APPLICATION OF TEACH-TALK-TOOL MODULE MANDARIN VERSION ON TEACHERS' LANGUAGE INTERACTIVE STRATEGIES AND THE LANGUAGE OUTPUTS OF STUDENTS WITH ASD

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by

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LIST OF ABBREVIATIONS

ASD	Autism spectrum disorder
TTT	TEACH-TALK TOOL
DSM-V fifth version	Diagnostic and Statistical Manual of Mental Disorders, the
DAC-LS (CV)	Development Assessment Chart - Language Section (Chinese version)
MLU	Mean Length of Utterances
M3L	Mean of the Three Longest Utterances
Strategy “a”	Strategy ask questions
Strategy “e”	Strategy expand utterances
Strategy “i”	Strategy imitate child’s response
Strategy “o”	Strategy order child to follow teacher’s verbal response
Strategy “u”	Strategy use positive feedbacks
Strategy “m”	Strategy modelling and descriptive talking
Strategy “d”	Strategy demanding desired consequences
Strategy “w”	Strategy waiting for a response
n_u	Total utterances elicited’
Teacher 1 / T1	Teacher Kim
Teacher 2 / T2	Teacher Cindy
Tan-1	Tan-Teacher Kim
Ivan-1	Ivan- Teacher Kim
Chong-1	Chong-Teacher Kim
Tan-2	Tan-Teacher Cindy
Ivan-2	Ivan-Teacher Cindy
Chong-2	Chong-Teacher Cindy
Lim-1	Lim-Teacher Kim
Yeen-1	Yeen-Teacher Kim
Lim-2	Lim-Teacher Cindy
Yeen-2	Yeen-Teacher Cindy

PENGAPLIKASIAN MODUL TEACH-TALK-TOOL VERSI BAHASA CINA BAGI STRATEGI INTERAKSI BAHASA GURU DAN PENGHASILAN BAHASA KANAK-KANAK ASD

ABSTRAK

Kajian ini bertujuan meninjau keberkesanan latihan dalaman perkhidmatan dengan menggunakan modul TEACH-TALK-TOOL (TTT) atas strategi interaksi bahasa guru dan penghasilan bahasa murid Autism Spectrum Disorders (ASD). Kajian ini melibatkan dua orang guru dan lima orang murid ASD di pusat intervensi awal kanak-kanak khas di Butterworth, Penang. Kajian ini mengaplikasikan reka bentuk kajian kes untuk menyelidik perubahan strategi interaksi bahasa guru dan penghasilan bahasa murid sebelum dan selepas pelaksanaan latihan guru TTT. Sumber data yang dianalisis termasuk rakaman video interaksi guru-murid, penilaian formal penghasilan bahasa murid, dan data temubual guru. Hasil dapatan kajian menunjukkan bahawa penggunaan strategi interaksi bahasa "aeiou" oleh kedua-dua orang guru adalah meningkat selepas mereka menjalani latihan TTT guru. Selain itu, kebanyakan murid ASD juga menunjukkan tanda-tanda peningkatan dalam penghasilan bahasa mereka selepas latihan guru tersebut. Hasil kajian memberikan bukti empirikal bahawa latihan guru dalam perkhidmatan dengan menggunakan TEACH-TALK-TOOL (TTT) modul pengajaran adalah berkesan untuk meningkatkan penggunaan strategi interaksi bahasa guru dan penghasilan bahasa murid ASD. Hasil dapatan kajian juga menyumbang kepada cadangan untuk memperbaiki kandungan modul pembelajaran TTT dan juga kaedah pelaksanaan latihan TTT guru.

APPLICATION OF TEACH-TALK-TOOL MODULE MANDARIN VERSION ON TEACHERS' LANGUAGE INTERACTIVE STRATEGIES AND THE LANGUAGE OUTPUTS OF STUDENTS WITH ASD

ABSTRACT

This study was conducted to explore the effects of an in-service teacher training using the TEACH-TALK-TOOL (TTT) teacher teaching module on the language interactive strategies used by the teachers and the language production of students with Autism Spectrum Disorders (ASD). This study involved two teachers and five students with ASD in an early intervention center in Butterworth, Penang. The study applied case study design to investigate the changes of the teachers' language interactive strategies and students' language outputs before and after the implementation of TTT teacher training. The data sources included video-records of teacher-student interactions, formal assessments of the students' language outputs, and teachers' interviews. The findings showed that the "aeiou" language interactive strategies targeted in the TTT teacher training were increasingly used by both teachers after the in-service training and the majority of students showed signs of improvement in their language outputs after the TTT teacher training. The findings provided empirical evidence to support that an in-service teacher training by using the TEACH-TALK-TOOL (TTT) teacher training module was effective to improve the language interactive strategies used by the teachers and the language production of students with ASD. The findings also contributed recommendations to improve the content and the implementation of TTT teacher training.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Past studies showed that in-service training for teachers contribute to positive gain in teachers' competency. In particular, good outcomes can be generated from in-service training and induction programs which specifically cater to the particular needs of teaching and learning (Wong, 2004). To date, one main concern is that local in-service training for special education teachers to understand and teach children with autism spectrum disorder is lacking. This has caused the special education teachers to have low confidence in their competency to teach students with autism spectrum disorders (Hasnah Toran, Hanafi Yasin, Mokhtar & Norani Salleh, 2010). Therefore, special education teachers need to be provided with access to in-service training in Autism Spectrum Disorder (ASD) because the field of autism education is developing and various evidenced-based strategies are now available (Hasnah Toran et al., 2010).

1.2 Background of the Study

Autism was first reported by Kanner (1943), and then the following year by Asperger (1944). Both of them chose the word 'autistic' to represent the characteristic or behavior shown by children with autism (Frith, 1989). Today, the most recent term used to refer to this category of disorder is "Autism Spectrum Disorder" (ASD). This term is currently used in the Diagnostic and Statistical Manual of Mental Disorders, the fifth version (DSM-5) published by American Psychiatric Association. (2013).

The inclusion of “spectrum” in the term is the explicit recognition of the diverse nature of autism which covers differences in the severity of the autistic condition, developmental level, and chronological age (American Psychiatric Association, 2013). The notion of spectrum is used to cover Pervasive Developmental Disorders (PDD) which were previously differentially classified in DSM-5, namely “Autistic Disorder," “Asperger's Disorder," “Pervasive Developmental Disorder Not Otherwise Specified," and “Childhood Disintegrative Disorder". Following that, “Autism Spectrum Disorder" (ASD) is now an umbrella term used to refer to all varieties of Pervasive Developmental Disorder (PDD) as listed above.

DSM-5 characterizes ASD according to two behavioral domains, namely deficits in social communicative domain (i.e., delay or disorder in social communication) and behavioral domain (i.e., unusually repetitive and restricted behavior and interest) (American Psychiatric Association, 2013). In additional to these deficits, many children with ASD also have speech and language impairments. In general, children with ASD often seem to exist in his/her own world. Their lack of communication and interaction with others might be due to their difficulties in communicating nonverbally, developing language skills, and understanding what others say to them (National Institute on Deafness and Other Communication Disorder, 2012). However, not every child with ASD has language problems. Some of them may have rich vocabularies and are able to talk about specific topics (National Institute on Deafness and Other Communication Disorder, 2012). The speech and language capacities of children with ASD varied, in line with the diversity in their cognitive and behavioral manifestations (American Psychiatric Association, 2013).

Below are some language use behaviors common in children with ASD (National Institute on Deafness and Other Communication Disorder, 2012):

1.2.1 Repetitive or Rigid Language

Generally, many children with ASD will verbally say things with no meaning. For example, a child may cite A to Z repeatedly. Immediate echolalia occurs when the child repeats words that someone has just said such as respond to a question by asking the same question. While in the delayed echolalia, the child may repeat words heard at an earlier time such as by saying “Do you want to play?” when he or she wants to play. Some of the children with ASD even like to use inappropriate voice tone, such as speak in high-pitched or use robot-like speech. Some of them also like to repeat the phrases they hear from television programs or commercials.

1.2.2 Narrow Interests and Exceptional Abilities

Some children with ASD may like to converse about his/her own interest topic only. However, many of them are unable to carry out meaningful two-way conversations about the topics. Even though about 10 percent of children with ASD show “savant” skills in particular areas, such as music and mathematics; not many of them could effectively communicate about these skills to others.

1.2.3 Uneven Language Development

Many children with ASD experience delay or atypical speech and language development. For example, they may acquire words such as “tractor” or “space shuttle” very fast if they were particularly interested in vehicles. However, they may not be able to use other common words. At the same time, many of them have excellent memories for information through hearing or seeing, but they may not comprehend what they have heard or read. That is why some of them are mistakenly thought to have hearing problems prior to being formally diagnosed with ASD.

1.2.4 Poor nonverbal conversation skills

Children with ASD often have difficulties in using gestures, such as pointing to an object for reference. They often avoid eye contact and inattentive which can make them seems rude. Many children with ASD become frustrated in their attempts to express their feelings and needs due to their inability to use the correct gestures or words to communicate. Because of this, they may act out their frustration through inappropriate behaviors.

1.3 Problem Statement

Globally, there is an increased prevalence of ASD. The Centers for Disease Control and Prevention (2014) in the United States estimates that 1 in 68 children in the United States are identifiable with ASD. This estimation is 30 percent higher than the previous report of 1 in 88 children in year 2012. Available data also show that two-thirds of ASD cases in the mainstream school population are undiagnosed and untreated (cited in Kim et al., 2011). The prevalence of ASD in schools could be as high as 1 in 50 as reported by the parents in the United States (Blumberg et al, 2013).

The issue of autism in Malaysia is gaining more public attention in recent years. Based on a research held in Perak, it was found that 1 in 625 children are identifiable with ASD (Hariati Azizan, 2008). However, this estimation might not represent the actual prevalence of children diagnosed with ASD in Malaysia due to factors related to reduced sample size and public awareness. For the diagnosis of students with ASD in Malaysia, the medical and educational authorities still face issues related to the lack of language and cultural appropriate assessment tools, and reduced awareness amongst

teachers and parents to refer cases for diagnosis purposes (Jasni, Yahaya, Chong, & Mohamed, 2012).

In recent years, National Autism Society of Malaysia (NASOM) reported a 30% increase in the number of individuals with ASD seeking its services across all age groups (Hariati Azizan, 2008). Consequently, there is a need to provide better remediation and educational placement for these individuals, especially those young children who are newly being diagnosed with ASD (Kim et al., 2011). Early remediation is important for children with ASD because it provides a support system for the child and the family; and to enable the child to eventually become a function member of society (Dawson, Rogers, Munson, & Smith, 2010; Rogers, 1996). Paul (2008) also added that, early intervention plays the vital role to increase children with ASD's communication skills.

To achieve this, teachers need to be more well-trained to teach children with ASD in schools (Hasnah Toran et al., 2010), including in the aspects of speech, language and communication. However, not all teacher training courses include ASD training in the pre-service training program (Carroll, Forlin, & Jobling, 2003). Besides that, the issue of teacher attrition in special education has led to many job left vacant which later filled by teachers who are not certified in special education (Vittek, 2015). This phenomenon is especially common in the early childhood intervention or preschool programs. Therefore, in-service training in the early childhood intervention or preschool programs acts to bridge the gaps in teachers' knowledge related to teaching students with ASD and enable them to educate and interact with students with ASD more effectively in these programs.

In Malaysia, in-service teacher training for special education teachers to understand and teach children with autism is lacking. This has caused the special

education teachers to have low confidence in their competency to teach students with ASD (Hasnah Toran et al., 2010). Currently, there is no official statements showed the lack of in-service teacher training in NGO-based early intervention center locally. However, from the researcher's past experience as a teacher in a NGO-based early intervention center, many teachers are not trained in special education and they rarely receive training due to the financial issue. As pointed out by Kadzamira and Kunje (2002) from Malawi, the majority of NGOs are unregulated due to the lack of financial and managerial capabilities.

Currently, there are only a few programs available in Malaysia which provide training services for parents, caregivers and teachers to help young children to communicate effectively, such as More Than Words (Sussman, 2012) and Floortime Workshops (2015). However, these programs use English as the medium of instruction and the training for these programs in the local settings is usually very costly. Many teachers and parents would have difficulties to access to these trainings. Due to this issue, this research sought to identify the efficacy of introducing a locally designed TEACH-TALK-TOOL (TTT) training module (Low, Lee & Aznan, 2015) to special education teachers in the context of early intervention centre. The training module was adapted into Mandarin, the first language of the teachers in the center. A central part of the training was for the teachers to practice language interactive strategies to enhance the language outputs of students with ASD. It is hoped that this investigation can contribute to the production of a useful and friendly-user teacher training module to the local community in the near future.

1.4 Purpose of the Study

Today, in-service teacher training on ASD is still lacking in Malaysia. Therefore, it is believed that a content-specific in-service teacher training program, such as the TTT teacher training program developed by Low, Lee and Aznan (2015) would bring good outcome to the target learners. In this study, the researcher aims to investigate the effect of using the Mandarin version of TTT training module (Low, Lee, Aznan & Tan, 2015) on the teacher-student interaction patterns and its ultimate effect on the language outputs of a sample of students with ASD.

1.5 Objectives of the Study

1.5.1 To identify the changes of teachers' language interactive strategies before and after the TTT training.

1.5.2 To identify the changes in language outputs of students with ASD before and after TTT training.

1.5.3 To investigate the relationship between the teachers' language interactive strategies and the language outputs of students with ASD.

1.6 Research Questions

The following research questions are formulated to meet the research objectives:

1.6.1 What are the changes of teachers' language interactive strategies before and after the TTT training?

1.6.2 What are the changes in language outputs of students with ASD before and after TTT training?

1.6.3 What are the relationship between the teachers' language interactive strategies and the language outputs of students with ASD?

1.7 Significance of the Study

The findings from this study has been contributed to understand the efficacy of implementing the TTT training based on the Chinese adapted module. The findings has been provided insights whether the teachers can use better interactive skills when they teach students with ASD, and whether the students would benefit from teachers' improved skills by showing improvement in their language outputs after the TTT training.

Specifically, the findings from this research has been provided insights to evaluate the relevance of the theory of Knowledgeable Teacher Hypothesis (KTH), which emphasis on the pedagogical content knowledge proposed by Shulman (1986) in the context of teaching language and communication skills to students with ASD. The pedagogical content knowledge in this study refers to the "aeiou" language interactive strategies implemented in TTT teacher training. In this study, the relevance of the theory of Knowledgeable Teacher Hypothesis (KTH) would be assessed within

the framework of Zone of Proximal Development as outlined in the social learning theory proposed by Vygotsky (1997).

During the TTT teacher training in this study, the teachers would learn and carry out the "aeiou" strategies through video-feedback and group discussion sessions. For the video feedback, they will record their interaction with the students, which will then be reviewed by another teacher for feedback. This study would assess whether the teachers could learn more effectively via this model of in-service teacher training by investigating the changes in their language interactive strategies before and after the TTT teacher training.

Following this, this study would also assess the changes in students' language outputs in responding to the changes in teachers' use of language interactive strategies. The findings will contribute to answer whether the TTT teacher training is effective in promoting improved language outputs in children with ASD alongside with the improvement seen in the teachers' use of language interactive strategies. Together, the findings of this study offer evidence to portray the effects of TTT teacher training in improving teachers' use of language interactive strategies and students' language outputs in the context of language and communication intervention for children with ASD in early intervention center; and offer recommendations to improve future practices.

1.8 Limitation of the Study

In this study, the relationship between the teachers' interactive strategies and the language outputs of students with ASD before and after the TTT training was investigated via a case study design. The case study focused on selected teachers and students in an NGO-based early intervention center. This qualitative case study involves five (5) students with ASD and two (2) teachers. The interpretation of the research data needs to be made cautiously based on the scope of data collection and the target sample.

First of all, three months of data collection was planned. The available time frame might limit the insights on the language gains experienced by the children in the case studies. In addition, the language outputs of the children might also be influenced by factors other than the teachers' interactive strategies. To control for these limitations, the design of multiple case studies was used to provide a richer insight on the language outputs of a group of children with almost similar ASD characteristics, rather than a single case study. Besides that, multiple data collection tools, namely a formal assessment tool, namely adapted Development Assessment Chart - Language Section (Chinese version) (in short form written as adapted DAC-LS(CV)) and an informal observation form (includes behavioral coding) were used for the triangulation of research findings.

Secondly, there is no medical evidence to prove that the target sample of the five (5) students with ASD is suffering from ASD. The diagnoses were only conveyed orally to the parents by local occupational therapists, speech therapists, and supported by the observation of the center's principal. Due to this limitation, Childhood Autism Rating Scale, Second Edition (Schopler, Van Bourgondien, Wellman & Love, 2010)

(in short form written as CARS2 (2010)) was used for a formal assessment of their ASD condition and severity level.

1.9 Operational Definition

This study utilies certain terminologies which are defined in their respective contexts as follows:

1.9.1 Early Intervention Center

Early intervention refers to a wide array of activities or programes designed to enhance young children development (Ramey & Ramey, 1998). One of the main functions of an early intervention center is to prevent mental retardation and poor intellectual development in children whose their families could not provide enough stimulation in the early years of life (Ramey & Ramey, 1998). In the current context, it refers to a NGO-based early intervention center for special needs children (including children with ASD) located in Butterworth, Penang.

1.9.2 Teacher

A 'teacher' is defined by the Oxford Advanced Learner's Dictionary of Current English (Turnbull et al., 2010) as "a person whose job is teaching, especially in a school". Within the context of this study, "teacher" refer to the individual who teaches students with learning difficulties (including students with ASD) in the NGO-based early intervention center for special needs children (located in Butterworth, Penang).

1.9.3 In-service Teacher Training

The Oxford Advanced Learner's Dictionary of Current English (Turnbull et. al., 2010) defines 'in-service' (of training, courses of study, etc.) as "while somebody is working in a job, in order to learn new skills"; while 'training' refers to "the process of learning

the skills that you need to do a job". In this study, in-service teacher training refers to the content-specific in-service teacher training using the Mandarin version of TEACH-TALK-TOOL module (Low, Lee, Aznan, Tan, 2015), which was participated by the teachers from the NGO-based early intervention center for special needs children (located in Butterworth, Penang).

1.9.4 TEACH-TALK-TOOL (TTT)

TEACH-TALK-TOOL (TTT) is an introduction module for teachers and parents to learn about ways to enhance language and communication skills of children with ASD (Low, Lee & Aznan, 2015). In this study, the Mandarin version TEACH-TALK TOOL module (Low, Lee, Aznan, Tan, 2015) was used as the medium to train the Mandarin-speaking teachers in this study to use language interactive strategies to enhance the language outputs of students with ASD.

1.9.5 Language Interactive Strategies

Interactive is defined as "that involves people working together and having an influence on each other" and strategy refers to "a plan that is intended to achieve a particular purpose" (Turnbull et. al, 2010). In the current context, language interactive strategies refer to a set of strategies called the "aeiou" language interactive strategies, namely "a" (Ask questions), "e" (Expand utterances), "i" (Imitate child's response), "o" (Order child to follow teacher's verbal response), "u" (Use positive feedbacks). These five strategies were incorporated in the TTT training module developed by Low, Lee and Aznan (2015). The detailed descriptions of the "aeiou" strategies would be outlined in Chapter Two.

1.9.6 Students with ASD

A ‘student’ is described by Dictionary (2015) as “a person who studies something”. ASD refers to autism spectrum disorder, a category of developmental disorders (including autism and Asperger's syndrome) marked by impairments in the ability to communicate and interact socially, and by the presence of repetitive behaviors or restricted interests (American Psychiatric Association, 2013). Therefore, students with ASD in the current context means students with autism spectrum disorder who are suffering communication problems secondary to ASD, who enrolled in the NGO-based early intervention center for special needs children (located in Butterworth, Penang).

1.9.7 Language Outputs

Language refers to “any means used to receive or send messages”, while the word ‘output’ means “the amount of something that a person, a machine or an organization produces” (Venn, 2006). The term ‘language outputs’ in this study refer to the utterances produced by the target sample (students with ASD). The utterances were analysed using the measures of M3L, MLU, word token and word type. Prior to the analyses, two types of utterance were differentiated: meaningful utterances and meaningless utterances (Axelrod, 1976). The meaningful utterances are meaningful sounds (Özçalışkan & Goldin-Meadow, 2005), words, phrases and sentences, which refer to specific referents or events. Examples of meaningful sounds are onomatopoeic sounds such moo, neigh and baa (animals sounds) (Özçalışkan & Goldin-Meadow, 2005). The meaningless utterance are echolalia (Howlin, 1982; Prizant & Duchan, 1981), singing following the sequence of lyric, and recitation (such as citing alphabets and numbers).

1.9.8 Mean Length of Utterances (MLU)

Mean length of utterances (MLU) is an assessment procedure for evaluating the ability of students with ASD to form words, phrases and sentences (Brown, 1973). In other words, MLU refers to the average number of morphemes (meaningful units) produced within a single utterance. For example, a student with ASD might say "I want" (two morphemes in one utterance), "tractor" (one morpheme in one utterance) and "horse" (one morpheme in one utterance) during an interaction session. This produces an MLU of 1.3 morphemes per utterance [(2+1+1) ÷ 3 = 1.3], where 4 is the total number of morphemes produced and 3 is the total number of utterances.

1.9.9 Mean of the Three Longest Utterances (M3L)

Besides MLU, other researchers used the measure of the mean of three longest utterances (M3L) to reflect the children's abilities in producing language. (e.g., Heilmann, Weismer, Evans, and Hollar, 2005; Thal, O'Hanlon, Clemmons, and Fralin, 1999). The calculation of M3L is the number of morphemes (meaningful units) in the three longest utterances divided by three. For example, the three longest utterance produced by a student with ASD in an interaction session are "I want car" (three morphemes in one utterance), "This is blue tractor" (four morpheme in one utterance) and "white horse" (two morpheme in one utterance) during a communicative exchange. This produces an M3L of 3 morphemes per utterance [(3+4+2) ÷ 3 = 3), where 9 is the total number of morphemes produced and 3 is the total number of utterances.

1.9.10 Word Type

Word type (also known as lexical type) are the number of different word varieties (word repetition was not considered) (Scarborough, 1990) produced by the students with ASD during the teacher-student interactions.

1.9.11 Word Token

Word token is the number of word occurrence (word repetition was considered) produced by the students during the teacher-student interactions (Richards, 1987).

1.10 Summary

This chapter provides some basic background information of the study. Many studies have shown that in-service teacher training is an important element to increase teacher's competency in teaching. Therefore, this study aimed to investigate the efficacy of implementing the Mandarin version of TTT training for the purpose of enhancing the teachers' language interactive strategies and ultimately the language outputs of students with ASD. Next, Chapter Two discussed some related researches which are relevant to this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the background and prevalence in ASD, speech and language communication problem in ASD, teachers' working experience, in-service teacher training, importance of teachers' language interactive strategies, past studies, theories of language development, theoretical framework, conceptual framework and closing with a summary.

2.2 Background and Prevalence in ASD

As reported in Chapter One in Section 1.1.1, the term of Autism Spectrum Disorder (ASD) in Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) covers a variety of autistic condition which covered pervasive developmental disorder (PDD), which were previously differentially classified in DSM-4, namely "autistic disorder," "Asperger's disorder," "pervasive developmental disorder not otherwise specified," and "childhood disintegrative disorder" (American Psychiatric Association, 2013). According to Frith and Happé (2005), ASD is among the most heritable developmental disorders. The siblings of those with ASD have 50 times higher risk of ASD than the general population. Further, the co-occurrence of ASD in identical twins is 60% to 90% compared to 0 to 5% in fraternal twins.

The Centers for Disease Control and Prevention (2014) in the United States estimates that 1 in 68 children in the United States are identifiable with ASD. This estimation is 30 percent higher than the previous report of 1 in 88 children in year 2012.

Available data also shows that two-thirds of ASD cases in the mainstream school population are undiagnosed and untreated (cited in Kim et al., 2011). Further, the data from parent reports suggested that the prevalence of ASD cases among the school-age children in the United States could be as high as 1 in 50 (Blumberg et al, 2013).

In identifying students with ASD in Malaysia, the medical and educational authorities still face issues related to the lack of language and cultural appropriate assessment tools, and the lack of awareness among the teachers and the parents to refer cases for formal diagnosis (Jasni, Yahaya, Chong, & Mohamed, 2012). Therefore, there is a critical needs for better detection, assessment, remedial services, and educational placement for the population of students with ASD in schools (Kim et al., 2011). An evidence-based teacher in-service training module, such as the TEACH-TALK-TOOL (TTT) training plays an important role in this process.

2.3 Speech and Language Communication Problem in ASD

ASD covers a set of developmental disabilities that can cause significant social, communication, and behavioral challenges. Some patterns of language use and behaviors are associated to children with ASD. For example, repetitive or rigid language, narrow interests and exceptional abilities, uneven language development, and poor nonverbal conversation skills (National Institute on Deafness and Other Communication Disorder, 2012). The speech, language and communication behaviour of young children with ASD described in turns below.

2.3.1 Speech and Language

Speech and language are interrelated. Speech is the physical process of making the sounds and sound combinations of a language (Roger & George, 2006). When children start to produce speech sounds, they would produce the sounds that reflect the language(s) in their environments (Low & Lee, 2011). They later use these speech sounds as the medium to convey messages (Pierangelo & Giuliani, 2002).

During the preschool years, children typically increase their vocabulary sizes to around 6000 words and they learn to speak in longer sentences (Sussman, 2012). As children grow cognitively, they learn to process, interpret and acquire the system of words used by the people in their environments which divided into two dimensions of language for communication, namely receptive language (i.e. language comprehension) and expressive language (i.e. language production) (Low & Lee, 2011). The signs of receptive language are when children start to respond to simple instructions such as 'no', 'sit down' and 'come'; the signs of expressive language are when children imitate the word used by adults in their surroundings to call for attention, request or comment (i.e. "I want" and "no") (Low & Lee, 2011).

However, many children with ASD are delayed in the acquisition of spoken language. They show vast variations in their language competencies, ranging from nonverbal to functionally verbal (Lord et al., 2000). In most circumstances, language delay is common among children with ASD. The language deficiencies of children with ASD are typically manifested as syntax (structural) and pragmatic (functional use) language problems (Geurts & Embrechts, 2008). Retrospective study showed that infants who were later diagnosed with ASD had lower scores in receptive and expressive language assessments during infancy (Lazenby, Sideridis, Huntington, Prante, Dale, Curtin, ... & Akshoomoff, 2016).

Other than language problems, some children with ASD also have speech problems. In particular, their speech production is characterised by abnormal rhythm, intonation and pitch, and they have difficulties in interpreting the emotional content and prosody of the speech that they hear (Kujala, Lepistö, Nieminen-von Wendt, Näätänen, & Näätänen, 2005). Further, a study done by Lord, Risi and Pickles (2004) found that approximately 14% to 20% of the studied children of ASD were still nonverbal at the age of 9 years. In addition, only 11% to 14% of the children with ASD had minimal speech using words but not three-word phrases. In general, children with ASD who displayed more atypical behaviors tended to have a lower nonverbal IQ, lower levels of expressive language, more severe social deficits, and more repetitive behaviors (Dominick, Davis, Lainhart, Tager-Flusberg, & Folstein, 2007).

To characterise the speech and language skills of children with ASD, the following classification was used in the Vineland Adaptive Behavior Scales-II (VABS-II) -- "(1) non-verbal: using fewer than three words and an expressive age equivalent corresponding to below 15 months; (2) minimally verbal: using at least three words but never or only sometimes or partially two-word phrases and an expressive age equivalent corresponding to below 24 months; and (3) phrase speech: using two-word phrases and an expressive age equivalent at or above 24 months" (Norrelgen et al., 2015).

2.3.2 Communication

Communication starts long before we learn to walk, especially in the first few months of life. Babies show the signs of communication by listening and looking to the people or things surrounds over them, and then they engaging in back-and-forth babbling games with the adults (The Hanen Centre, 2011). Once children acquired the abilities of speech, they become active verbal communicative partners. Other than verbal

communication, other modes of communication are body gestures, sign language, and the use of written (Owens, 2015).

Communication deficits are the defining characteristics in children with ASD. The deficits included: (1) lack of interest to communicate with others, (2) lack of intentionality in communication, and (3) lack of abilities to initiate, maintain and end a reciprocal interaction (Tomasello, 2010). These three major deficits in communication would hinder the abilities of children with ASD to progress in communication with others (Tomasello, 2010). However, it does not mean those children with communication delay cannot make significant improvement. Early intervention is one of the efforts to enhance their social and communication strengths (Sussman, 2012).

As a consequence, children with ASD with deficits in speech and language communication problems would require the adults' guidance to improve their speech and language communication skills. It is important to acknowledge that each individual child with ASD presents with his or her own unique set of abilities and challenges. Therefore, there is no "one-size-fits- all" solution when it comes to helping children with ASD (Autism Speaks, 2016). However, past research had provided evidence that in-service teacher training can be used to train adults to become better communicative partners which enable them to help children with ASD to acquire language and communication skills (Harjusola-Webb & Robbins, 2012; Meadan, Ostrosky, Zaghlawan, & Yu, 2012).

2.4 In-service Teacher Training

In-service teacher training (also known as in-service teacher profesional development) is a profesional training or teacher development effort, ranging from continuous, comprehensive career-long programs of teacher learning to occasional, ad hoc workshop (Leu & Ginsburg, 2011). Many in-service teacher trainings are organised on an ad-hoc basis and the training programs are often in using teacher's time (Robson, 1997). Examples of in-service teacher trainings included conferences, seminars, courses, certificate programs, bachelor's degree completion programs and graduate programs (Ozer, 2004). These efforts were typically implemented by the faculties of education to meet the continual training needs of in-service teachers (Ozer, 2004).

There are evidence that in-service teacher training bring positive outcomes to the teachers. For example, Robson (1997) found that the provision of in-service training for the mainstream primary teachers in Belize, United States had improved the educational opportunities for special need students in mainstream schools. On the other hand, Kretlow, Wood and Cooke (2011) found that the coaching approach in in-service teacher training contributed to increase the teachers' accurate use of research-based strategies in the classrooms. All teachers were found to have improved in their delivery of instruction after the in-service training.

This study focused on in-service teacher training which aims to improve teachers' language interactive skills and to measure its effects on the language outputs of children with ASD. As previously mentioned, there were very few studies that focused on in-service training for teachers in early intervention center and preschool context to enhance the language outputs of children with ASD. Most research focused on teacher training for behavioral intervention for students with ASD (Alexander, Ayres, & Smith, 2015).

Among the very few existing programs, “More than Words” (The Hanen Program) is relatively well-known (Sussman, 2012). This program provide evidence-based approach to help parents and teacher to facilitate the language development of young children with ASD (Sussman, 2012). However, participating in this program locally is rather costly. Hence, not many teachers and parents could afford it. Hence, a locally developed teacher training module known as TEACH-TALK-TOOL (TTT) was produced by Low, Lee and Aznan (2015) to enable teaching staff to help children with ASD to build better language skills with minimal training costs.

2.4.1 TEACH-TALK-TOOL Training

TEACH-TALK-TOOL (TTT) training is an in-service teacher training module which can be used as a medium to train teachers to learn language interactive strategies to scaffold the language development of children with ASD. This module was designed by Low, Lee and Aznan (2015) to help teachers to understand about ASD so that they could help the children to build better language and communication skills.

TTT is suitable for self-learning and in-house training in a small group (i.e., two to five in a group). At the moment, there is no published study on the effects of TTT teacher training yet. There is an ongoing research which focuses on the effectiveness of the Malay version of TTT on teachers’ skills, led by a doctoral candidate named Eni Eliza Ghazali (Low, Lee, Aznan & Eni, 2015). The preliminary findings from the mentioned research showed that TTT teacher training has benefited the novice teachers who are lacking in experience and knowledge about ASD.