

# The Implementation of Interactive Multimedia Learning Autism (IMLA). Alpha, Beta and Pilot Testing Stages

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**Abstract**— *The increasing numbers of Autism have been increased lately. Even though many research dedicated to autistic children around the world but the outcome was too limited and only made known to the doctor and the parents. None of this outcomes could be shared and distribute to society because the outcomes was too technical and limited. The information's related to Autism are too general and only focus on certain cases. The main issues arises are how this information's could be learn and shared amongst society? This study proposes one prototype to be implemented which is the implementation of Interactive Multimedia Learning Autism (IMLA). The development of IMLA was resulted from rigorous researches that have been made before such as through extensive literature reviews and Preliminary Investigation (PI). This study will highlight the elements and process used in the development such learning theories, theoretical framework, alpha, beta and pilot testing. The findings from the study will lead to the implementation of IMLA and will be tested with real target respondents. The findings show that the significance levels of knowledge, awareness and motivation of target respondents are increased significantly.*

**Index Terms**— Interactive, Multimedia, Learning, Autism

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## 1 INTRODUCTION

This research has being initiated since many previous researches that have being carried out before only focused on autistic child. Furthermore the selection of these issues was derived from the increasing numbers of Autism cases being reported throughout Malaysia and also the findings from Preliminary Investigation (PI) which reveals that the lack of knowledge and awareness was the main aspects why these issues has being chosen by the researcher. It is hopes this research will become a source of information's towards educating society to identify autism symptoms so that in future they will be aware and mentally prepared if this issues happen to them.

## 2 LITERATURE REVIEW

In general, autism is a development disorder characterized by impairments in three areas such as social, communication and behaviours. Autism first describes by American psychiatrist Leo Kanner in 1943 [7] (Patrick, 2002), is thought to result from a brain disorder that takes place during the first two and a half years of childhood. Although autistic children look like ordinary people but this disability will causes them to experience our world very differently. People who could not understand them often see them as selfish, slow and odd. This is cause by lack in the social instincts of caring, sharing and pretending and they normally do not play, communicate and make friends.

Malaysian Ministry of Health [6] (Nettleton, 2008) reported that Autism is a rising issues throughout the world and the number of cases being reported in Malaysia has being increased tremendously over the years. Even though, there has been a considerable increase in the amount of afford to improve the awareness of Autism but this issue is still below knowledge of many Malaysians. While there is no cure for autism, an early exposure and education for societies are im-

portant in order to reduce its implications later.

[5] (Mansor, 2010) indicates that autism is often misconstrued as mental illness in Malaysia. They are mostly kept at home and hidden from the outside world. Due to this, most of them do not have the life chances of others such as obtaining proper education and access to health care hence; society must take that decisive step forward and educate those around us on autism. He suggested, the society need to spread the knowledge and awareness of autism and teach about the behavioural symptoms to look out for if they suspect their children could be suffering from autism. Over the years, many efforts has gone into the exploration of technology to aid in diagnoses and treatment of the disease but unfortunately most of the results and findings are only concentrated on Autistic child and the outcomes mostly too clinical to be understood by society. So, in order to increase the public knowledge and awareness, there is a need to have suitable learning environment and instructional tools that can provide society with interactive and engaging experience of learning systems so that they will have proper knowledge in facing with these issues in future.

A series of Preliminary Investigations (PI) has being conducted by [3] (Jasni, Wan Ahmad Jaafar, & Toh, 2010) in two states of Peninsular Malaysia at early stage of this study with purpose to seek target respondents opinions and basic knowledge towards autism. This PI conducted through interviewed with selected respondents which comprises of three expert in autism areas, mothers with autistic child, two fathers and one mothers without autistic child and three young women. The overall results shows that some of them are having very low knowledge and do not understand about autism and how to identify their symptoms. Some of the feedback stated that there are reasons to these problems such as lack of basic knowledge at school, lack of awareness given by the authorities, level of education background, lack of expertise and facilities.

### 3 OBJECTIVE

This study aims to outline the process in the development of Interactive Multimedia Learning Autism (IMLA). The core research questions that guide this study are as followed;

- **To determine which learning theories, theoretical framework and instructional system design that works best in this development.**
- **To analyze the process of alpha, beta testing and pilot testing.**

### 4 PROBLEM STATEMENTS

Most of the feedback received from the Preliminary Investigation (PI) and literature reviews reveals that the lack of knowledge and awareness in identifying autistic behavioural symptoms was the main issues that arise during the survey. Even though there are many efforts to improve the awareness of Autism among society but the level of their knowledge and awareness was still very low. As commented by National Autism Society of Malaysia (NASOM) chairman [2] (Azizan, 2008), awareness of autism has increased in the last few years but more research is needed to access the situation and to draft an efficient support system to address it. The increasing of numbers was based on cases reported and parents coming to seek for help. The main question is how the finding can be understood by society if they does not really understand the basic knowledge in recognizing Autism behavioural symptoms. This situation is resulted from most of research outcomes only specific to Autistic child, parents and doctor itself. Information's regarding Autism should be taught and educate properly by using suitable learning environment so that the basic knowledge can be transformed amongst society smoothly.

Currently, there are information's available either books, magazine events online resources explaining the issues of Autism but the method in presenting those information's was too technical and confusing to others. Quite often the information's provided contains lots of technical jargon and the sentence was too scientific to be understood by normal person. So the need of interactive and engaging learning experience to construct knowledge is important to be implemented as stated by [4] (Jonassen, 1999), learning is a process of actively constructing knowledge by integrating experiences into the learners existing schemata. Furthermore learning experiences should enable knowledge construction by providing interactive, content rich and engaging learning activity. The lack in recognizing autism behavioural symptoms are important to be improves by society. As mention by Melaka Tengah Autism Association (MTAA) president in revealed that autism is treatable and early intervention is crucial. She added parents and society should be aware of warning signs and symptoms of autism so that they can bring their child for diagnosis. Information's regarding autism should be follow up with necessary treatment right away. They must not wait and expect the

child to catch up later or outgrow the problem. The more they know about autism spectrum disorder, the better equipped they will be to make informed decisions for their child.

A senior lecturer in Early Intervention, Autism and Assessment from Universiti Kebangsaan Malaysia supported above feedback where many parents in Malaysia do not have basic knowledge in terms of financial means to care for their autistic children. Working parents also often find themselves torn between career and many professional women have to quit their jobs to look after their child's. She added many parents do not have proper method and knowledge to handle the autistic child and these scenarios lead to arguing and separation of the family. Even there are a cases that some parent's who has higher degree such as PhD also think why they should bother with early intervention because nothing much that can be done.

### 5 LEARNING THEORIES

The development of Interactive Multimedia Learning Autism (IMLA) will be supported by suitable learning theories and theoretical framework that will discuss briefly in this paper. This study adopted learning theories such as Constructivist Learning Environment (CLEs) Theory by David Jonassen (2004), Condition of Learning by Robert Gagne (1965), Learning Style Theory by David Kolb's (1984), Cognitive Theory of Multimedia Learning by Mayer's (2003) and Motivation Theory by Keller (2006).

The theory of Constructivists Learning Environment and Condition of Learning contains suitable elements that can guide and motivate learners to learn new materials. Under the constructivist learning environment among the elements that will be apply into this research is **Active, Constructive, Collaborative, Conversational, Reflective, Contextualized, Complex, and Intentional**. The use of these elements will expect to have suitable relationship that need to be achieved at the end of their lesson. By combining with theory condition of learning that contains some elements such as **Gaining Attention, Inform the Objective, Stimulate Learning, Present Information, Learning Guidance, Eliciting Performance, Provide Feedback, Assess Performance and Enhancing Retention** will help learners to construct new knowledge. The theory of ARCS Motivational by Keller will be adapted to measure the motivation levels after they finish completing both presentation modes.

### 6 HOW THE DESIGN SUPPORT THE LEARNING THEORIES AND MULTIMEDIA PRINCIPLES?

The main elements in the development of this prototype are the combination between constructivist learning environment elements and multimedia principles. Elements in constructivist such as active, constructive, collaborative, conversational, reflective, contextualized, complex and intentional will be applied in designing and developing IMLA and the method of how these learning materials should be conducted is adapted from Gagne's condition of learning. Among the ele-

ments in this theory include gaining attention, informing the objective, stimulating learning, presenting information, learning guidance, eliciting performance, providing feedback, assessing performance and enhancing retention. The effects of interaction between constructivist, Gagne's elements and support from multimedia principles will form effective prototype in enhancing learners' knowledge and awareness.

## 7 INSTRUCTIONAL SYSTEM DESIGN

Instructional System Design is the practice of maximizing the effectiveness, efficiency and appeal of instruction. This prototype will be based on [1] (Alessi & Trollip, 2001) instructional system design in order to enhance learner's ability in recognizing autism behavioural symptoms. This model will involve four stages in the development process which are Planning, Design, Development and Ongoing Evaluation. The reason of using this model was to develop and produce an effective interactive multimedia learning system online for intended respondents.

## 8 THE DEVELOPMENT OF INTERACTIVE MULTIMEDIA LEARNING AUTISM (IMLA)

The main instruments for this research as stated in Figure 2.13 would be the implementation of Interactive Multimedia Learning Autism (IMLA). This learning system will be accessible online and the autistic behavioural symptoms characters will be the main learning objects in enhancing learner's knowledge and awareness towards these issues. Before using IMLA, learners will be tested by using Knowledge Awareness Scale (KAS) in order to find out their knowledge towards the learning material. There are two sections in IMLA; Presentation Mode 1 and Presentation Mode 2. Both of the presentation modes will be tested on different target groups of student. The purpose is to find out which treatments will be more suitable in enhancing learner's knowledge in the identification of autistic behavioural symptoms.

Learners will utilize the learning material from IMLA within the stipulated time given to them. After both groups have completed, they would be asked to give their opinions by filling out Knowledge Awareness Scale (KAS) questionnaire. The questionnaire is divided into two sections; Knowledge and Awareness. The number of questions is 10 for each section and most of the questions will refer to respondents' experience after they have used the IMLA. The last task in this research is by completing the motivation questionnaire as well as seeking the effects of both presentation modes in enhancing learner's motivation in learning Autistic behavioural symptoms.

## 9 ALPHA TESTING

The alpha testing was conducted at the Centre of Instructional Technology & Multimedia (CITM) in USM and a number of 15 undergraduate students participated in this evaluation. The purpose of the alpha testing was to assure that would be no errors in the process of implementing the prototype. A copy of

IMLA in CD format and instrument's such are Knowledge Awareness Scale (KAS) and Instructional Materials Motivation Scale (IMMS) has been distributed to the undergraduate and postgraduate students'. They were given three days of duration to reviews the prototype and instruments'. All feedback and suggestion were analyzed and taken into consideration in improving the prototype.

## 10 BETA TESTING

Once the changes have been made into the prototype, it needs to be tested again with the same target respondents. This beta testing conducted with purpose to improve the technical issues found in the pilot testing. Another reason is ensure that there were no issues on the functionality in the prototype. A numbers of 26 undergraduate students have been selected to participate in this testing. The session was administered at computer lab and the permission to conduct this test was given by the class lecturer. The session lasted one hour and the feedback was analyzed by using descriptive method. There are many feedback were given by respondents and the outcomes of these feedback has made the prototype become more consistent, precise and stable.

## 11 PILOT TESTING

The pilot testing is the final stage before the real treatment administered to real sampling. Pilot testing has been administered at Centre for Instructional Technology and Multimedia (CITM) and a number of 20 undergraduate students participated in this testing. During the pilot testing, students were randomly divided into two groups; Modality and Redundancy Mode. The students have completed the Baseline Test, Pre-test, Treatment, Post-test 1 and IMMS. The main purpose to conduct pilot testing is to validate overall research procedures, test the reliability of the materials and instruments as well as to measure the time required in handling the treatment. The outcome of this pilot testing could be categorized into below sentences;

### 11.1 Procedure

The overall procedure was done successfully where all the instrument and treatment have been administered to respondents. Total sample was 20 undergraduate students and before the session starts they have divided into two groups; ten students for Modality mode and ten students for Redundancy mode. The instruments of Baseline Test (Index of Learning Style (ILS) and Pre-test 1 (Knowledge Awareness Scale (KAS 1) was among the instrument that have been administered to sampling. The baseline test has been administered first in order to identify learning preference style of the sampling. The reason is to correlate sampling perception towards the prototype that they will use later. KAS 1 has been administered with purpose to find out the levels of knowledge and awareness of sampling towards autism. Both instruments were conducted successfully and the time give for these instruments was twenty minutes. After the completion of both instruments

during pre-test, the sampling started to use the treatment which is the use of Interactive Multimedia Learning Autism (IMLA). Before the treatment, a copy of IMLA has been installed in every computer at designated lab. The treatment was conducted smoothly and the treatment lasted one hour. Once the treatment completed, the instruments of KAS 2 was administered where the questionnaire in this instrument are all the same but only the placement of questions are different. This is to reduce Hawthorne effects during the session. Final instrument was the use of Instructional Material Motivational Scale (IMMS) where the purpose of this instrument was to seek any achievement score in terms of motivation level after the sampling has finished completing the treatment. Overall conclusion for this pilot testing shows that the process has been administered successfully and there are no major error found during the process. All sampling has been cooperative and the feedback from this session has been analyzed in order to improve the prototype.

### 11.2 Functionality

During the treatment, the functionality of IMLA was proven to be working successfully. There was no error such as missing links, dead link, lost in internet connection, and etc. All elements in prototype such as html pages, autism behavioural symptoms characters, animation, animated gif, audio and JavaScript has been working perfectly and there were no comments highlighted from the sampling during the treatment. Even though the prototype has been assessed from the desktop in the computer lab, one of the features in IMLA requires sampling to fill up the quiz given and during the treatment there were no complaints from the sampling that the quiz does not connected/congested to the internet. This shows that the prototype was ready for the real treatment with the real sampling later.

### 11.3 Results

The results from this pilot testing can be interpreted into below section. This pilot testing proved that the Redundancy Mode was better in term of significance in enhancing knowledge and awareness of autism symptoms compare to Modality Mode. Through the descriptive statistics output by SPSS software, one way Anova features has been utilized to output the results. As stated in Table 1.0, under the KAS 1 during Pre-Test, the mean score for Modality Mode was 107.8000 and Redundancy Mode was and 99.1000. In KAS 2 during Post-Test 1 showed significance achievement of scored where Modality Mode was 113.300 and Redundancy Mode were 118.600. Result of IMMS during Post-Test was 143.7000 for Modality Mode and 128.7000 for Redundancy Mode.

**Table 1.0** Descriptive Statistics

Descriptive Statistics				
	Presentation Mode	Mean	Std. Deviation	N
KAS 1 during Pretest	Modality	107.8000	11.70755	10
	Redundancy	99.1000	12.64428	10
	Total	103.4500	12.67187	20
KAS2 during Posttest	Modality	113.300	17.9447	10
	Redundancy	118.600	15.0791	10
	Total	115.950	16.3594	20
IMMS_Posttest	Modality	143.7000	12.31124	10
	Redundancy	128.7000	18.91531	10
	Total	136.2000	17.33448	20

For Test of Within-Subjects Contrasts in Table 1.1, the result between Post-Test 2 and Pre-Test showed the result of significance was .001 and between Post-Test 3 and Pre-Test was .000. Under presentation modes, during Post-Test 2 and Pre-Test, it scored .038 and during Post-Test 2 and Pre-Test the scored of significance level was .423. The results from the pilot testing proved that Modality mode to be more significant than Redundancy Mode as measured by outcome in Pre-Test (KAS 1), Post-Test 1 (KAS 2) and Post Test 2 (IMMS). In term of relationship between moderator variable as shown in Table 1.2, on the Test of Homogeneity revealed the significance of Learning Style with the score of .003 and for Gender was .398.

**Table 1.1** Tests of Within-Subjects Contrast

Tests of Within-Subjects Contrasts						
Measure: MEASURE_1						
Source	knowledgeawarenessmotivation	Type III Sum of Squares	df	Mean Square	F	Sig.
knowledgeawarenessmotivation	Level 2 vs. Level 1	3125.000	1	3125.000	15.930	.001
	Level 3 vs. Level 1	21451.250	1	21451.250	72.671	.000
knowledgeawarenessmotivation * Modes	Level 2 vs. Level 1	980.000	1	980.000	4.996	.038
	Level 3 vs. Level 1	198.450	1	198.450	.672	.423
Error (knowledgeawarenessmotivation)	Level 2 vs. Level 1	3531.000	18	196.167		
	Level 3 vs. Level 1	5313.300	18	295.183		

**Table 1.2** Test of Homogeneity of Variances

Test of Homogeneity of Variances				
	Levene Statistic	df1	df2	Sig.
Learning Style	12.054	1	18	.003
Gender	.750	1	18	.398

In general the overall results showed that there are significance relationship between Knowledge and Awareness in all stages of two presentation modes. In term of interaction between modes there are significance relations exists. This result showed that Modality mode proved to have strong effects on the target respondents in term of minimizing the extraneous effects in identifying Autism behavioral symptoms.

### 11.4 Procedures and Methods for data analyses during treatment

The findings of study analyzed by using Microsoft Excell and Statistical Package for the Social Science (SPSS). The use of Microsoft Excell is used to manipulate the score given by the Autism Spectrum Quotient (ASQ). The statistical data will be used to calculate the data at significant level .05 for all statistical analyses. In this pilot testing session, the result of treatment was analyzed by using descriptive method where the Analysis of Variance (ANNOVA) was used to output the overall scored of means in Pre-Test, Post-Test 1 and Post-Test 2. The reason to use this method was to test the hypothesis of  $H_{0.1}$ ,  $H_{0.2}$ ,  $H_{0.3}$ ,  $H_{0.4}$ ,  $H_{0.5}$ , and  $H_{0.6}$  that has been set earlier. Before the treatment was conducted, Index of Learning Style (ILS) feedback was analyzed to determine the preference style of sampling. The method of t-test statistical technique was conducted to analyze the score as shown in below Table 1.3.

**Table 1.3** Group Statistics

Group Statistics					
	Learning Style	N	Mean	Std. Deviation	Std. Error Mean
Presentation Mode	Visual	15	1.6000	.50709	.13093
	Text / Audio	5	1.2000	.44721	.20000

## 12 CONCLUSIONS

The results from this pilot testing proved that the implementation of Interactive Multimedia Learning Autism (IMLA) clearly contributed to the significance understanding of sampling in identifying Autism behavioural symptoms. The development of interactive multimedia learning is vital to be implemented so that the burdens of societies in getting the information's regarding Autism could be minimized.

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