could help in assisting children with learning disabilities in unleashing their potentials thus to perform better academically. Attention Deficit Hyperactivity Disorder (ADHD) is a learning disability whereby student's displays inattentive behavior in class, hyperactive and disruptive behavior that could lead to social isolation hence risk the student's academic performance. This document detail out the integration of courseware as a technology to help the students diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) learning disability.

ACKNOWLEDGEMENT

First and foremost, I would like to express my utmost gratitude to Allah SWT for making it possible for me to undertake a project that allows me to gain insight and knowledge on Attention Deficit Hyperactivity Disorder, a neurobehavioral that is categorized as a learning disabilities and in a way to contribute to society especially Malaysians, to create an awareness of such neurobehavioral.

Endless gratification goes to Ms. Emelia Akashah Binti Patah Akhir, who continuously gave me guidance on completing this project with endless encouragement to do the best of my ability. Also, to Dr Mohamed Nordin Bin Zakaria, who have been such a great help in my crucial time with patience in giving out his ideas and point of views towards my prototype.

Not forgetting, my family for giving me strong support throughout the process. My utmost gratitude goes to my colleague, Noorzaini Ilhami Mohd Noor for his help and guidance in completing the project, that without the help, it would not be as smooth sailing as it was. I would like to extend my appreciation to all my classmates TECHIES 0707 for all the support and help throughout the completion of this project.

Last but not least, thank you to Universiti Teknologi PETRONAS for providing me this opportunity to learn, gain decision making ability and experience building a courseware.

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CHAPTER 1

INTRODUCTION

This chapter introduces the project background, problem statement, project objectives and project scopes of the research. Along the chapter are a brief explanation and a review of the whole project research.

1.1 Project Background

Many parents take it as their child being too naughty, out of control when their children behave inappropriately, tear down the house like tornado, shouting, create a nuisance, climb the furniture and as a result parents take the action to punish them, scold them, ground them when the children are actually suffers from a learning disability called Attention Deficit Hyperactivity Disorder or better known as ADHD that is commonly out of parents' knowledge, and when parents' gets the idea that their child suffers from ADHD they mistakenly took it as deformities when ADHD are actually a gift that needs a right method to nurture it [1].

Attention Deficit Hyperactivity Disorder (ADHD) is a neurological condition that is usually genetically transmitted. It is characterized by low span of attention, poor organizational skills and poor performance on tasks requiring sustained mental activity [2]. Children with Attention Deficit Hyperactivity Disorder (ADHD) may demonstrate inattention, hyperactivity and disruptive behavior in class and become a hindrance once they enter school. This study will seek to help children identified with ADHD as early as

the age of 6 (Pre School) with their learning disabilities using an interactive courseware.

The approach in nurturing them with an interactive courseware, learning with a touch of technology rather than usual practical practice could help expand their focus limit, attract their attention and also to aid school teachers and parents in guiding children with ADHD.

The target user of this interactive courseware will be Pre School children, children below 6 years old as at this age are the vital age of a children development and they are at their most attentive moment of absorbing knowledge from the surroundings. The content of the interactive software will be illustrated with colorful flashy graphics and sounds to attract the children to enjoy the learning process.

1.2 Problem Statement

Since technology is vital in this 21st century in attracting nowadays computer savvy generation, the idea of coming out with an interactive courseware inclusive of a relevant course based on school syllabus could help the ADHD children in expanding their method of learning in the same time act as one of a treatment. In addressing a gap and differences of current method used by parents, teachers and some learning method with technology insert that had been be found in the Internet, few problems had been identify to come out with an interactive courseware. There are :-

1) Existing method and less interactive CD available in market

Training method in Malaysia for an example the The Hils Learning Centre in Mont Kiara, uses only practical approach to train kids with ADHD behavioral disorder. They gave them advices, get them to seat with a psychiatrist, music therapist and monitor their activities.

By having a more technology inserted training method, children with ADHD will finds it more fun and interesting. They could play fun games that need to be completed within time with attractive color while listening to music; it could help them to stay more in focus and to pay more attention in details of the interactive courseware. The design of the courseware that will be based on the research will take the lead on how it can help the ADHD child to be more focused by the graphics used with an adequate time constraint as the ADHD child has their limit in focusing. In planning phase of drafting out the input in the courseware, few significant problems have been identified in current existing courseware that is available in market. There are :-

- Using two dimensional (2D) graphics rather than three dimensional (3D)
- Available in only games rather than according to school syllabus software Example product : http://www.smartbraintech.com
- Games available are for general and are not focused in depth for the ADHD children. Example website : http://www.funbrain.com/, http://www.smart-kit.com/

2) Awareness

Malaysians aren't aware with the existence of ADHD behavioral disorder that passed down by genetics. They usually take it as a child being too naughty and end up by punishing them. Punishing these gifted children without noticing the problem they have could actually discourage and disrupt their unseen potentials. Children with ADHD are gifted child with the potential of becoming a genius with a correct method in raising them up to nurture their talent.

With an interactive courseware as one of a comprehensive treatment using ICT that parents could use at home as well as teachers could use in school will help to train and nurture children with ADHD to be more focused, well-mannered as they will attracted to the animation, the colors, music and videos. Apart from that, by having this interactive courseware it will also create awareness in Malaysia market that ADHD behavioral disorder is a serious problem that should be attend with details.

1.3 Objective

1. To study and understand the suitable learning method for ADHD children and implement it into an interactive way of learning to attract ADHD children by using attractive colors, music also by having an adequate time limitation to test and enhance their limit of focus.
2. To design and developed an aided tools base on the research done to help both parents and teachers to train ADHD children whenever in school or home and use it as a new approach of learning apart from the therapy session the ADHD children are having.

1.4 Scope of Study

The research of this project will focus on the characteristic of ADHD children and the best criteria/attributes that will capture their attention to further their focus limit in studies especially in their vital age – below 6 years old. Enhancement in graphic design and interface will be made to current learning tools and how can flash graphics plays a role in the development of an effective courseware.

The deliverables of this project is an interactive courseware to act as an aid for parents and teachers as a learning tool in developing the potentials in the ADHD children. The project is developing a prototype with an integration of two elements of research as mentioned above which is the study of ADHD children and the study of courseware as the technology to deliver out the input based on the analysis of the ADHD children most effective learning method.

1.5 Feasibility Study

Feasibility study is the analysis that looks at the potential of upcoming problem and the potential risk a developer might encounter during the development of the project. It is to uncover important risks associated with the project.

1.5.1 Technical Feasibility

The project is technically feasible with some risks that need to pay a close attention to.

Users' risk regarding the usage of multimedia as one of learning tools is medium

- Users are ADHD children who are hyperactive and easily distracted children who will most likely find learning through multimedia application is something new to them and might find it hard to make them start playing with the application in the computer.
- Majority of parents and teachers who is well trained and know how to handle the behavior of ADHD children have used the similar software before can help guide the children.

Developer's risk regarding familiarity with the technology is high

- Developer has no experience in using Adobe Flash Professional CS5 to create a courseware.
- Developer is able to come out with graphics ideas.
- Multimedia development tools are available and consultants are readily available to provide help if needed.

The project size is considered medium

- Features and functions are set but developments are subjected to the limited time developer has to develop the courseware.

1.5.2 Operational Feasibility

Assessing the level of users' acceptance of the courseware, this project has a medium risk. The objective of the courseware is simply to help aid ADHD children in their early age to be interested in learning by capturing their attention and as one of the alternative tools of treatment not solely proven that it can healed ADHD but it helps. Therefore, the users of the courseware are expected to reap the benefit of the development of this project as a baby step to nurture ADHD kids by the slogan that learning is fun.

CHAPTER 2

LITERATURE REVIEW

This literature review explores in depth two dominant element of this research which is courseware as the deliverables of this project and the study of Attention Deficit Hyperactivity Disorder (ADHD) children. There will be an introduction of both element, the details studies and a further discussion supporting by evidence form reliable sources such as journals, conferences and books.

2.1 Definition and Benefit of Courseware and the Game-Based Learning Content

The Concise Oxford English Dictionary currently defines courseware as a computer programs or other material designed for use in an educational or training course [3]. Courseware not only can be used as a tool to aid teachers in teaching during classes but also could give out the idea that learning is fun with interactive graphics, colorful images and sounds. Education plays a vital role nowadays in developing an excellent individual of knowledge society and moving into this 21st century where technology is inserted in almost everything, the approach of inserting technology into a broader field of education could increase the children's concentration and understanding with its multisensory capability to catch attention and to cultivate the participation spirit of the children [4].

The Millennial Generation today or better known as the Y generation are likely associated as the technology savvy generation as they are grown up with a tech lifestyle as early as the age of 3 years old. Blackberry, iPad, iPhone are essential and with only one click they are connected to the world largest civilization, the Internet. The characteristic of children nowadays that is prone to technology and is called as the "echo boomers" hence explain the relevant of education with the touch of technology such as courseware.

Courseware is proven to be the most effective learning method as it could improve learning, to get the children to think out of the box, to experience the new environment of transferring knowledge, undeniably interactive, flexible to be used at home, in school or the day care center, modular, practical, consistent, timely, engaging and cost effective.

Game based-learning method that is planning to be inserted in this courseware is one part of the learning content that can be define by three terms; competition, engagement and immediate reward. Competition will motivate the ADHD children by score and provide assessment of their performance. The competition is in regards of competing oneself to a better performance and achievement that hence will create engagement between these children with ADHD with the courseware. Engagement takes place when the children with ADHD play the game while learning and they will not stop until the games is over. As a token of achievement, immediate rewards will be received to motivate them to be more participative in learning using the courseware. Game-based learning has been recognized as an effective way of learning and has merged to be a promising approach in addition to traditional classroom-based learning.

2.2 Definition and Sub-Type of Attention Deficit Hyperactivity Disorder (ADHD)

America Psychiatry Association indicates Attention Deficit Hyperactivity Disorder (ADHD) as a neurobehavioral condition characterized by excessive restlessness, inattention, distraction and impulsivity [5]. It is a biological condition that affects the brain to screen out the unimportant information explaining why ADHD children focused more on everything around him rather than focused on one single task. Still, ADHD is a developing subject [6]. Some studies shown that ADHD is passed down by genetics, some said it could cause by mother's smoking habits during pregnancy.

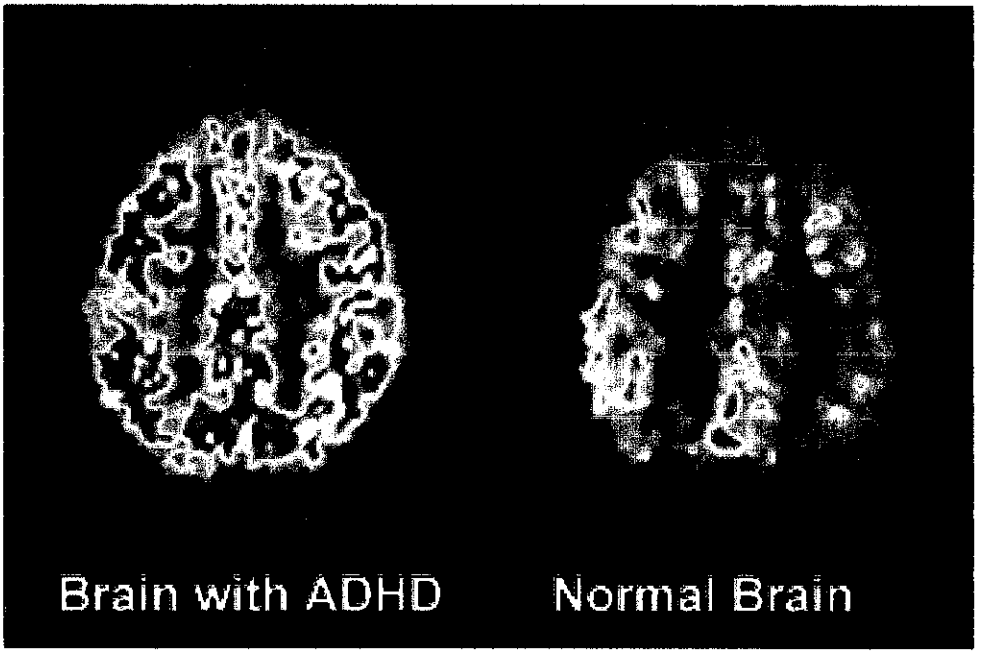


Figure 2.1 : Difference between brain with ADHD and normal brain

Children diagnosed with ADHD could fall onto either three sub type of Attention Deficit Hyperactivity Disorder (ADHD) which is :-

1) Primarily inattentive
2) Primarily hyperactive/impulsive or combined inattentive
3) Hyperactivity disorder.

Based on Diagnostic and Statistical Manual (Fourth Edition) criteria for ADHD (see appendix) there are few criteria that need to be meet in order to confirm if the children is positively diagnosed with ADHD [7]. Ryan-Krause also [7] did mention additional key component to rectify the diagnosis to make sure the children own this learning disability. The additional key component are :-

4) Behaviors in question to be more extreme than those found in same-age peers.
5) Behaviors to interfere with a child's life and learning across settings, in this case for younger children, at home and day care or pre-school.
6) Behaviors must be present at least six months to avoid making an inaccurate diagnosis of ADHD in situations when the problematic behaviors might reflect a response to a recent traumatic life event or current medical illness.

ADHD is the most common behavioral disorder of children especially in their vital age (pre-school before the age of seven years old) which is before entering primary school. Children with ADHD may exhibit lack of adaptability in daily lives, difficulty with transition including difficulty in development of self-help skills and impaired communication [8]. Gilliam and Shahar [9] also believe that with the exhibition of such behavior could results in social isolation of the children driven by fewer opportunities to experience mixing out with friends outside the home hence limit the opportunities for learning social skills through peer interaction just because the parent-child relationship is so focused on discipline and control that family outings are limited. Above exhibition of traits could risk children with ADHD's performance academically such as poor language development, including the phonological awareness needed for reading, poorly developed memory and overall a poor cognitive flexibility [8].

But with a right method in nurturing the disability of the children diagnosed with ADHD, they could turn out to be someone with a very high potential to succeed in their future fields. Hartmann [1] mentioned that the ADHD traits are genes of Thomas Edison, the innovative physician that first came out with the idea of a bulb and invented many more electrification of the city. In his book [1], Hartmann share Edison's experience as a child with ADHD :

"When Edison's school teacher threw him out of school in the third grade for being inattentive, fidgety, and "slow," his mother, Nancy Edison, the well-educated daughter of a Presbyterian minister, was deeply offended by the schoolmaster's characterization of her son. As a result, she pulled him out of the school. She became his teacher from then until the day he went off on his own to work for the railroads (inventing, in his first months of employment, a railroad timing and signaling device that was used for nearly a century). She believed in him and wasn't going to let the school thrash out of him his own belief in himself. As a result of that one mother's efforts, the world is a very different place"

Adult and children diagnosed with ADHD are gifted, though most of the time their gift are unrecognized, misinterpreted and punished [1]. Most people in society take it as a deformities, shunted them into Special Education for this learning disability when these children diagnosed with ADHD have a bright future ahead them with a right method nurturing it. Ignoring this kind of gift will be a great waste to the human capital as a whole. Dr Edward Hollowell [10], experts psychiatrist of ADHD also an author quoted *"It is how you manage it that determines whether it become a gift or a curse"* because by punishing and vilify these children with ADHD could results them to become sullen, angry, defiant, oppositional and in extreme cases, suicidal. Hyperactivity and conduct disorder behavioral are highly correlated with

crime [11] when the wrong method had been enforced in bringing up individuals with ADHD.

These Edison-gene children are by natural enthusiastic, creative, disorganized, nonlinear in their thinking, innovative, easily distracted, capable of extraordinary hyper focus, determined, eccentric, easily bored, impulsive, entrepreneurial, energetic and understands of what it means to be an outsider. These qualities in them could lead them to become a natural explorers, inventors, discoverers and leaders only with a right method in nurturing this learning disability to unlock their potentials [1].

2.3 Learning Studies for Attention Deficit Hyperactivity Disorder (ADHD) Children

Children always have something that they feel excited about. Be it from playing with colors to paint a drawing in an art class, to getting the new experience playing new instrument during the music class. But unlike children with ADHD, they usually walk around while everyone is in an excitement with the colors in art class; they usually caught day dreaming staring outside the window while teacher is explaining about photosynthesis [4]. The brain of children diagnosed with ADHD functions differently. When teacher explains to the class about photosynthesis and everyone is getting the idea that photosynthesis could only be done during the day with sunlight, children with ADHD will stare outside the window and ponder, how can it be done with the sun behind the clouds, on the day but not sunny. Children with ADHD think outside of the box.

In Malaysia, children with ADHD is categorized as children with Special Education Needs, grouped by learning disabilities (LD) [4] as their learning difficulties is differ from the normal and to such extent need to be individualized, adapted and specialized in order to meet their needs [12]. Just

like the quote "Its motivation that gets you started", children diagnosed with ADHD respond best to motivation, positive reinforcement and will perform better in task given [13]. Hence suggest the role of a teacher in building up a positive relationship with the students diagnosed with ADHD to understand them better and in the same time to let them know that the teacher would like to see them succeed, instilling a motivation in each and every one of them. Referring to a clinical investigation, 80 % of 200 children aged equal or less six years old is positively diagnosed with ADHD [14], explains the reason of focusing this research of study to children in the pre-school years. It is believe that the early childhood education a children receive is the education that determines their values, their path and for parents, teachers to identify their potentials. The vital years during pre-school could give a big impact to children diagnosed with ADHD as the traits in them will start to nurture earlier and could result in a great potential unleashed.

Teacher as the gatekeeper of psychological treatment in school is responsible with the early detection of unusual learning habit and behavioral disorder of the students in her class apart from parents and if teacher failed to detect the children that is most likely could be positively diagnosed with ADHD, the child will not receive an adequate treatment according to his learning disabilities [15].

2.4 Learning Strategies for children with Attention Deficit Hyperactivity Disorder (ADHD)

This project is aimed to help these children with ADHD at their vital age (pre-school) to perform in their studies despite the behavioral disorder that creates learning disabilities in them. The best way to aid these children is by creating a simple learning strategy of teaching techniques style available. In this project, there are two type of learning technique will be use.

1) Scaffolding

Scaffolding is use to organize and support the student inquiry, to keep student interested and keep them guided from staying too far while seeking the truth. In scaffolding, usually teacher provides opportunities for learning to help the students. At least there are eight characteristics of scaffolding :

i. Scaffolding provides clear direction
ii. Scaffolding clarifies purpose
iii. Scaffolding keeps students on task
iv. Scaffolding offers assessment to clarify expectations
v. Scaffolding points students worthy sources
vi. Scaffolding reduces uncertainty surprise and disappointment
vii. Scaffolding delivers efficiency
viii. Scaffolding creates momentum

2) Token Economy Systems

Token economy system could motivate students to achieve a goal identified in a behavioral contract, and in this case, it would motivate children with ADHD to perform better. Token economy system can be in the form of rewarding points or presents. It will encourage children with ADHD to work hard during the learning process.

2.5 Interactive Courseware for children with Attention Deficit Hyperactivity Disorder (ADHD) and the Existing Courseware

Technology can be a great means of assistance in education especially in educating the "echo boomers" generation nowadays. Computer could be a great tool for this young "echo boomers" the Y generation to find out more about the world and most importantly to experience the consequences of their actions [16]. Specifically in this context, the application of technology in assisting children diagnosed with ADHD could enable them to enhance their potential with a well design Computer Assisted Instruction courseware [16] and supported by [12] that this special education could aid this children to maximize their potentials to achieve self-sufficiency.

As mentioned earlier reported by [15], children diagnosed with ADHD appreciates motivation and positive reinforcement to perform better in task given. However in the reality, individualized attention and back to back motivation from teacher is limited. Teachers don't have enough time to personally aid students to boost the potentials in them, and one of the most efficient way in which instructions could be individualized is by using technology as the assistant in transferring the knowledge [18].

Courseware is the best platform in sharpening the potentials of children's diagnosed with ADHD as it can be apply in both home and classroom during school hours [19]. Based on interviews and observations conducted by [19], it is found that there is no specific courseware for students with learning disabilities. Findings in the Internet mostly result in courseware in website available for all children and without specification, the content of the courseware could somehow cannot comply with the disabilities of this children diagnosed with ADHD, supported by [19] based on the interviews and observation conducted. Courseware as the deliverables could deliver an effective method of learning to students with learning disabilities as not only

the content that matters but the also the color used in the courseware. Children diagnosed with ADHD tend to commit more errors on the Farnsworth-Munsell 100 Hue Test (FMT), a test to test individual's color vision [20]. Therefore it is essential to select the right colors and number of colors according to observation to create an effective and interactive courseware for children diagnosed with ADHD [17].

Most available courseware is in two dimensional (2D) graphic designs and it is less attractive compared to a three dimensional (3D) graphic design. By coming out with a three dimensional (3D) based courseware; it could attract the children more and could expand their focus limit as they go through the syllabus and games with three dimensional (3D) content. According to Tavanti and Lind [21], *"a realistic 3D displays better supports a specific spatial memory task, namely learning the place of an object"* hence explain that three dimensional (3D) could help the children with learning disabilities to better enhance their memory rather than a two dimensional (2D) design of courseware.

Not only that most available courseware is in two dimensional (2D), but the available courseware is also focused more on games rather than follow the syllabus of a school. Furthermore as point out by [19] in their results of interview and observation, most game available is in higher level than the students with learning disabilities ability. If the courseware incorporates the elements from a school syllabus, it could be a great aid for teacher in school and parents at home to monitor children diagnosed with ADHD. The usage of the courseware won't be restricted to only playing games to expand focus limit and to make them stay still, but also could be a great assistant in assisting them with studies and to perform better in school, keeping the children with ADHD to always be motivated and positive.

Based on online observation of the existing courseware, few case study has been developed to fill in the criteria of the courseware that still need to be done in order to capture the attention of this ADHD children hence keeping them interested in studying to perform better academically and socially.

Case Study 1 : The Interface Design

The interface designs found in most courseware are simple, mostly available in 2D and are unattractive. For an example, the Speed Spell, an online educational spelling game retrieved at http://www.gotkidsgames.com/ss/ as shown below. The main problem of ADHD children is lack of the concentration and therefore, the interfaces of the new courseware have to be interesting and colorful in order to attract their attention to explore it.

Figure 2.2 Screenshot of existing courseware

Case Study 2 : The text on paper versus the text on the screen

	Paper	Screen
Typeface	As long as the typeface fits well with the style and tone of the project, any typeface will work.	Just about all typefaces are readable at larger point sizes. Serif and san serif typefaces with relatively even letter stroke thicknesses work well in large or small point sizes. Decorative,script, condensed and expanded typefaces should be avoided for body copy or small type.
Size	9, 10, and 11 point type are common sizes used in documents with lengthy amounts of body text.	Low screen resolutions make type below 12 points in size difficult to read.
Spacing	Extra tight and extra wide letterspacing, word spacing, and leading are commonly used in a wide variety of printed projects.	Too tight spacing makes the edges of anti-aliased type blur together. Even the edges of type with normal spacing can blur together at smaller point sizes. Too wide spacing consumes valuable screen.

Weight	All weights of type are readable.	Very thin letter strokes are hard to read on screen, except in very large sizes.
Color and Contrast	Control over color is good; the designer can specify more subtle color combinations and still achieve legible type. Generally, the higher contrast, the easier the type to read.	Colors are difficult to control, as projects cross computer platforms and are displayed on a wide range of grayscale and color monitors.
Flow	Writers try to achieve a smooth continuity in text.	The flow of text is even more critical in interactive documents because the text can split up between multiple screens.

Table 2.1 Differentiation of text on paper and the text on the screen

CHAPTER 3

METHODOLOGY

3.1 System Methodology

The system methodology that will be used in developing this interactive courseware for ADHD children are ADDIE. ADDIE is the best to be use in order to guide the development of the learning process using technology.

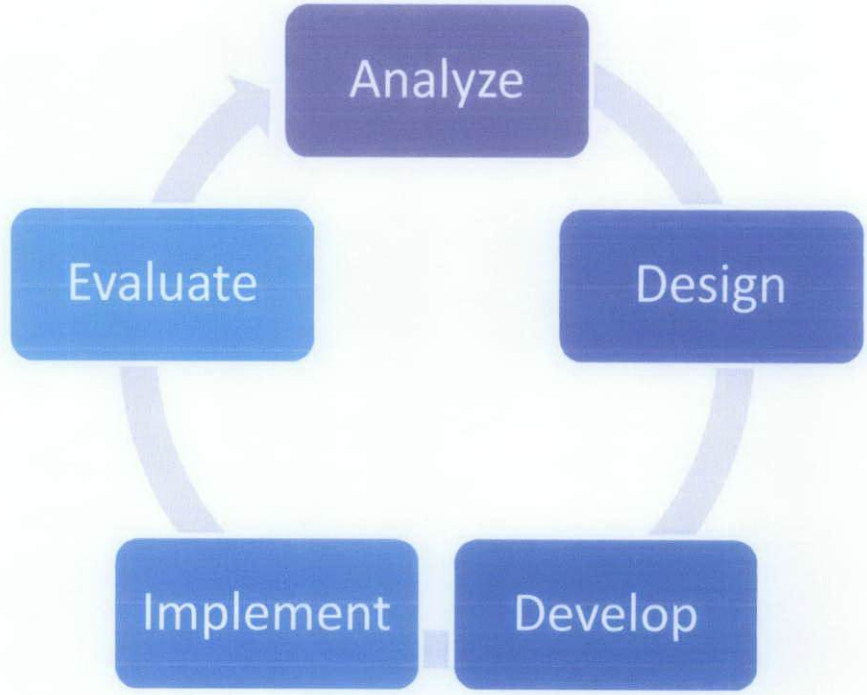


Figure 3.1 System Methodology diagram

1) Analysis

In this analysis phase, research will take place in terms of searching the background of the behavioral disorder, review the materials available from psychiatrist, technologies, and educator to come out with the requirement of the courseware, a survey is conducted.

2) Design

Design phase will detail out the plan layout of the courseware and the storyboard of the courseware. This is where courseware architecture takes place, visual layouts and content of the courseware are plan.

3) Development

In development phase, developer will develop the courseware based on the design planned earlier.

4) Implementation

Implementation phase consists of testing the software to the target user.

5) Evaluation

Evaluation will be done based and feedbacks are most likely to be received by the end user of the courseware.

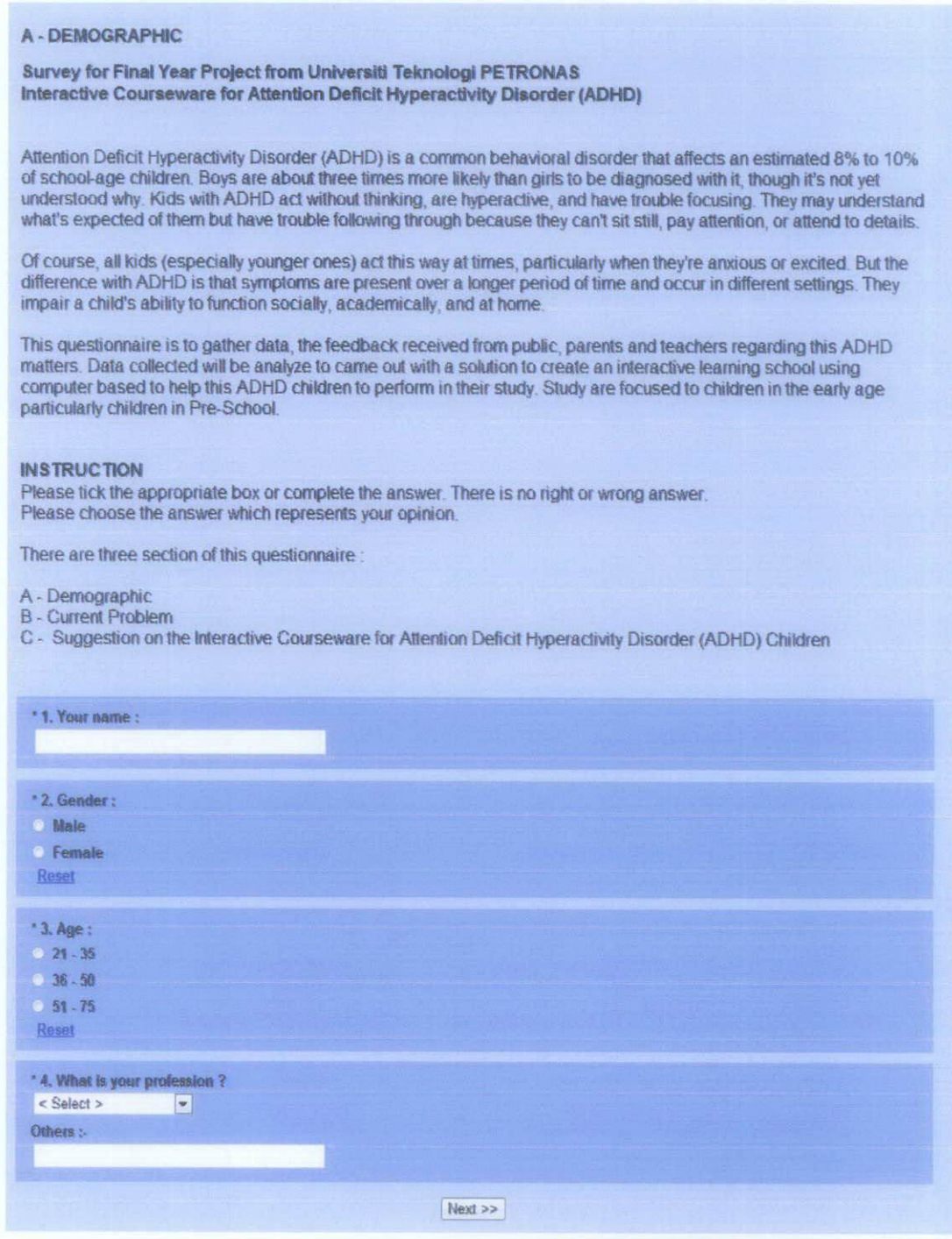
3.2 Research Methodology

In order to come out with the requirement of the courseware, few research study has been conducted and there are :-

3.2.1 Literature review

Throughout the literature review, some information on ADHD, the learning method and the background of education for the ADHD Pre-School children has been discovered. This information was used to reinforce the importance of this project. Apart from that, other existing coursewares available on the market were analyzed to figure out the best graphic and interface to be developed parallel to the needs of ADHD children. Following this, some aspects of multimedia such as flashy animation and colors were researched upon.

3.2.2 Questionnaire



A - DEMOGRAPHIC

Survey for Final Year Project from Universiti Teknologi PETRONAS
Interactive Courseware for Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder (ADHD) is a common behavioral disorder that affects an estimated 8% to 10% of school-age children. Boys are about three times more likely than girls to be diagnosed with it, though it's not yet understood why. Kids with ADHD act without thinking, are hyperactive, and have trouble focusing. They may understand what's expected of them but have trouble following through because they can't sit still, pay attention, or attend to details.

Of course, all kids (especially younger ones) act this way at times, particularly when they're anxious or excited. But the difference with ADHD is that symptoms are present over a longer period of time and occur in different settings. They impair a child's ability to function socially, academically, and at home.

This questionnaire is to gather data, the feedback received from public, parents and teachers regarding this ADHD matters. Data collected will be analyze to came out with a solution to create an interactive learning school using computer based to help this ADHD children to perform in their study. Study are focused to children in the early age particularly children in Pre-School.

INSTRUCTION
Please tick the appropriate box or complete the answer. There is no right or wrong answer.
Please choose the answer which represents your opinion.

There are three section of this questionnaire :

A - Demographic
B - Current Problem
C - Suggestion on the Interactive Courseware for Attention Deficit Hyperactivity Disorder (ADHD) Children

* 1. Your name :

* 2. Gender :
- Male
- Female

Reset

* 3. Age :
- 21 - 35
- 36 - 50
- 51 - 75

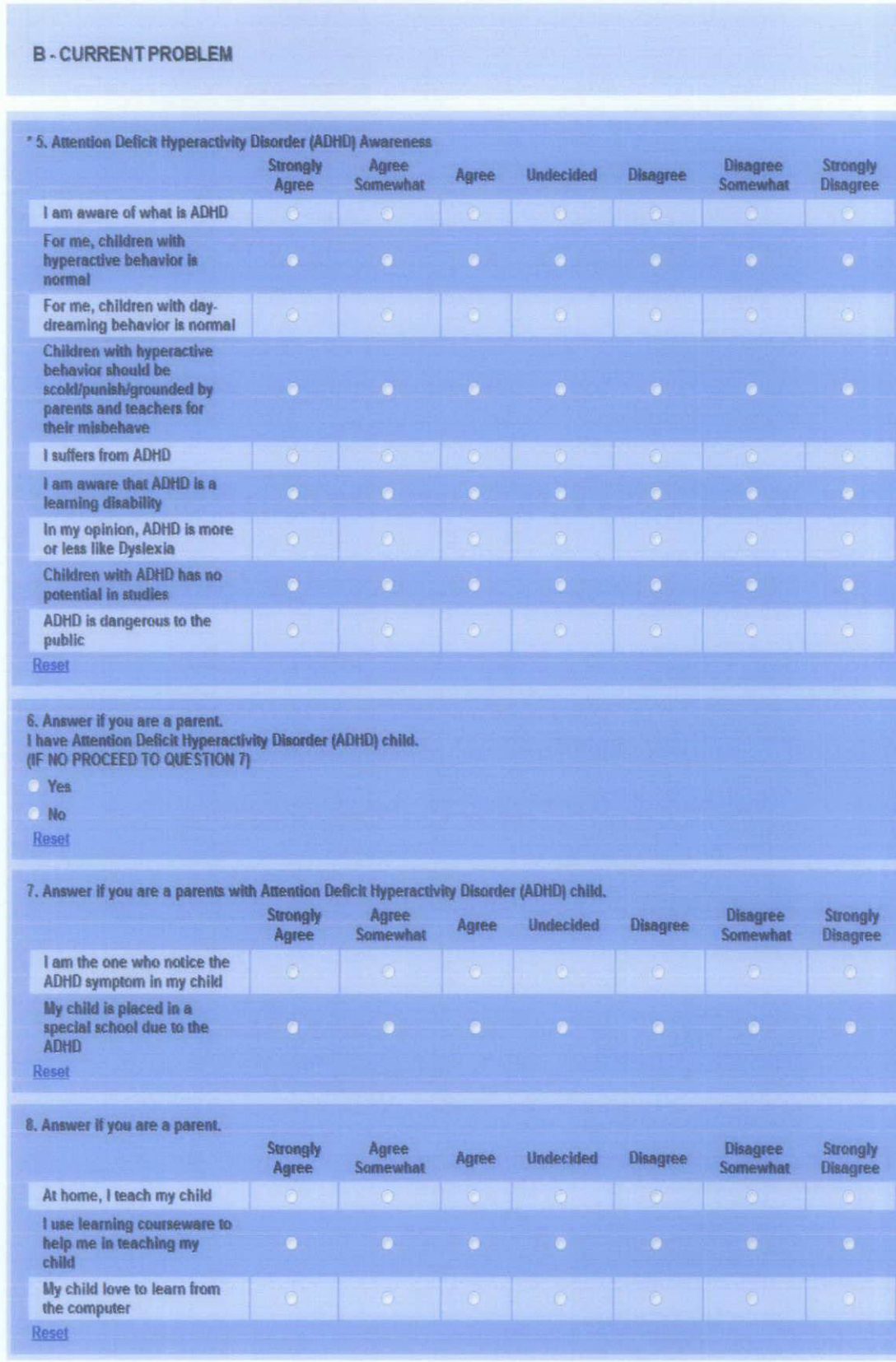
Reset

* 4. What is your profession ?
< Select >

Others :-

Next >>

Figure 3.2 Screenshot of online questionnaire



B - CURRENT PROBLEM

* 5. Attention Deficit Hyperactivity Disorder (ADHD) Awareness

	Strongly Agree	Agree Somewhat	Agree	Undecided	Disagree	Disagree Somewhat	Strongly Disagree
I am aware of what is ADHD							
For me, children with hyperactive behavior is normal							
For me, children with day-dreaming behavior is normal							
Children with hyperactive behavior should be scold/punish/grounded by parents and teachers for their misbehave							
I suffers from ADHD							
I am aware that ADHD is a learning disability							
In my opinion, ADHD is more or less like Dyslexia							
Children with ADHD has no potential in studies							
ADHD is dangerous to the public							

Reset

6. Answer if you are a parent.
I have Attention Deficit Hyperactivity Disorder (ADHD) child.
(IF NO PROCEED TO QUESTION 7)

- Yes
- No

Reset

7. Answer if you are a parents with Attention Deficit Hyperactivity Disorder (ADHD) child.

	Strongly Agree	Agree Somewhat	Agree	Undecided	Disagree	Disagree Somewhat	Strongly Disagree
I am the one who notice the ADHD symptom in my child							
My child is placed in a special school due to the ADHD							

Reset

8. Answer if you are a parent.

	Strongly Agree	Agree Somewhat	Agree	Undecided	Disagree	Disagree Somewhat	Strongly Disagree
At home, I teach my child							
I use learning courseware to help me in teaching my child							
My child love to learn from the computer							

Reset

Figure 3.3 Screenshot of online questionnaire

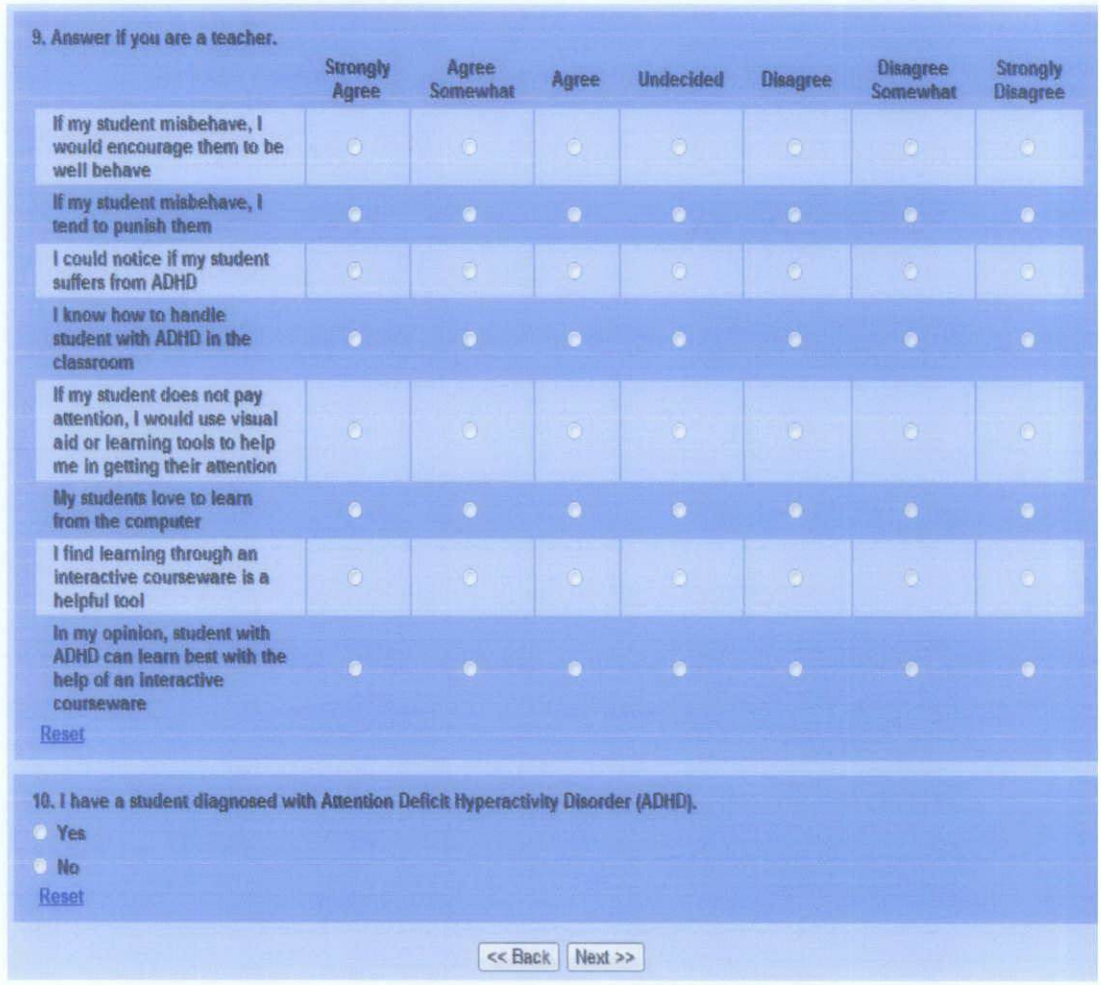
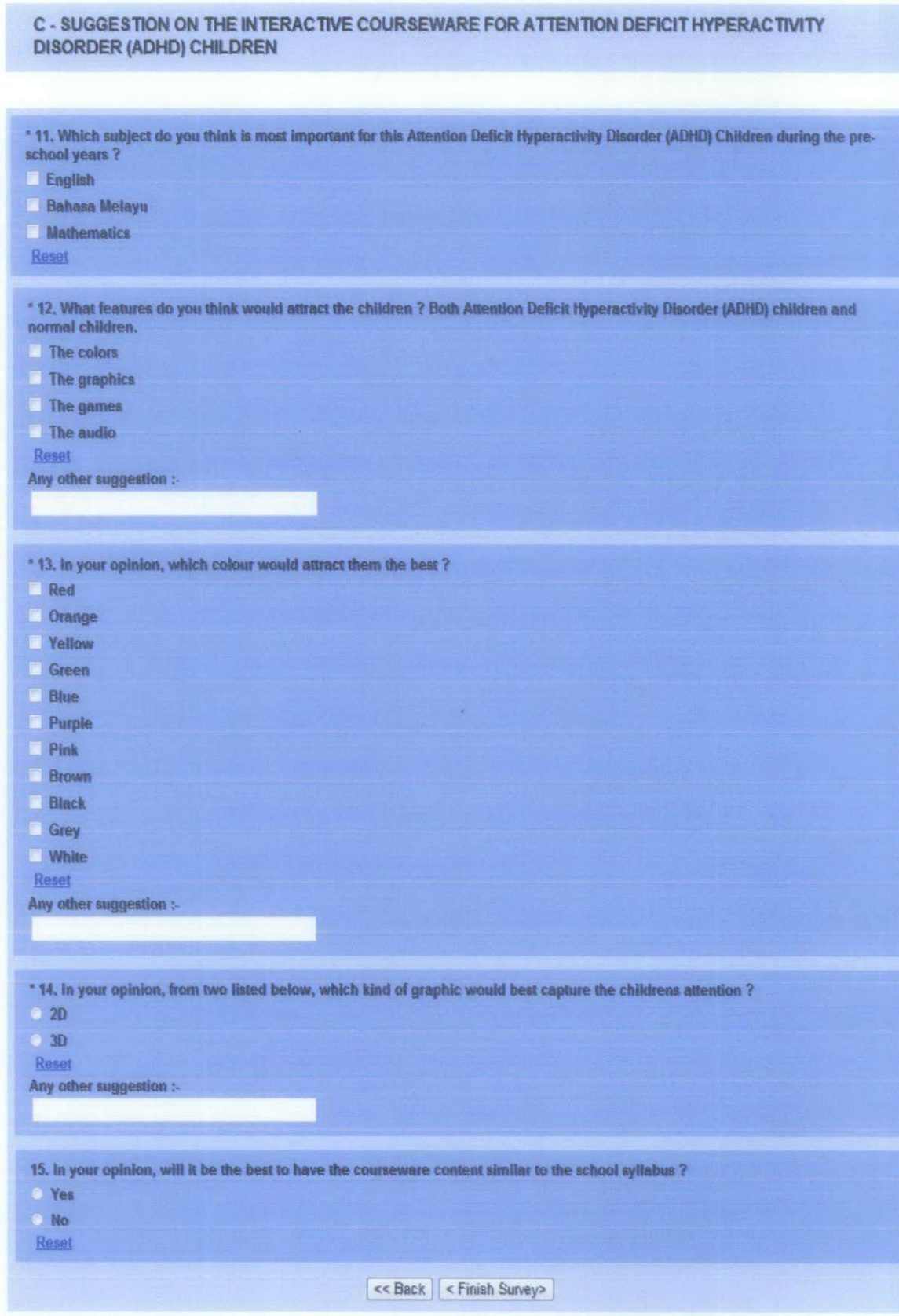


Figure 3.4 Screenshot of online questionnaire


C - SUGGESTION ON THE INTERACTIVE COURSEWARE FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) CHILDREN

* 11. Which subject do you think is most important for this Attention Deficit Hyperactivity Disorder (ADHD) Children during the pre-school years ?

- English
- Bahasa Melayu
- Mathematics

Reset

* 12. What features do you think would attract the children ? Both Attention Deficit Hyperactivity Disorder (ADHD) children and normal children.

- The colors
- The graphics
- The games
- The audio

Reset

Any other suggestion :-

* 13. In your opinion, which colour would attract them the best ?

- Red
- Orange
- Yellow
- Green
- Blue
- Purple
- Pink
- Brown
- Black
- Grey
- White

Reset

Any other suggestion :-

* 14. In your opinion, from two listed below, which kind of graphic would best capture the childrens attention ?

- 2D
- 3D

Reset

Any other suggestion :-

15. In your opinion, will it be the best to have the courseware content similar to the school syllabus ?

- Yes
- No

Reset

<< Back | < Finish Survey>

Figure 3.5 Screenshot of online questionnaire

3.3 Tool Required

3.3.1 Hardware

The hardware used to develop the system is a customized desktop and the specification of the hardware is as followed:

Operating System	**Microsoft Windows 7 Ultimate**
Processor	Intel ® Core ™ i3-2100 CPU 3.10 GHz
Memory	4.00 GB of RAM
Disk space	400 GB

3.3.2 Software

Adobe Flash Professional CS5

Adobe Flash Professional CS5 is multimedia software used to create content for web application and games. It is ideal for those who want to develop a courseware with an interactive and attractive graphic design using flash animation. Adobe Flash Professional CS5 is used because its capability to help developer come out with a flashy alphabet, numbers and pictures.

3.4 Gantt Chart

Key milestones are included in the Gantt Chart. Kindly refer to Appendix 2.0

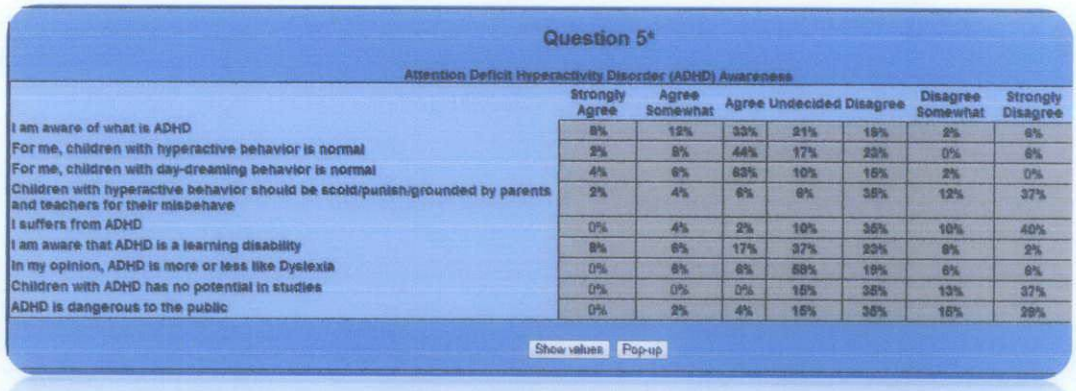
CHAPTER 4

RESULT AND DISCUSSION

Below are the data gathered from the questionnaire distributed during the survey to plan on the design requirement to develop the courseware. The survey has been done by people from various backgrounds to know their awareness of the ADHD behavioral disorder and their point of view regarding learning through courseware. The total number of respondent participating in this survey is 49 respondents.

From the 49 respondents, in the section A of the survey that basically gather the demographic information of the respondent, it is identified that 21 of them are male, the other 28 are female, mostly are at the age of 21 to 35.

Section B goes on in depth to measure the current problem of the subject matter, the awareness of ADHD among the respondent and below are the result from questions that has been asked.



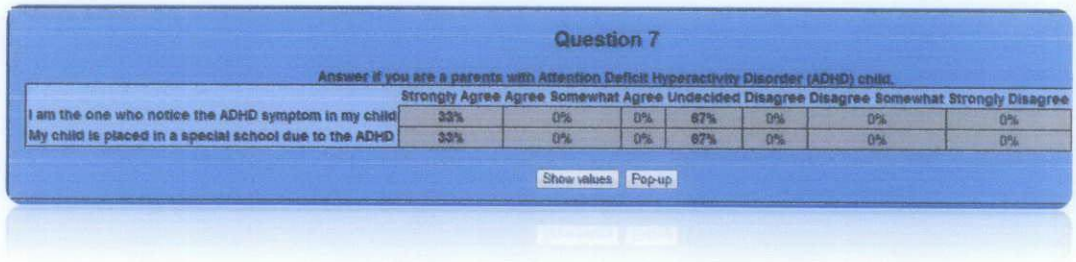
Question 5*

Attention Deficit Hyperactivity Disorder (ADHD) Awareness

	Strongly Agree	Agree Somewhat	Agree	Undecided	Disagree	Disagree Somewhat	Strongly Disagree
I am aware of what is ADHD	8%	12%	33%	21%	19%	2%	6%
For me, children with hyperactive behavior is normal	2%	8%	44%	17%	23%	0%	6%
For me, children with day-dreaming behavior is normal	4%	6%	63%	10%	15%	2%	0%
Children with hyperactive behavior should be scold/punish/grounded by parents and teachers for their misbehave	2%	4%	6%	6%	35%	12%	37%
I suffers from ADHD	0%	4%	2%	10%	35%	10%	40%
I am aware that ADHD is a learning disability	8%	6%	17%	37%	23%	6%	2%
In my opinion, ADHD is more or less like Dyslexia	0%	6%	6%	58%	19%	6%	6%
Children with ADHD has no potential in studies	0%	0%	0%	15%	35%	13%	37%
ADHD is dangerous to the public	0%	2%	4%	15%	35%	15%	29%

Show values | Pop-up

Figure 4.1 Screenshot of questionnaire's result



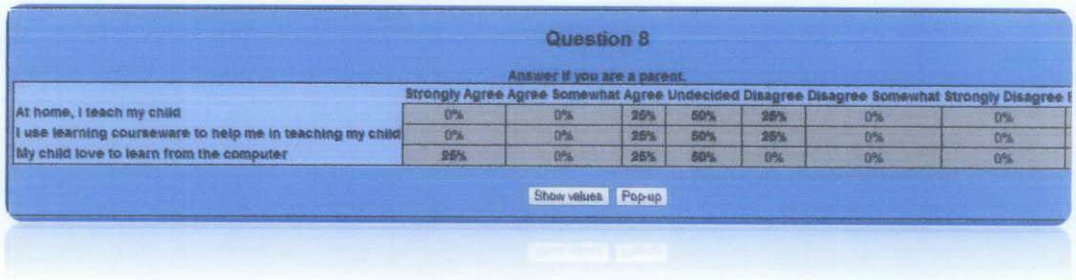
Question 7

Answer if you are a parents with Attention Deficit Hyperactivity Disorder (ADHD) child.

	Strongly Agree	Agree Somewhat	Agree	Undecided	Disagree	Disagree Somewhat	Strongly Disagree
I am the one who notice the ADHD symptom in my child	33%	0%	0%	67%	0%	0%	0%
My child is placed in a special school due to the ADHD	33%	0%	0%	67%	0%	0%	0%

Show values | Pop-up

Figure 4.2 Screenshot of questionnaire's result



Question 8

Answer if you are a parent.

	Strongly Agree	Agree Somewhat	Agree	Undecided	Disagree	Disagree Somewhat	Strongly Disagree
At home, I teach my child	0%	0%	25%	50%	25%	0%	0%
I use learning courseware to help me in teaching my child	0%	0%	25%	50%	25%	0%	0%
My child love to learn from the computer	25%	0%	25%	50%	0%	0%	0%

Show values | Pop-up

Figure 4.3 Screenshot of questionnaire's result

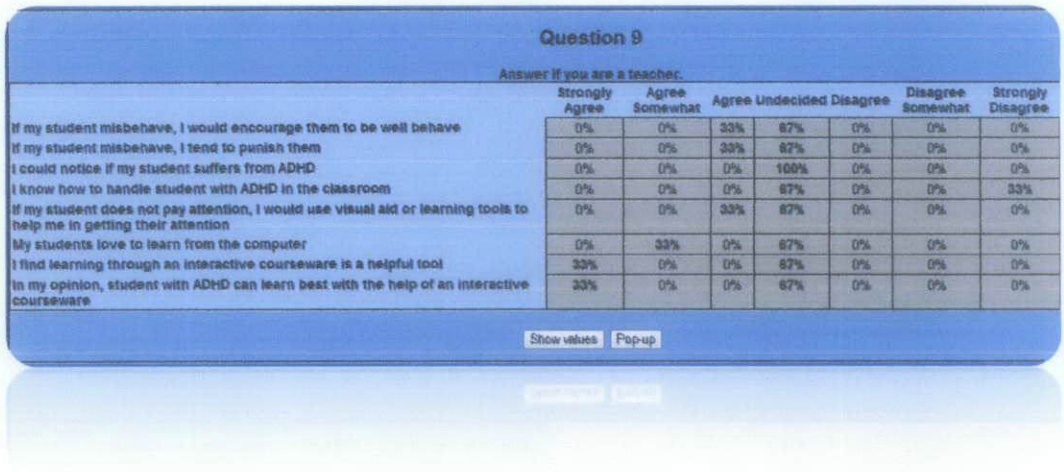


Figure 4.4 Screenshot of questionnaire's result

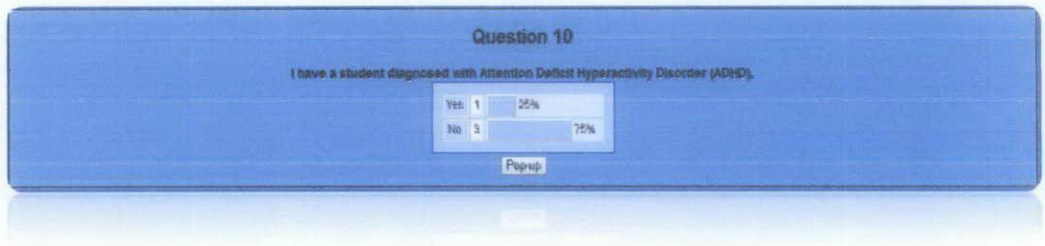


Figure 4.5 Screenshot of questionnaire's result

Section C is the crucial section where the finding of requirement to develop the courseware will be use. In section C, respondent are open to drop their suggestion by the choice available, also any other opinion that they have.

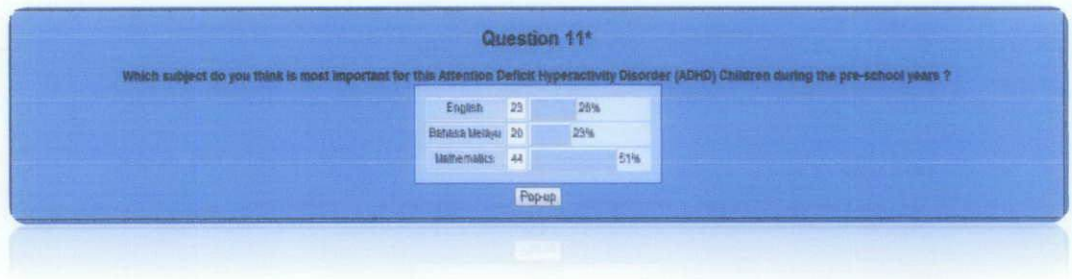


Figure 4.6 Screenshot of questionnaire's result

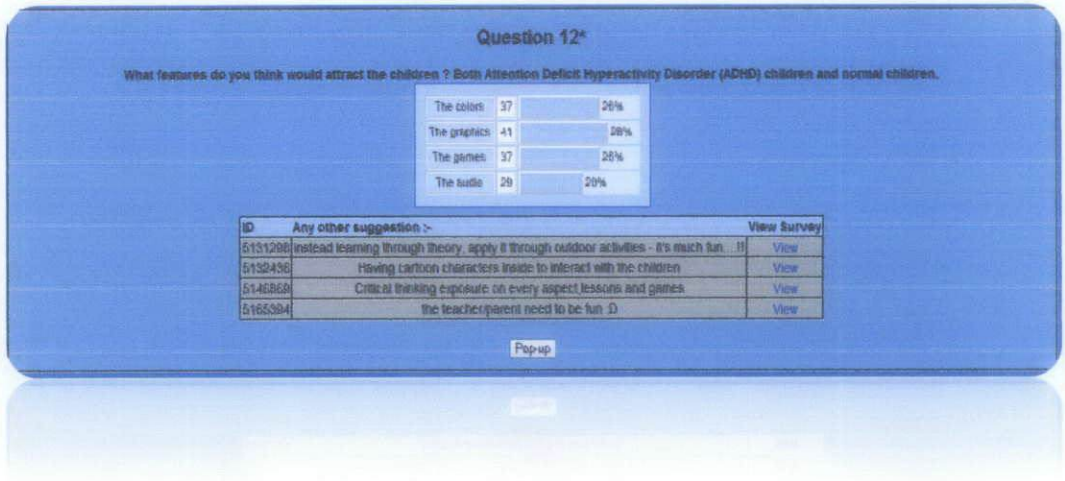


Figure 4.7 Screenshot of questionnaire's result

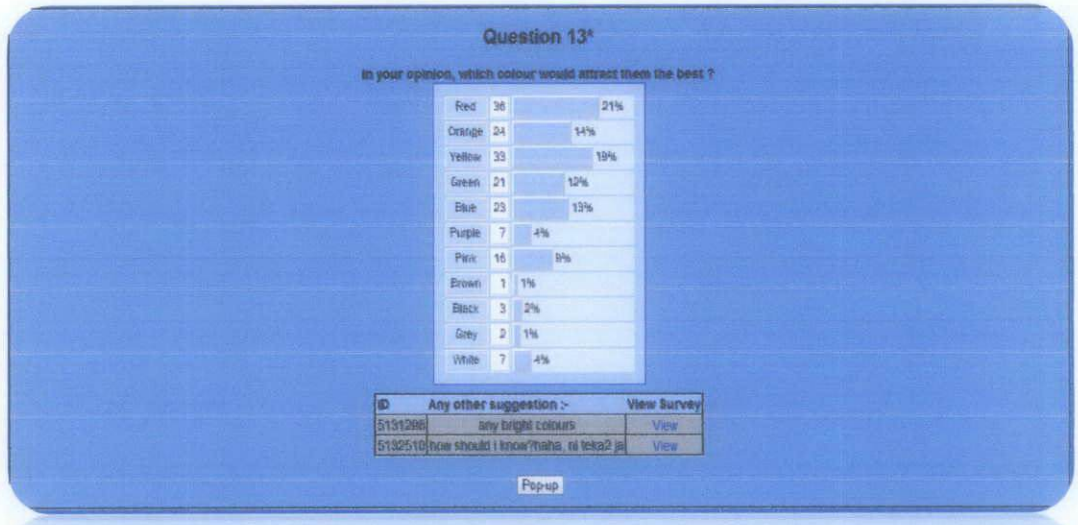


Figure 4.8 Screenshot of questionnaire's result

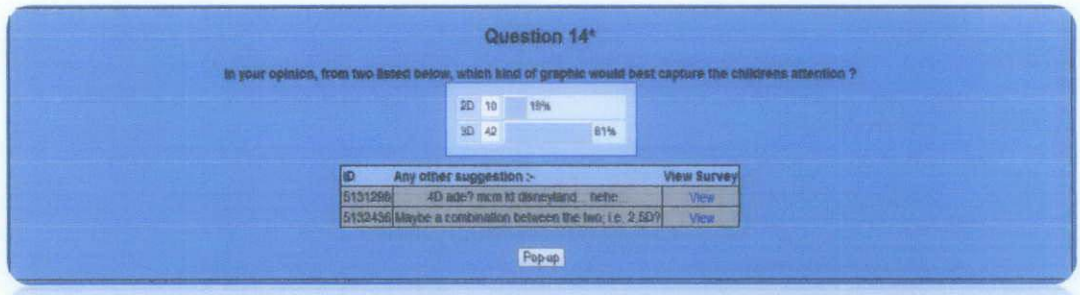


Figure 4.9 Screenshot of questionnaire's result

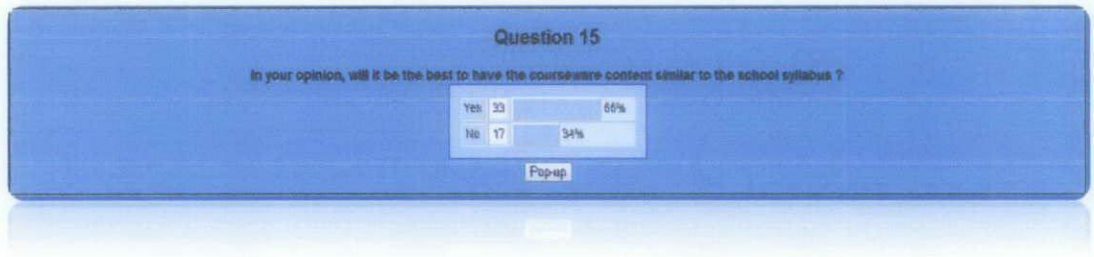


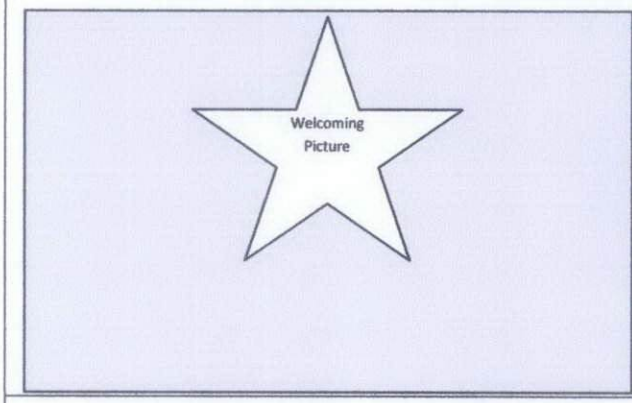
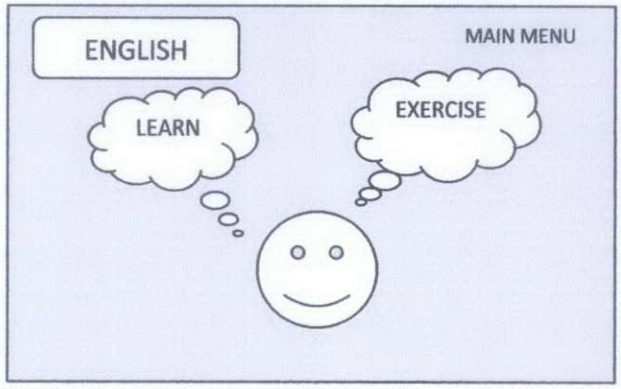
Figure 4.10 Screenshot of questionnaire's result

4.1 Findings

From the data analysis in section C, the design and architecture of the courseware are as below :-

a) Module are inclusive of English subject and Mathematics subject
b) The graphic of the courseware will be featured in 3D with bright colors to capture the ADHD children's attention
c) The content of the courseware will be covering the basic school syllabus of a pre-school children together with an interactive game- based learning method

Below are the storyboard planned for the prototype, and the development of the prototype will be based on the storyboard.

Scene	Description
	The first screen that user will see as s/he launches the software is the menu. Consist of option to choose whether to choose English or Math.
	When the user clicks the button English/Math, they will see the option to choose learn or to play exercise.

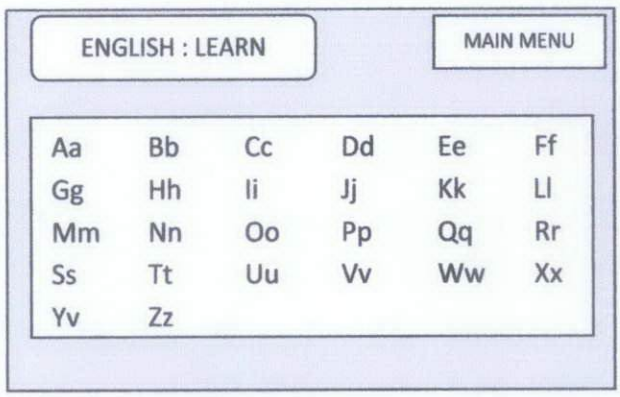
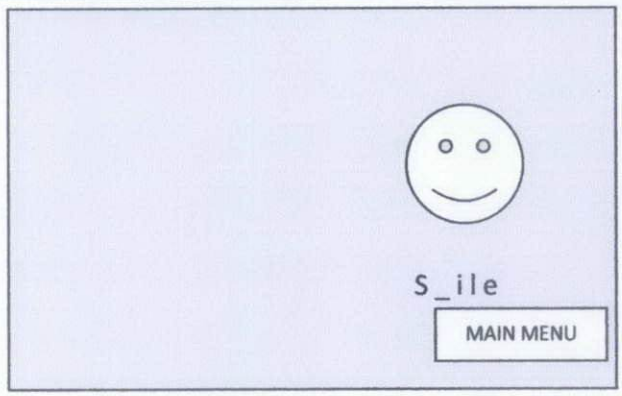
	If the user clicks learn, they will get to learn the basic alphabet for English and basic numbers for Math. Each alphabet and number will pop up a figure when user clicks on it.
	In exercises for both English and Math user needs to click the right alphabet and number to answer the question. If it's right a tick symbol will appear and if it's wrong a cross symbol will appear.

Table 4.1 Storyboard

4.2 Prototype

The prototype was developed based on the research study done via survey and compilation of literature review. The prototype of the courseware using Adobe Flash Professional CS5 depicts an attractive flashy graphic with a content of both English and Mathematics as the learning subject and exercise of the courseware.

The home page of the courseware consists of a flashy animation of numbers and alphabet coming out from the books at the bottom left. There are three options to navigate user to the next stage which is to choose either English, Math or to Exit.

Figure 4.11 Screenshot of the prototype

As soon as the users click English or Math, there will be two options to choose, either to click on Learn or to click on Exercises. However the exercise for English is still under progress the prototype is 70 % working.

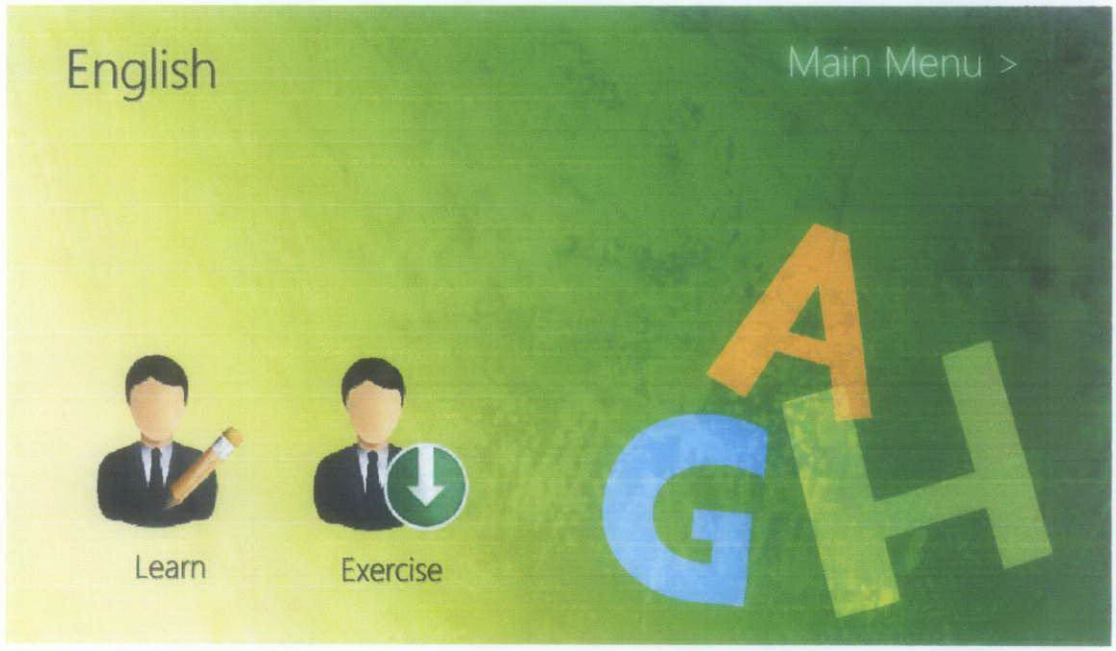


Figure 4.12 Screenshot of the prototype

Figure 4.13 Screenshot of the prototype

In Learn button, for both Math and English, a basic alphabet from A to Z and number from 1 to 10 will be depicted as following.

For English : Learn – Click 'A'

Figure 4.14 Screenshot of the prototype

Figure 4.15 Screenshot of the prototype

For Math : Learn – Click '1'

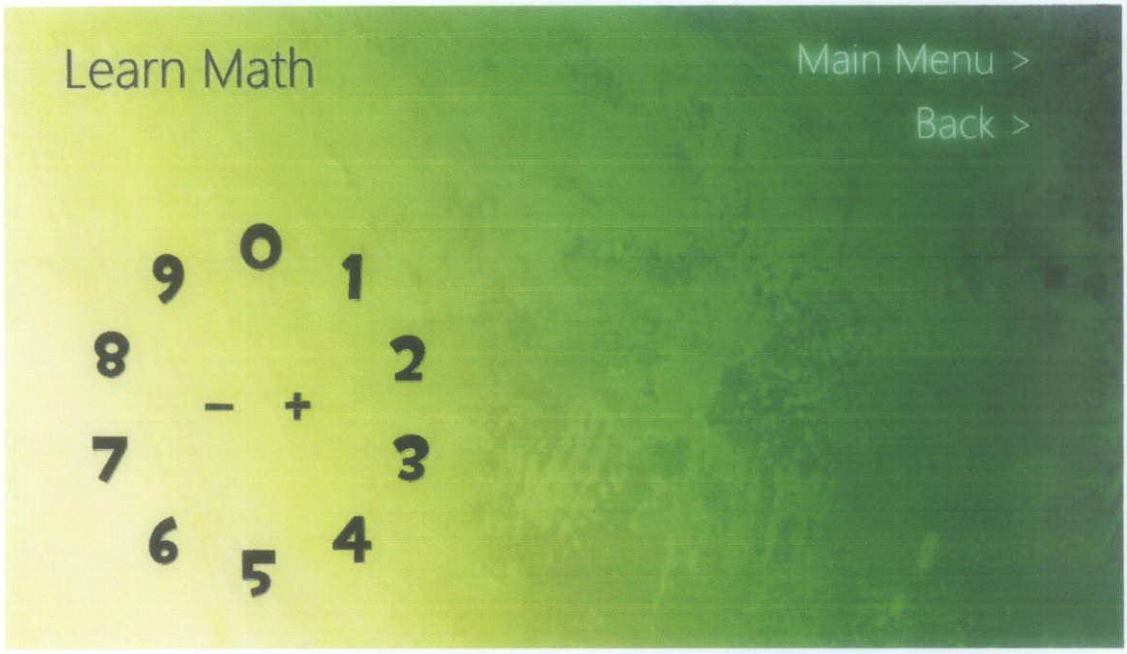


Figure 4.16 Screenshot of the prototype

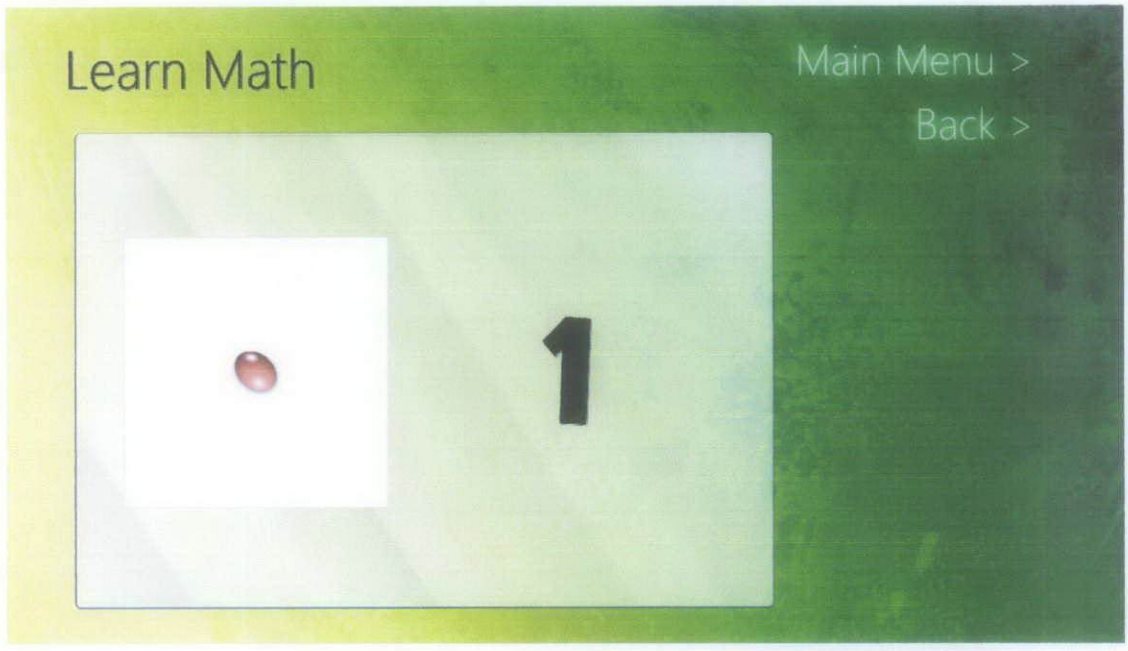


Figure 4.17 Screenshot of the prototype

For Math : Exercise

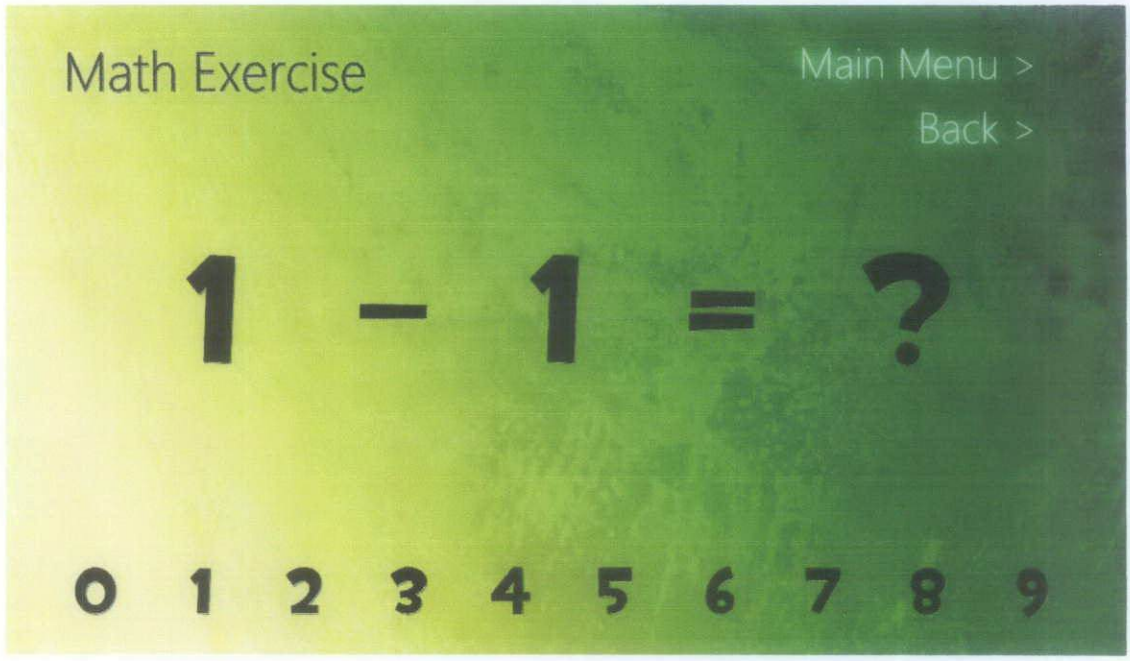


Figure 4.18 Screenshot of the prototype

User can click on the option of the number below to answer the question and if it is right, a right symbol also sound will appear and vice versa. If the answer is right.

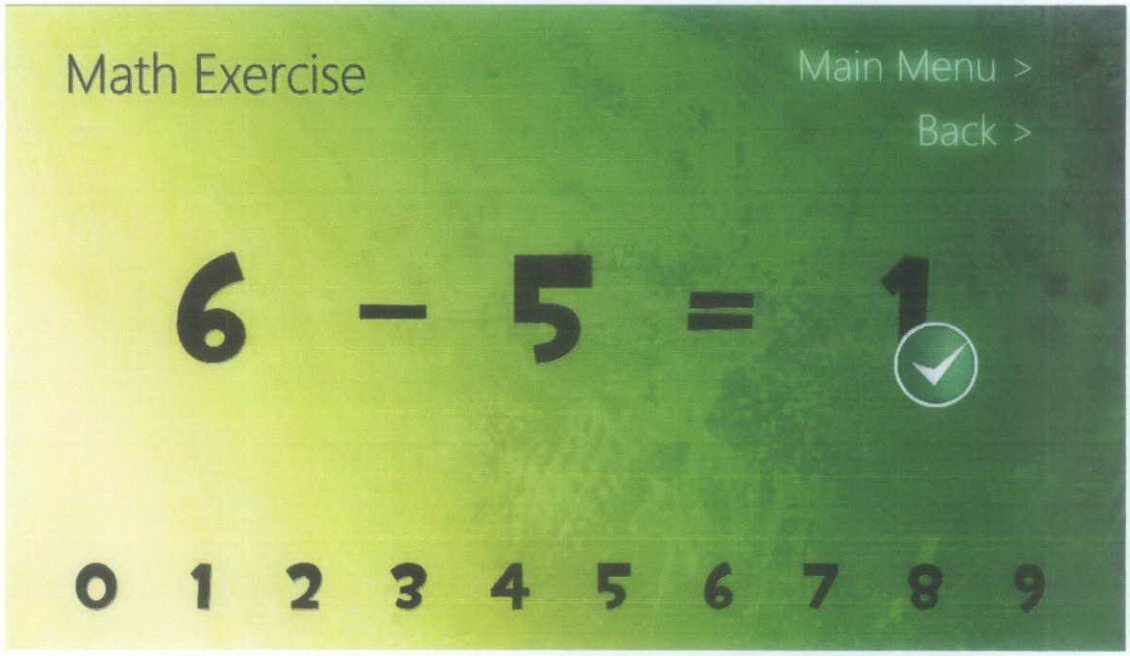


Figure 4.19 Screenshot of the prototype

If the answer is wrong.

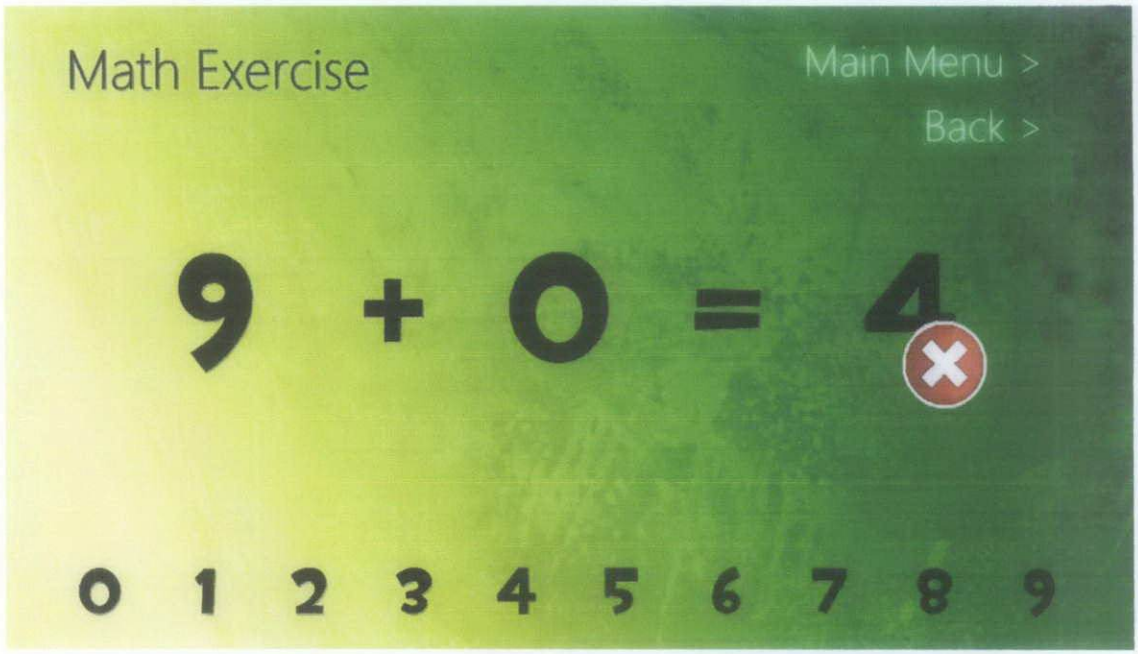


Figure 4.20 Screenshot of the prototype

CHAPTER 5

CONCLUSION AND RECOMMENDATION

As a conclusion this project is aimed to aid teachers and parents to help the ADHD children to perform better in their studies. Using the learning theories and method as mention above in the literature review, it could unlock the potential of the ADHD children as the behavioral disorder that they suffers are actually a gift. With the technology inserted, it is most likely that the courseware could attract the attention of these children by the features used in the courseware.

However, in the future, further enhancement could be made by upgrading the graphic of the courseware as well as the audio of it to capture better attention of these children. Below are the recommendations to further develop this potential courseware for ADHD children.

- Insert time constraint in the exercises
- Turn the animation/pictures to flashy 3D
- Insert moving character or any videos
- Insert chirpy audio or phonetic sounds for the alphabet section in learn English

APPENDICES

Appendix 1.0

BOX. Attention deficit hyperactivity disorder diagnostic criteria Diagnostic and Statistical Manual (fourth edition) criteria for ADHD*

I. **Either A or B:**

A. Six or more of the following symptoms of inattention have been present for at least 6 months to a point that is disruptive and inappropriate for developmental level:

Inattention

1. Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
2. Often has trouble keeping attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
5. Often has trouble organizing activities.
6. Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).
7. Often loses things needed for tasks and activities (e.g., toys, school assignments, pencils, books, or tools).
8. Is often easily distracted.
9. Is often forgetful in daily activities.

B. Six or more of the following symptoms of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for developmental level:

Hyperactivity

1. Often fidgets with hands or feet or squirms in seat.
2. Often gets up from seat when remaining in seat is expected.
3. Often runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless).
4. Often has trouble playing or enjoying leisure activities quietly.
5. Is often "on the go" or often acts as if "driven by a motor."
6. Often talks excessively.

Impulsivity

7. Often blurts out answers before questions have been finished.
8. Often has trouble waiting one's turn.
9. Often interrupts or intrudes on others (e.g., butts into conversations or games).

II. Some symptoms that cause impairment were present before age 7 years.

III. Some impairment from the symptoms is present in two or more settings (e.g., at school/work and at home).

IV. There must be clear evidence of significant impairment in social, school, or work functioning.

V. The symptoms do not happen only during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder. The symptoms are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Based on these criteria, three types of ADHD are identified:

1. ADHD, *Combined Type*: if both criteria 1A and 1B are met for the past 6 months
2. ADHD, *Predominantly Inattentive Type*: if criterion 1A is met but criterion 1B is not met for the past 6 months
3. ADHD, *Predominantly Hyperactive-Impulsive Type*: if Criterion 1B is met but Criterion 1A is not met for the past 6 months

From the National Center on Birth Defects & Developmental Disabilities, Centers for Disease Control and Prevention, NCBDDD Pub. No., November 2001.

**The year 2000 Diagnostic and Statistical Manual for Mental Disorders (DSM-IV-TR) provides criteria for diagnosing ADHD. The criteria are presented here in modified form in order to make them more accessible to the general public. They are listed here for information purposes and should be used only by trained health care providers to diagnose or treat ADHD.*

Appendix 2.0

Activity	Duration	Start Date	End Date	Key Milestones
Stage 1: Proposal and Approval	9 D	31/1/2011	7/2/2011	**Submit Approved Proposal**
-Submit Project Proposal	0 D	4/2/2011	4/2/2011	
-Gain approval on the topic	0 D	7/2/2011	7/2/2011	
Stage 2: Research and Development	25 D	8/2/2011	4/3/2011	
Phase 1 : Analysis				
Conduct Research	10 D	10/2/2011	23/2/2011	
Submit of Extended Proposal	4 D	4/3/2011	8/3/2011	**Submit Extended Proposal and Proposal Defense Presentation**
Phase 2 : Design	45 D	9/3/2011	22/4/2011	
Design Courseware Storyboard	10 D	9/3/2011	19/3/2011	
Prepare Interim Report	35 D	20/3/2011	22/4/2011	**Interim Report**
Phase 3 : Develop	45 D	1/5/2011	22/6/2011	
Develop Interface	1/5/2011	27/3/2011	22/6/2011	**Prototype**
Phase 4 : Implement	10 D	23/6/2011	4/7/2011	
Phase 5 : Evaluate	14 D	5/7/2011	19/7/2011	
Develop Test Plan	7 D	5/7/2011	11/7/2011	

Execute Test plan	7 D	12/7/2011	19/7/2011	
Final Presentation	0 D	September	September	**Presentation**
Final Report Submission		September	September	**Final Report**

REFERENCES

1. Hartmann, Thom. (2003) *The Edison Gene : ADHD and The Gift of The Hunter Child.* United States : Lake Book

2. Jacobs, Carole and Wendel, Isadore. (2010*) The Everything Parent's Guide to ADHD in Children : A Reassuring Guide to Getting The Right Diagnosis, Understanding Treatment and Helping Your Child Focus.* United States : Adams Media

3. The Concise Oxford English Dictionary Website

4. Zarina Muda. (2006) Storytelling Approach In Multimedia Courseware : An Introduction to Science for Pre-School Education

5. American Psychiatric Association. (2000) *Diagnostic and Statistical Manual of Mental Disorders* (4th Edition, text revision) Washington DC : American Psychiatric Association

6. Supiah Saad and Lindsay, G. (2010) Pre-School Children with Attention Deficit Hyperactivity Disorder (ADHD) in Inclusive Settings : Challenging but Not Problematic. *Pertanika Journal Social Science & Humanities* 18 (1)

7. Ryan-Krause, Patricia. (2010) Attention Deficit Hyperactivity Disorder (ADHD) : Part 1 *Journal of Pediatric Health Care* 24 (3)

8. Laforett, D.R, Murray D.W and Kollins, S.H. (2008) Psychological Treatments for Pre-School aged Children with Attention Deficit Hyperactivity Disorder (ADHD) *Development Disabilities Research Review* 14 (4)

9. Gilliam, W. and Shahar, G. (2006) Pre-School and Child Care Expulsion and Suspension : Rates and Predictors in one state *Infant & Young Children* 19 (3)

10. Newsweek : The Gift of ADHD by Anne Underwood

11. Babinski, L.M., Hartsough, C.S. and Lambert, N.M. (1999) Childhood Conduct Problems, Hyperactivity-Implusivity, and Inattention as Predictors of Adult Criminal Activity *The Journal of Child Psychology and Psychiatry and Allied Disciplines* 40

12. Lee Lay Wah. (2007) Development of Multimedia Learning Resources for Children with Learning Disabilities in an Undergraduate Special Education Technology Course MEDC 1

13. Carlson, C.L. and Tamm, L. (2000) Responsiveness of Children with Attention Deficit Hyperactivity Disorder (ADHD) to Reward and Response Cost : Differential Impact on Performance and Motivation *Journal of Consulting and Clinical Psychology* 68 (1)

14. Wilens, T.E., Biederman, J., Brown, S., Monuteaux, M., Prince, J. and Spencer, T.J (2000) *Journal of Development and Behavioral Pediatrics* 23

15. Savener, T.R.M. (2005) Teacher's Perceptions of Hispanic and Anglo Children's Behavior and Learning Problems Unpublished PhD Dissertation, Texan Tech University

16. Judge, S.L. (2001) Computer Applications in Programs for Young Children with Disabilities : Current Status and Future Directions *Journal of Special Education Technology* 16 (1)

17. Song, K.S., Lee, J.A. and Kim, J.K. (2010) Aesthetic Aspect of CAI Courseware to Developmental Disability Children Learning

18. Lee Lay Wah. (2003) An Introduction to Assistive Technology : Meeting the Needs of Students with Disabilities *Diges Pendidik* 3 (2)

19. Multimedia Courseware for Slow Learners : A Preliminary Analysis

20. Banaschewski, T., et. al. (2008) Color Perception in ADHD *Journal of Child Psychology and Psychiatrist* 47 (6)

21. Tavanti, M. and Lind, M (2001) 2D VS 3D, Implications on Spatial Memory Symposium on Information Visualization, San Diego 22-23 Oct