

**DEVELOPMENT AND EFFECTS OF
AN INTERACTIVE MULTIMEDIA LEARNING
ENVIRONMENT (IMLE) IN LEARNING
AUTISM BEHAVIORAL SYMPTOMS**

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AN INTERACTIVE MULTIMEDIA LEARNING
ENVIRONMENT (IMLE) IN LEARNING
AUTISM BEHAVIORAL SYMPTOMS**

by

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LIST OF ABBREVIATION

ASQ	Autism Spectrum Quotient
ATID	Allesi & Trollip is Model for Design and Development
CLE	Constructivist Learning Environment
GUI	Graphical User Interface
IMLE	Interactive Multimedia Learning Environment
IMMS	Instructional Materials Motivation Survey
KAS	Knowledge Awareness Scale
NASOM	The Nasional Autism Society of Malaysia
NTL	NASA Task Load
PI	Preliminary Investigation

**PEMBANGUNAN DAN KESAN
PERSEKITARAN PEMBELAJARAN INTERAKTIF MULTIMEDIA (IMLE)
DALAM MEMPELAJARI TINGKAH LAKU SIMTOM AUTISTIK**

ABSTRAK

Kajian ini memberi tumpuan untuk membangunkan dan menilai keberkesanan persekitaran pembelajaran interaktif multimedia dengan tujuan meningkatkan pengetahuan pelajar, kesedaran serta motivasi ke arah pembelajaran tingkah laku simtom autistik. Persekitaran Pembelajaran Interaktif Multimedia (IMLE) telah dibangunkan dengan mengintegrasikan teori pembelajaran dan prinsip multimedia yang berkaitan untuk menyediakan pelajar dengan pengalaman kandungan interaktif. Objektif kajian ini adalah untuk mengkaji kesan IMLE seperti yang diukur oleh Skala Pengetahuan Kesedaran (KAS) dari segi Strategi Rekaan, Jantina, Gaya Pembelajaran dan motivasi pelajar. Penyelidikan ini menggunakan kajian kuasi-eksperimen bertujuan untuk menyiasat kesan dua mod persembahan pada skor pencapaian pelajar. Instrumen utama bagi mengukur kesan pembelajaran ini adalah melalui pembangunan Persekitaran Pembelajaran Interaktif Multimedia (IMLE) dengan dua mod persembahan: Mod Persembahan 1 (Prinsip Modaliti) dan Mod Persembahan 2 (Prinsip Redundancy). Sampel kajian ini terdiri daripada pendidikan khas pra perkhidmatan guru yang mengambil kursus pendidikan khas di universiti awam tempatan. Jumlah saiz populasi sebanyak 550 telah dipilih dan berdasarkan jadual Krejcie dan Morgan (1970), seramai 225 sampel telah dipilih untuk rawatan akhir. Kajian ini menggunakan beberapa instrumen dalam memastikan keseragaman keputusan semasa rawatan. Instrumen pertama ialah Indeks Gaya Pembelajaran (ILS) yang dibangunkan oleh Felder dan Soloman (1994) bertujuan untuk mengenal pasti gaya pembelajaran sampel. Instrumen kedua ialah Skala Pengetahuan Kesedaran (KAS) yang memerlukan sampel untuk menilai instrumen sebelum dan selepas mod persembahan.

Instrumen terakhir adalah Bahan Pengajaran Skala Motivasi (IMMS) yang dibangunkan oleh Keller (2006) dimana instrumen ini dijalankan adalah untuk mengukur tahap motivasi selepas mereka selesai menggunakan bahan pembelajaran KAS 2. Data akhir telah disusun dan dianalisis menggunakan Pakej Statistik untuk Sains Sosial (SPSS) versi 19. Untuk semua analisis yang dibincangkan, tahap signifikan 0.05 telah ditetapkan. Nilai p yang kurang atau sama daripada 0.05 menunjukkan penolakan hipotesis null dan nilai p yang lebih daripada 0.05 menunjukkan penerimaan hipotesis null. Analisa kovarians (ANCOVA) dan analisa multivariat kovarians (MANCOVA) dan Perbandingan dari segi pasangan telah digunakan untuk analisis statistik inferensi. Secara umumnya, dapatan kajian ini menunjukkan terdapat peningkatan yang ketara dalam jumlah pengetahuan dan kesedaran responden terhadap bahan pembelajaran. Kajian ini telah menyebabkan pembentukan bahan pembelajaran di mana gejala tingkah laku autistik boleh diakses dengan mudah oleh masyarakat melalui persekitaran pembelajaran multimedia. Persekitaran pembelajaran ini boleh membantu untuk memendekkan proses mengenal pasti gejala tingkah laku autistik pada masa akan datang disebabkan perkembangan teknologi komputer yang berkembang setiap hari. Teori pembelajaran dan prinsip multimedia yang digunakan dalam kajian ini telah berjaya mencapai objektif kajian dan hipotesis penyelidikan. Tambahan pula markah yang ditunjukkan oleh mod persembahan adalah hasil daripada keberkesanan Skala Pengetahuan Kesedaran (KAS) yang digunakan semasa rawatan. Walau bagaimanapun, penambahbaikan dan pindaan diperlukan untuk menjadikan kajian ini lebih berkesan. Penggunaan teori pembelajaran dan prinsip multimedia yang berkesan dan terkini adalah diperlukan untuk mengukuhkan lagi pembangunan bahan pembelajaran ini. Walaupun sampel hanya bagi kedua-dua negeri di Semenanjung Malaysia, sampel yang lebih luas adalah diperlukan untuk penduduk yang lebih besar serta kesan yang lebih meluas.

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IN LEARNING AUTISM BEHAVIORAL SYMPTOMS**

ABSTRACT

This research was focused to develop and evaluate the effectiveness of a multimedia learning environment with the purpose of increasing learners' knowledge, awareness as well as perceived motivation towards learning of autism behavioral symptoms. An Interactive Multimedia Learning Environments (IMLE) was developed by integrating relevant learning theories and multimedia principles to provide learners with an interactive content experience. The objective of this research was to study the effects of IMLE as measured by Knowledge Awareness Scale (KAS) in terms of Design Strategies, Gender, Learning Styles and perceived motivation. This research employed a quasi-experimental research with purpose to investigate the effects of two presentation modes: Presentation Mode 1 (Modality Principle) and Presentation Mode 2 (Redundancy Principle). The sample of this study consists of special education pre service teacher who were taking special education courses at local public universities. The total population size of 550 was selected and based on Krejcie and Morgan (1970) table; around 225 samples was selected for the final treatment. The study used several instruments in ensuring the consistency of the outcome during the treatment. The first instrument was the Index of Learning Styles (ILS) developed by Felder and Soloman (1994) with purpose to identify the learning style preferences of the respondents. A second instrument was the Knowledge Awareness Scale (KAS) which requires respondents to self-assess the instrument before and after the presentation modes. The last instrument was the Instructional Material Motivation Scale (IMMS) developed by Keller (2006) which measure the perceived motivation after respondents have completed with KAS 2.

The final data were compiled and analyzed using Statistical Packages for the Social Sciences (SPSS) version 19. For all analyses discussed, a significant level of 0.05 was set. A p value of less or equal than 0.05 indicates the rejection of null hypotheses and a p value of more than 0.05 indicates acceptance of null hypotheses. Analysis of Covariance (ANCOVA), Multivariate Analysis of Covariance (MANCOVA) and Pairwise Comparison were used for inferential statistical analysis. In general, the findings from this study shows a significant increased in the amount of knowledge and awareness of respondents towards the learning material. This study had resulted in the production of learning material where the autism behavioral symptoms can be accessed easily by the society through a multimedia learning environment. This learning environment can help to shorten the process in identifying autism symptoms in the future as the technology of computers evolved every day. The learning theories and multimedia principles used in this study were successfully managed to achieve the research objectives and research hypothesis. Furthermore the gain scores showed by the presentation modes was a result of the effectiveness of Knowledge Awareness Scale (KAS) instrument used during the treatment. Nevertheless, further improvements and amendments are necessary to make this study more effective. The use of more reliable and current learning theories and multimedia principle are needed as to strengthen the development of learning material. Since the size of samples only covered for two states in peninsular Malaysia, wider sample are needed to generalize the outcomes to a bigger population.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This research intended to develop and looking at the effects of an Interactive Multimedia Learning Environment (IMLE) with purpose to increase the knowledge, awareness, and perceived motivation of respondents towards learning autism behavioral symptoms. An Interactive Multimedia Learning Environment (IMLE) was developed by integrating suitable learning theories and multimedia principles which provide learners with an interactive content experience. The reliability of this learning material was tested by the Knowledge Awareness Scale (KAS) instrument. Many research before was focused on autistic children themselves without considering alternatives methods in helping society to identify the symptoms of these children. This was the initial impetus for conducting this research and it is hoped this research will provide a new source of information for society to understand and identify autism behavioral symptoms so that we may be more aware and prepared to deal with this issue physically and mentally.

Furthermore, the selection of this topic was also a resulted from the increasing numbers of autism cases being reported worldwide, particularly in Malaysia, as well as findings from the Preliminary Investigation (PI), which showed a lack of knowledge and awareness of autism in our society. This research looking at the effects of an Interactive Multimedia Learning Environment (IMLE) which could facilitate a learner's knowledge, awareness and perceived motivation in learning of autism behavioral symptoms.

1.2 Background of the Study

The issues of autism have always been a big questions to many of us. Since autism which always misinterpreted and associated with a group of complex disorders of brain development., these disorders are characterized in varying degrees, by difficulties in social interaction, verbal and nonverbal communication and repetitive behaviors.

Center for Disease Control estimated that an average of 1 in 88 children in the United States have the symptoms of autism (Baio 2008). As the incidences are rise around the world, the exposure to these disorders also increased through relations with their peers, television and various other media. This situation leads to knowledge and awareness which may not be accurate depending on where the information's come from.

The Malaysian Ministry of Health as reported by Nettleton (2008) stated that autism is a rising phenomenon throughout the world and the number of cases being reported in Malaysia has increased tremendously over the years. Although there has been a considerable increased in efforts to improve awareness of autism, this issue is still not considered by many Malaysians. The fact that there is no specific cure for autism should not be a reason why society should not be educated or exposed to this matter.

Mansor (2010) indicated that autism is often misconstrued as mental illness in Malaysia. Autistic children are mostly kept at home and hidden from the outside world. Due to this, most of them do not have the same chances that normal children have, such as getting a proper education or having the same access to health care. They should be treated the same way and for this reason, society needs to be exposed to autism and the truth about it. Education is always the key to a better life and the same principle applies to autism.

He suggested that it is time to get the issue of autism “out of the closet.” People need to have at least basic knowledge of what autism is. Ignorance about autism might not end well for those who are affected, when they or the people around them do not have a clue about their affliction.

The American Psychiatric Association (2000) stated that Autism Spectrum Disorders (ASDs) are a group of developmental disabilities characterized by impairments in social interaction and communication and restricted, repetitive and stereotyped patterns of behavior. Autism was first described by American psychiatrist Kanner in 1943 as resulting from a brain disorder that takes place during the first two and a half years of childhood.

Although autistic children look like ordinary people, this disability causes them to experience the world differently. People who do not understand often see them as selfish, slow and odd. This is because they lack the social instincts of caring, sharing and pretending. As a result, they normally do not play, communicate or make friends easily. Since autistic children are never certain of what is happening around them, it will be harder for them to make choices and express themselves in comparison with normal children without autistic symptoms.

These scenarios somehow present the possibility of leading our society towards a wrong perception of these autistic children. The question like how these children could be recognized and ways of identifying them ought to be answered and should not be put on hold.

Over the years, many efforts have gone into the exploration of technology to aid the diagnoses and treatment of the disability. Unfortunately most of the results and findings only concentrated on the autistic child and the outcomes are mostly too clinical to be understood by society.

Concerning to this issues, there have been some studies measuring the level of knowledge within specific populations. Drager and Schwartz (2008) reported that sixty-seven (67) school based from thirty different states completed a survey to test their knowledge about autism. The results showed that "current professionals in the field have an unbalanced understanding of autism and have some insecurities regarding their abilities to provide effective services to the students". Cascella and Colella (2004) reported that school speech pathologists were more confident in recognizing autistic behaviors but were not confident in assessing or treating patients with autism.

In order to increase the knowledge, awareness and perceived motivations of society towards autism, there is a need to have a suitable learning environment as well as proper instructional tools that will provide an interactive and engaging learning material system, so that society will be properly equipped with the right knowledge to face these issues later.

1.3 Preliminary Investigation (PI)

A series of Preliminary Investigations (PI) (Appendix 1) was conducted during the early stage of this study to ascertain the research problems. The use of a needs analysis is to identify the problems from the target respondents and the options in solving the problems. During the investigation, two types of approaches were applied, namely observation and interviews.

As reported by Jasni et al. (2011), two experts from the National Autism Society of Malaysia (NASOM), Kuala Lumpur, were interviewed and both of them confirmed that lack of knowledge and awareness in our society is the main reason why autism issues exist in Malaysia. They also agreed that there are other causes as well, such as the lack of related research in this area, low levels of education and poor facilities given by the government. According to them, knowledge, awareness and perceived motivation of autism need to be enhanced as a continuous process so that every member of society should be aware of it. They added that the information provided by the government is still insufficient and only little effort has been allocated to fund the autism center in Malaysia. Even though there are financial assistance provided by Malaysian Ministry of Women and Family Development, more information should be given to the public as an effort to educate them about autism. One should not stop only after two or three times; it should be done continuously. Mainstream media such as the television can also help by disseminating the educational message through advertising.

The advancement of new media technology such as the Internet and Social Network systems can be used in persuading society to learn more about autism. At the kindergarten and school levels, the government should provide more special education teachers who are capable of recognizing autism behavioral symptoms so that the slow learner students can be identified earlier.

An expert from the Intervention Unit of the School of Education, Universiti Kebangsaan Malaysia (UKM), agreed that basic knowledge and awareness play an important part in helping autistic children in getting a fair treatment from the community. She added that the current level of knowledge and awareness of autism among societies was very low because the model for disability treatment in Malaysia is through medical means and can only be handled by the medical fraternity.

The way autism has been perceived in Malaysia is that if someone has autistic children, then, this is their issue, and that there is nothing they can do with it. They do not see that this issue needs to be addressed in our society.

A mother with autistic children was interviewed and she agreed that the lack of information has definitely contributed to the alarmingly low level of knowledge, awareness and perceived motivation towards the issue of autism. She only came to be involved with autism after her child was diagnosed with autism at the age of three. Before that she had just read about it on the Internet as well as from books and magazines. The majority of people still do not know what autism is and the demands of these children. She also mentioned that she has never heard of the existence of a study that involves multimedia learning where parents can both learn and teach their children on how to communicate at the same time.

Two parents without autistic children agreed that they did not have proper knowledge and awareness about these symptoms and felt that it needs to be increased as society does not have a clue as to what autism is. They also agreed that an autistic child needs special attention and must be treated fairly by society. Most parents feel ashamed and cannot accept the fact that they have this child and the complexity of the information available with regard to this issue definitely does not help them to understand the situation. They added that support from the authorities was not well covered and there are lack of information and campaigns about these issues being organized for the public.

The two young women who were interviewed admitted that they did not have any information's at all regarding autistic children but like the others, they agreed that knowledge and awareness needs to be enhanced by educating our society on this matter.

Thus, these Preliminary Investigation (PI) results show that there is an urgent need to improve knowledge, awareness and perceived motivation levels regarding autism as well as to implement a suitable learning environment for society. With these, it is hoped that they will be able to learn and understand the autism behavioral symptoms without depending on the clinical outcomes. The researcher believes that the use of multimedia learning could help to increase the learners' knowledge and awareness levels towards autism and increase their perceived motivation in preparing themselves mentally and physically to face this issue in the future.

1.4 Problem Statement

A series of Preliminary Investigations (PI) have been conducted in two states of Peninsular Malaysia at the early stage of this study with the purpose of seeking opinions and basic knowledge of the respondents towards autism in general. This PI was conducted through a series of interviews with selected respondents; three autism experts, mother with autistic children, two fathers and a mother without autistic children, as well two young women. The overall results showed that some of them had very little knowledge regarding autism and did not know how to identify related symptoms. Among the reasons cited were as follows: no early exposure at school, no awareness among authorities, low level of education, few experts and poor facilities provided for this cause.

According to the chairman of the National Autism Society of Malaysia (NASOM) (2010), the level of awareness of autism has increased over the years but it is not enough considering that many have not gotten the message of what autism is. More research should be conducted in this matter even though many parents have done their share in reporting the cases and seeking help for their autistic children.

These people need to understand the basic concept of autism before they can actually understand the findings from the researches. That is why it is really important for these people to be educated in the matter of autism. How are they supposed to help their children when they, themselves do not understand what actually is happening to their children? In order to educate these parents, it is crucial to consider a good learning environment as well as learning construction; this is what should be explored as the first step in dealing with autism.

A senior lecturer in Early Intervention, Autism and Assessment from Universiti Kebangsaan Malaysia (UKM) also holds the view that many parents in Malaysia do not have the basic knowledge in terms of the amount of money required in meeting the needs of an autistic child. Working parents also often find themselves torn between career and family commitments and many professional women have had to quit their jobs to look after their children. She also added that many parents do not use proper methods and knowledge in handling their autistic children and these scenarios usually lead to arguments and separation of the family. Surprisingly, there are also cases where parents who just give up on their children despite the fact that they have a higher level of education such as a doctorate degree. Sadly, they did not bother with early intervention as they think that there is nothing much that can be done for their autistic child.

It is important that the lack of knowledge, awareness and perceived motivation in recognizing autism behavioral symptoms is addressed. As mentioned by the President of Melaka Tengah Autism Association (MTAA) in 2010, autism is treatable and early intervention is crucial. She added that parents and society should be aware of warning signs and symptoms of autism so that they can take their children for diagnosis. Once diagnosed with autism, parents should not take follow-up treatments for granted as this may cause problems in the future.

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 children.

Barger and Campbell (2011) supported above statement where they explore the knowledge of autism among middle schools students. According to this study, 41.6% of students had heard of autism where he concluded that the students with awareness of autism had a slightly better knowledge of autism than their peers who had never heard of autism. Overall, the students were varied in the level of knowledge that they had regarding the characteristics of autism. The study concludes that in order for autistic peers to participate successfully in an education system among their peers, there must be an increase in the level of knowledge of autism among students.

A study of the knowledge of autism among general practitioners in Pakistan found that only 44.6% of the general practitioners surveyed had heard of autism (Assassi and Ibrahim, et al. (2011). This study measured the awareness of autism in relation to the knowledge of autism among its participants. This study concludes that there are "knowledge deficits concerning autism etiology and diagnosis" and in order for autism disorders to be properly diagnosed and treated, both private and public schools in Pakistan should develop a more robust curriculum on the subject of autism.

There is a lot of information regarding autism available these days which can be accessed online from books and magazines, as well as organized events. However, the methods used to inform society sometimes can be too technical and confusing to ordinary people. Those without basic knowledge of what autism is will have a hard time understanding this issue.

There is usually a lot of technical jargon and the sentences can be really scientific as well. In this case, parents are the audiences and they need to understand the information conveyed.

1.5 Purpose of the Study

Based on the problem statement, the main purpose of this study was to fill a gap of knowledge and awareness which resulted from the literature reviews, current cases being reported and also the finding from the Preliminary Investigation (PI). The learning material was emphasized on the learning theories and multimedia principles with a view to increasing the knowledge, awareness and perceived motivation of the intended respondents. The independent variables used in this study were the modes of learning environment; (i) Presentation Mode 1 (Modality Principle) which states that the learning process will be more effective when the visual is presented with audio and (ii) Presentation Mode 2 (Redundancy Principle) which reveals that visuals with text will give greater understanding to the learners. As supported by Craig et al. (2002), Mayer and Moreno (1998), and Moreno and Mayer (1999) have shown that modality effect holds for retention, matching and transfer performance in computer-based environments which used explanations about lightning or brakes, using animation and narration or on-screen text. Consequently, the redundancy principle suggests that removing redundant on-screen text results in better performance than when redundant material is included (Mayer, 2001). The successful of this learning material will trigger learner's motivation to be aware of autism wherever they go. The dependent variable was to achieve knowledge, awareness and perceived motivation and Learning Styles and Gender were used as moderating variables in this study. Learning styles has been used as a moderator variable with purpose to identify the learners' learning styles preferences.

Genders have been utilized to see which genders are affected most after the treatment. According to Jonassen (1999), there is a need for a suitable and interactive learning environment experience since 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 activities. When designing learning instructions, the learning material should take into consideration appropriate technology and contents as well as pedagogy.

1.6 **Generic Model for the Study**

This study will employ the technology model from Fogg (1997) in formulating the solution model to the problem domain. This model is the study of computers as a persuasive technology which includes the design, research and analysis of interactive computing products which are created for the purpose of changing people's attitudes or behaviors. As shown in Figure 1.1, the left oval represents the Interactive Multimedia Learning Environment (IMLE) and right oval is the intention to increase knowledge, awareness and perceived motivation. The combination between these two ovals resulted with the formulation of Captology which refers to the changes in human behaviors through the use of computer technology.

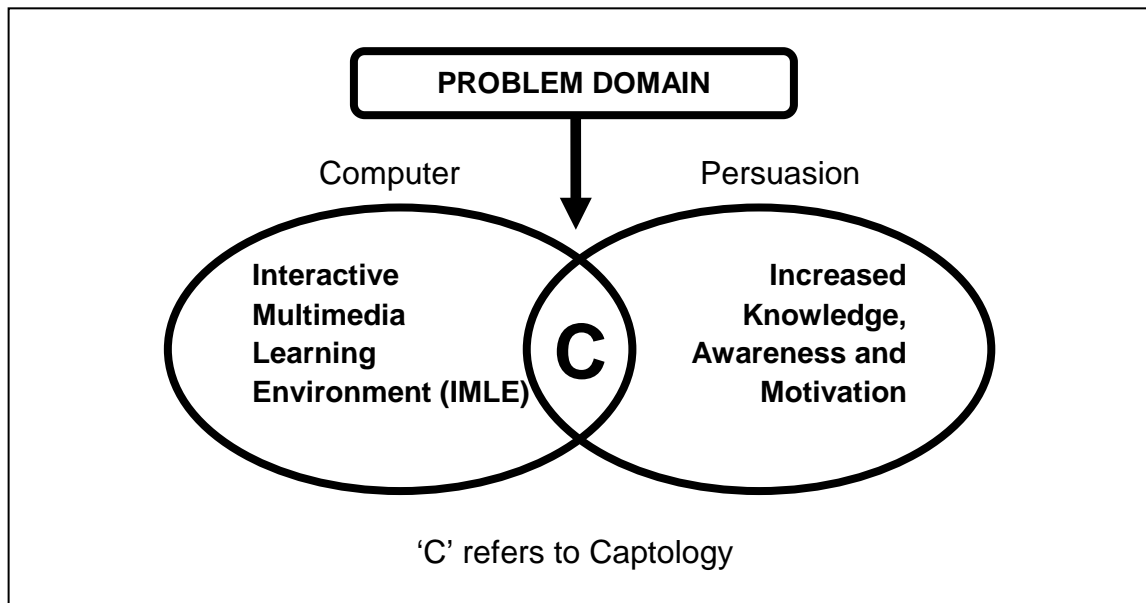


Figure 1.1 Illustrated Model of the Study based on Fogg (1997)

The advancement of computing technology has been growing tremendously and more products have been designed to change what people think and do. Persuasive computing technologies can influence people’s attitudes and bring some constructive changes in many domains such as marketing, health, safety and the environment. In relation to this, the development of this research adapted this elements which purposely to change learners’ attitude or behaviors. The rational in using this model is that the use of computer technology is a vital approach in changing the human perception towards learning autism behavioral symptoms. So, the development of this research adapted the elements of knowledge, awareness and perceived motivation with the hope of consequently people will change their attitude and behavior toward learning autism behavioral symptoms.

1.7 Design Strategies of IMLE (Macro and Micro Strategies)

This research requires suitable instructional theories to be implemented towards the development of the learning material. Instructional design theories can be defined as the practice of creating instructional experiences which make the acquisition of knowledge and skill of the learning material more efficient, effective, and appealing. Reiser and Dempsey (2007) added that an instructional design is defined as a systematic process that is employed to develop education and training programs in a consistent and reliable fashion.

In addition, instructional design models or theories may be thought of as frameworks for developing modules or lessons that increase or enhance the possibility of learning and encourage the engagement of learners so that they learn faster and gain deeper levels of understanding. In order to achieve this situation, different learning theories that are associated with the above environment, need to be combined together by using the macro and a micro design strategies approach. Reigeluth and Merrill (1978) described the macro design strategies as being more concerned about the subject matter and how the content should be presented to learners.

A micro design strategy refers to how characteristics, sequences and relationship of content unite with each other. So the macro design strategy in this study involves the implementation of an Interactive Multimedia Learning Environment (IMLE) whereas the micro design strategy enlists the use of multimedia principles and learning theories that will be embedded in the learning material.

1.8 Research Objectives

The objectives of this research were:

- i. To study the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score in terms of perceived knowledge and awareness as measured by Knowledge Awareness Scale (KAS).
- ii. To study the effects of two presentation modes in an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Design Strategies.
- iii. To study the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Gender.
- iv. To study the effects of two presentation modes in an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Gender.
- v. To study the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Learning Styles.
- vi. To study the effects of two presentation modes of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Learning Styles.
- vii. To study the effects of learners' perceived motivation after the use of an Interactive Multimedia Learning Environment (IMLE) as measured by Instructional Materials Motivation Survey (IMMS).

1.9 Research Questions

The study will attempt to answer the following questions:

- i. Is there a significant difference in the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score in terms of perceived knowledge and awareness as measured by Knowledge Awareness Scale (KAS)?
- ii. Is there a significant difference in the effects of two presentation modes in an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Design Strategies?
- iii. Is there a significant difference in the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Gender?
- iv. Is there a significant difference in the effects of two presentation modes in an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Gender?
- v. Is there a significant difference in the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Learning Styles?

- vi. Is there a significant difference in the effects of two presentation modes of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Learning Styles?

- vii. Is there a significant difference in the effects of learners' perceived motivation after the use of an Interactive Multimedia Learning Environment (IMLE) as measured by Instructional Materials Motivation Survey (IMMS)?

1.10 Research Hypotheses

The hypotheses that drive this research are listed below. This research deploys null hypotheses which have been tested at the end of the research and the level of significance used in this research is set at 0.05.

H₀₁ There is no significant difference in the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score in terms of perceived knowledge and awareness as measured by Knowledge Awareness Scale (KAS).

H₀₂ There is no significant difference in the effects of two presentation modes in an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Design Strategies.

H₀₃ There is no significant difference in the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Gender.

H₀₄ There is no significant difference in the effects of two presentation modes in an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Gender.

H₀₅ There is no significant difference in the effects of an Interactive Multimedia Learning Environment (IMLE) on students' achievement

score as measured by Knowledge Awareness Scale (KAS) in terms of Learning Styles.

H₀₆ There is no significant difference in the effects of two presentation modes in an Interactive Multimedia Learning Environment (IMLE) on students' achievement score as measured by Knowledge Awareness Scale (KAS) in terms of Learning Styles.

H₀₇ There is no significant difference in the effects on learners' perceived motivation after the use of an Interactive Multimedia Learning Environment (IMLE) as measured by Instructional Materials Motivation Survey (IMMS).

1.11 Significance of the Study

The significance of this research is as follow;

- i. The presentation mode developed will help special education pre service teacher students to identify autism behavioral symptoms so that they will be aware and recognize these symptoms during their teaching in class.
- ii. The proposed model of an Interactive Multimedia Learning Environment (IMLE) will help to assist instructional designers and multimedia programmers in designing and developing multimedia learning environments.
- iii. The presentation mode developed will contribute to the field of autism in general especially to the medical doctors in helping them to disseminate the information to society particularly in identifying autism behavioral symptoms.
- iv. The findings of this research will help the Ministry of Health to create more awareness programmed so as to be able to recognize autistic behavioral symptoms to the society in the future.
- v. Most importantly, the findings of this research will help society to change their mindset which autism is treatable and that early intervention is crucial in helping autistic children to get fair treatment from their family.

1.12 Limitations of the Study

Limitations of this research include:

- i. The study is limited to the special education pre-service teacher students from local public universities in Penang and Perak only.
- ii. This study measures the effects of an Interactive Multimedia Learning Environment (IMLE) in increasing knowledge and awareness of target respondents especially after the treatment.
- iii. This study measures the effects from the Knowledge Awareness Scale (KAS) instrument in increasing learners' knowledge and awareness before and after the treatment.
- iv. This study measures only the effects of independent variables without adapting control group since it has no benchmark.
- v. This study measures the perceived motivational levels which assess the learners' experiences after using both presentation modes of an Interactive Multimedia Learning Environment (IMLE).

1.13 Theoretical Framework

The formulation of this theoretical framework as shown in Figure 1.2 based on the learning theories, multimedia principles and baseline tests results with purpose to identify the autistic behavioral symptoms. Based on these feedbacks, most of the respondents do not have proper knowledge in identifying autism behavioral symptoms. In order to investigate the causes of this problem, this study adapted appropriate multimedia principles and learning theories as shown in Figure 1.2.

These theories are Constructivist Learning Environment (CLEs) Jonassen (2004), Condition of Learning Theory by Gagnè (1965), Learning Styles Theory by Kolb's (1984), Cognitive Theory of Multimedia Learning by Mayer (2003) and ARCS Motivational Theory by Keller (2006).

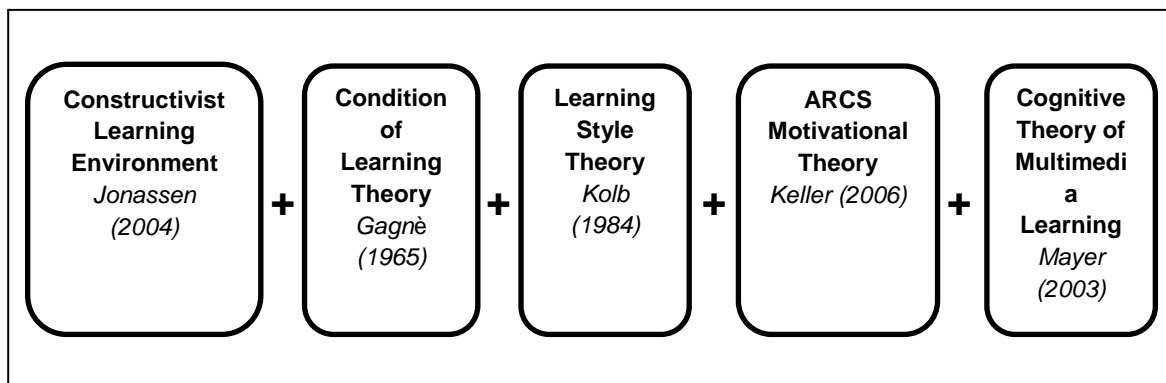


Figure 1.2 Graphical Representation of the Theoretical Framework

The process of transferring and disseminating information needs structured instructional system. The instructional design will be based on the constructivist approach that is using learning to solve problems by Jonassen (2004). This theory states that knowledge can be transmitted by technology and acquired by learners.

He added that from the constructivist conceptions of learning; assuming that knowledge is individually constructed and socially co-constructed by learners based on their interpretations of experience in the world by using different kinds of instruction or methods in learning.

From the developmental point of view, the presentation modes in this study will be designed using the constructive method where learners will be learning the autism behavioral symptoms through an interactive and informative presentation.

Under the Condition of Learning Theory by Gagnè (1965), he argued that one of the failures in the learning process is the lack of gap in the learner's knowledge of the sub-components of the tasks, i.e. the pre-requisite skills.

Thus, he assumed that a cumulative organization of learning events based on pre-requisite relationships is among the learned behaviors that need to be investigated. In other words, instruction should be provided with a set of component tasks. These tasks should be sequenced accordingly in order to ensure that the learners will achieve optimal mastery of each component especially the final task. The significance of these classifications is that each different type requires different types of instruction. He identified five major categories of learning: Verbal Information, Intellectual Skills, Cognitive Strategies, Motor Skills and Attitudes.

Learners' learning styles is really important in determining their rate of success in following the instructions. According to Pashler (2009), learning styles are various approaches or ways of learning. They involve educating methods particular to an individual that presumably will let the individual learn at his or her best. Most people prefer identifiable methods of interacting with, taking in, and processing stimuli or information.

The theory of Learning Styles is always associated to Kolb's (1984) where he proposed a model based on Experiential Learning Theory (ELT). The ELT outlines four related approaches toward grasping experience: Concrete Experience and Abstract Conceptualization, as well as two related approaches toward transforming experience: Reflective Observation and Active Experimentation.

The process of acquiring new knowledge involves human cognitive strategies in learning new materials. As proposed by Mayer in Cognitive Theory of Multimedia Learning (2003), multimedia learning is based on three main assumptions: there are two separate channels (auditory and visual) for processing information; there is limited channel capacity; and that learning is an active process of filtering, selecting, organizing, and integrating information.

Mayer argued that humans can only process a small amount of information in a channel at a time, and they make sense of incoming information by actively creating mental representations. Mayer's Cognitive Theory of Multimedia Learning reveals that the brain does not interpret a multimedia presentation of words, pictures, and auditory information in a mutually exclusive fashion; rather, these elements are selected and organized dynamically to produce logical mental constructs.

ARCS Motivational Theory by Keller (2006) reveals that there are four steps in promoting and sustaining motivation in the learning process. They are Attention, Relevance, Confidence and Satisfaction which make the short form of ARCS. Motivational design refers to the process of arranging resources and procedures to bring about the changes in motivation. Motivational design can be applied to improve a learner's motivation particularly in learning new knowledge.

1.14 Research Framework

This research framework as shown in Figure 1.3 is based on the theoretical framework, instructional design model, treatment condition such as independent variable, moderator variable and the learning outcomes/depending variables.

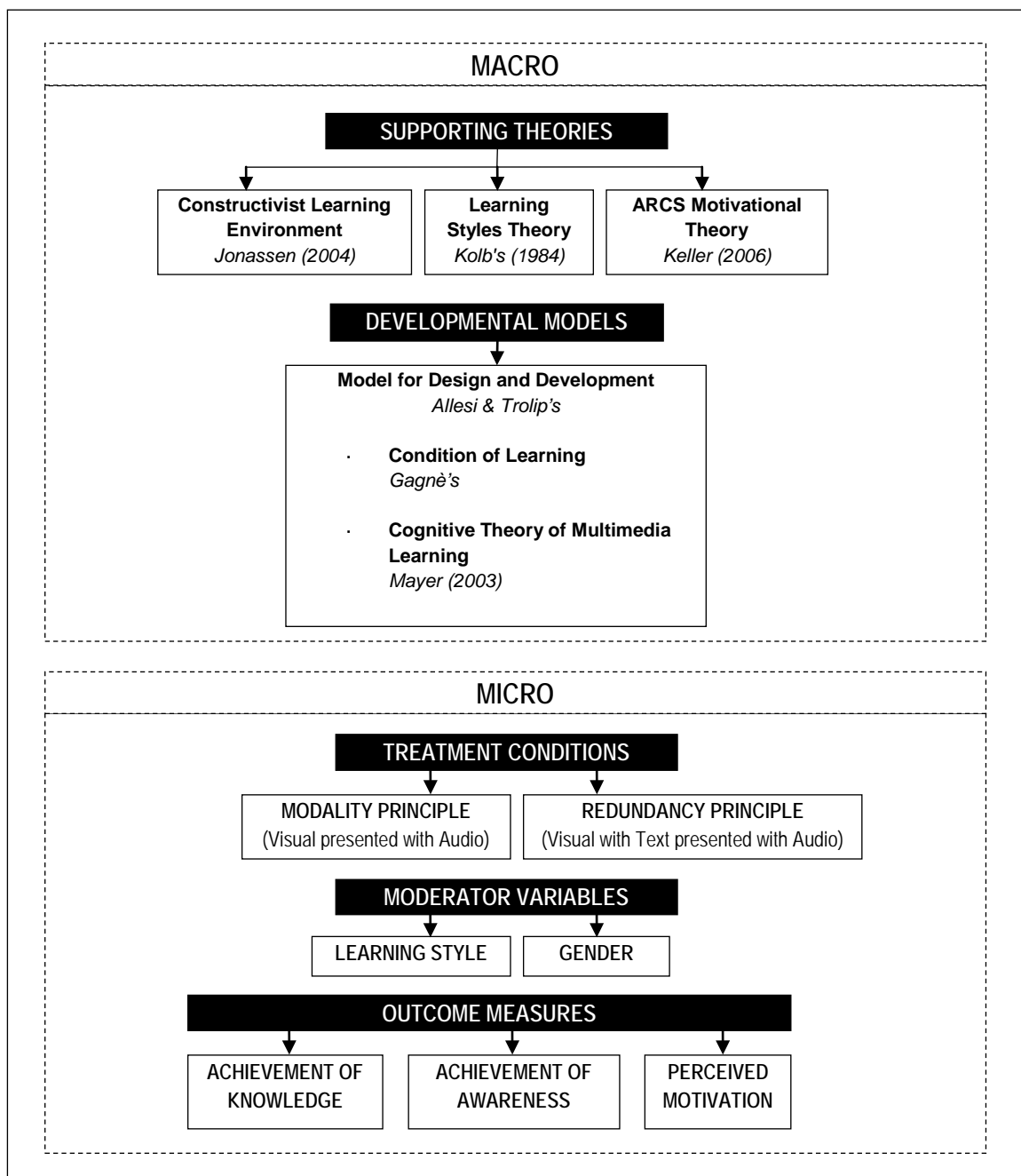


Figure 1.3 Graphical Representation of the Research Framework