

THE DEVELOPMENT AND VALIDATION OF
PROGRAM LATIHAN AUDITORI MELAYU (PLAM) FOR
INDIVIDUALS WITH POST-LINGUAL HEARING
IMPAIRMENT

BY

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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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ABSTRACT

Auditory Training (AT) is an intervention that emphasises on the listening skills development to improve the recognition and interpretation of speech sounds among people with hearing impairment. However, fewer than 10% of audiologists worldwide offer AT to patients with hearing loss due to limited assessment and rehabilitation tools (e.g., in Malay). This study aimed to develop a Malay AT program (*Program Latihan Auditori Melayu*; PLAM) for individuals with post-lingual hearing impairment, establish its validity and measure the effectiveness. This study adopted a quasi-experimental research design which involved four stages; 1. Scoping Review, 2. Development of PLAM, 3. PLAM Validation, 4. Measurement of the PLAM's effectiveness. Pubmed, Science Direct, Scopus and Pro Quest (medical and health) databases were searched using English keywords; *hearing loss, AT, hearing aids, cochlear implants, perceptual learning, aural rehabilitation, auditory rehabilitation, adult*. A total of 24 papers (from 2007-2017) were accepted and reviewed. The PLAM was carefully designed based on the Malay language and covered all AT parameters found from scoping review. Content validity was conducted on six experts. Picture validity, pre-testing and pilot study were conducted on 10 subjects with normal hearing. The effectiveness of PLAM was measured on 20 individuals with post-lingual hearing impairment (10 training subjects and 10 control subjects). The training subjects received a 45-minute PLAM training weekly by trainers for six weeks. Eight trainers underwent two-hour classes, and a 30-minute quiz prior to the training. Score for pre and post training was obtained using PLAM screening (PLAM-S), Malay Hearing Handicap Inventory for adult (HHIA-M) and Malay Auditory-Visual Matrix Sentence Test (MMST-AV) to measure the PLAM effectiveness. The scoping review results described AT programs to have an exceptional **design** but shared practically the same **parameters**. The development of PLAM included; 1. PLAM manual and 2. PLAM Training. Content validity yield the Item-Content Validity Index (I-CVI) value of 0.833 to 1 for each section, and the Scale-Content Validity Index/Average (S-CVI/Average) value of 0.997. Picture validity showed 99.19% responses agreed that the picture used are guessable and translucent. Pre-testing score showed 100% subjects agreed PLAM instructions is suitable, understandable and the training is feasible. From the pilot study, the normal subjects obtained >80% score for all sections in PLAM module with a minimum score of 88.7%. The training group showed significant improvement of post-training score for MMST-AV ($p=0.007$), PLAM-S: ($p=0.005$) and HHIA-M ($p<0.005$) as compared to the pre-training score. A significant greater normalised gain was observed in training group as compared to control group for HHIA-M ($p=0.049$) and PLAM-S ($p<0.001$), but no gain difference was observed between training and control group for MMST-AV ($p=0.821$). 100% of the trainers perceived PLAM module is sufficient and performances of PLAM documents are good. 97.5% of trainers' responses agreed that their knowledge regarding AT has improved. The power of study was 99.73%. In conclusion, the PLAM has been comprehensively developed, has achieved good content validity and picture validity, and good pre-testing results, and was proven effective in improving the subjects' speech-perception and hearing handicap-perception.

ملخص البحث

التدريب السمعي (AT) هو أسلوب تدخل يركز على تطوير مهارات الاستماع لتحسين التعرف على أصوات الكلام وتفسيرها بين الأشخاص الذين يعانون من ضعف السمع. لكن أقل من 10٪ من أخصائيي السمع حول العالم يقدمون التدريب السمعي للمرضى الذين يعانون من فقدان السمع؛ بسبب محدودية أدوات التقييم وإعادة التأهيل (كما هو الحال مع اللغة الملايوية). هدفت هذه الدراسة إلى تطوير برنامج تدريب سمعي باللغة الملايوية وهو برنامج PLAM للأفراد الذين يعانون من ضعف السمع من متعلمي اللغة مسبقاً، وإثبات صلاحيته وقياس فعاليته. اعتمدت هذه الدراسة تصميم بحث نصف تجريبي شمل أربع مراحل: المراجعة النطاقية، وتطوير برنامج التدريب السمعي الماليزي، ثم التحقق من صحته، وقياس فعاليته. تم البحث في قواعد البيانات التالية: PubMed و Science Direct و Scopus و Pro Quest (الطب والصحة) باستخدام كلمات رئيسية باللغة الإنجليزية: فقدان السمع، التدريب السمعي، سماعات الأذن، زراعة القوقعة، التعلم الإدراكي، التأهيل السمعي، التأهيل السمعي للبالغين. تم اختيار 24 ورقة (من 2007 إلى 2017). تم تصميم الـ PLAM بعناية إلى اللغة الملايوية وشمل جميع معايير التدريب السمعي التي تم العثور عليها من خلال المراجعة النطاقية وتم مراجعة المحتوى من قبل ستة خبراء. تم إجراء صلاحية الصور والاختبار التمهيدي والدراسة التجريبية على 10 أشخاص يتمتعون بسمع طبيعي. تم قياس فعالية الـ PLAM على 20 فرداً يعانون من إعاقة سمعية من متعلمي اللغة مسبقاً (10 أشخاص لمجموعة التدريب و10 أشخاص كمجموعة ضابطة). تلقى المشاركون تدريباً لمدة 45 دقيقة على برنامج PLAM أسبوعياً من قبل المدربين لمدة ستة أسابيع. خضع ثمانية من المدربين لدروس لمدة ساعتين واختبار لمدة 30 دقيقة قبل التدريب. تم الحصول على نقاط التدريب قبل وبعد التدريب باستخدام فحص الـ PLAM وقائمة إعاقة السمع باللغة الماليزية للبالغين (HHIA-M) واختبار جملة المصفوفة السمعية والبصرية الماليزية (MMST-AV) لقياس فعالية الـ PLAM. وصفت نتائج المراجعة النطاقية أن برامج التدريب السمعي لها تصميم استثنائي ولكنها تشارك عملياً في نفس المعايير وهي: عمل دليل إرشادي للـ PLAM والتدريب عليه. كان مؤشر صحة محتوى العنصر (I-CVI) من 0.833 إلى 1 لكل قسم، وقيمة مؤشر صحة المحتوى/المتوسط (S-CVI/Average) بلغت 0.997. أظهرت صحة الصور أن 99.19٪ من الاستجابات اتفقت على أن الصور المستخدمة قابلة للتخمين وأنها واضحة. أظهرت درجة الاختبار التمهيدي أن 100٪ من المشاركين اتفقوا على أن تعليمات الـ PLAM مناسبة ومفهومة وأن التدريب عملي. من خلال الدراسة التجريبية، حصل الأشخاص العاديون على نسبة أكبر من 80٪ لجميع الأقسام في وحدة الـ PLAM مع حصول الحد الأدنى على نسبة 88.7٪. أظهرت مجموعة التدريب تحسناً كبيراً بعد التدريب (p=0.007=MMST-AV و p=0.005=PLAM-S و p=0.005>HHIA-M) مقارنة بما قبل التدريب. لوحظت زيادة معنوية أكبر في المجموعة المختبرة مقارنة بالمجموعة الضابطة لمؤشر HHIA-M (p=0.049) وفي (p=0.001>PLAM-S)، الفارق بين مجموعتي التدريب والضابطة لاختبار جملة المصفوفة السمعية والبصرية الماليزية (p=0.821). أكد 100٪ من المدربين أن وحدة الـ PLAM كافية وأداء مستندات جيد. وافق 97.5٪ من المدربين على أن معرفتهم بالتدريب السمعي قد تحسنت. كانت قوة الدراسة 99.73٪. ختاماً، تم تطوير الـ PLAM بشكل شامل، وحقق صلاحية جيدة للمحتوى والصور، وأظهرت نتائج الاختبار المبدئي أنها جيدة، وتم إثبات فعاليته في تحسين إدراك الكلام لدى المشاركين وفهم الإعاقة السمعية.

APPROVAL PAGE

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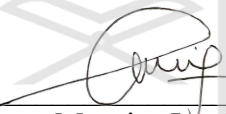
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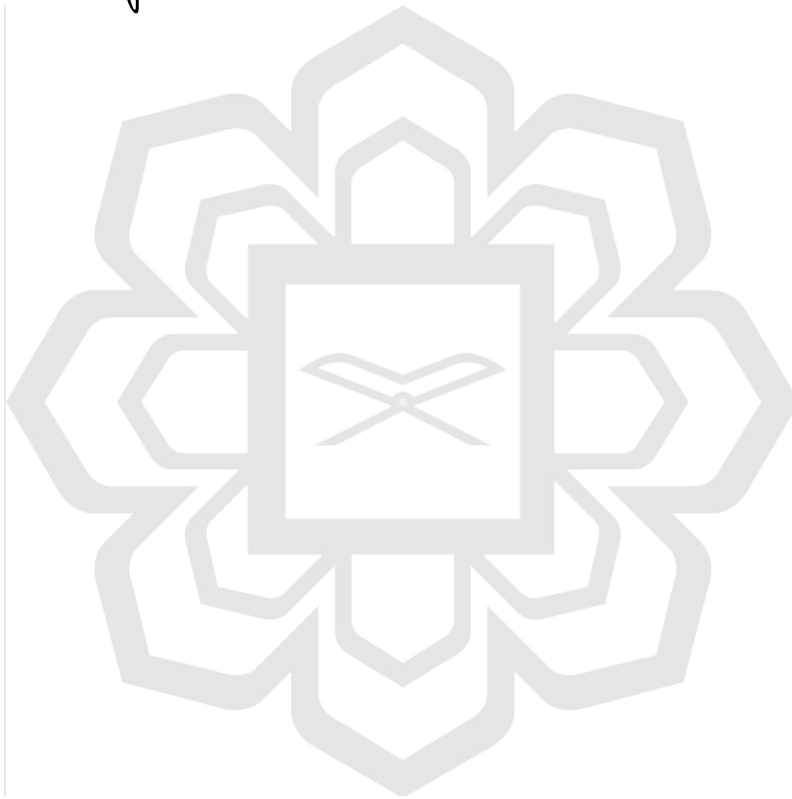
DECLARATION

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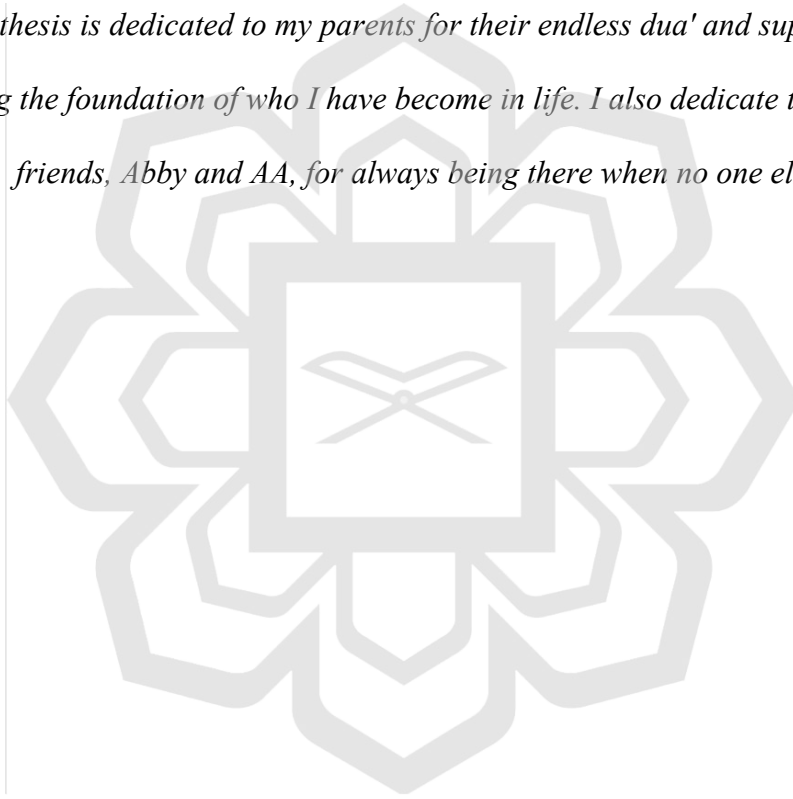
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

This thesis is dedicated to my parents for their endless dua' and support, and for laying the foundation of who I have become in life. I also dedicate this to my best friends, Abby and AA, for always being there when no one else was.



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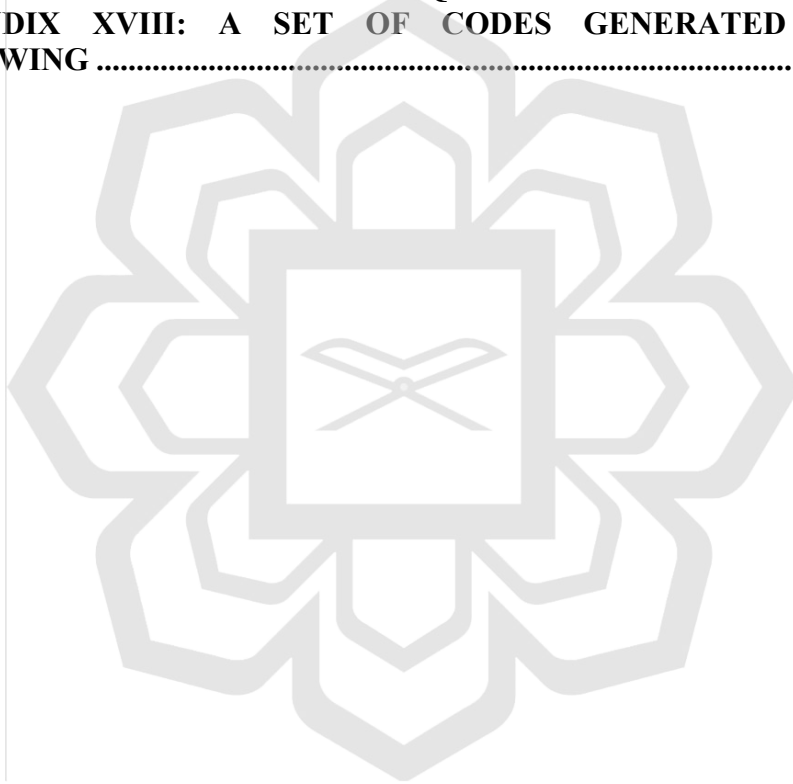
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LIST OF ABBREVIATIONS

3fPTA	Three-Frequency Pure-Tone Average
APHAP	Abbreviated Profile of Hearing Aid Performance
AT	Auditory Training
dB	Decibel
C	Consonant
CAST	Computer-Assisted Speech Training
CBAT	Computerised-based AT
CI	Cochlear Implant
cLEAR	Customised Learning: Exercises for Aural Rehabilitation
CNC	Nucleus-consonant monosyllabic words
CUNY	City University of New York
DASLP	Department of Audiology and Speech-language Pathology
F2F	Face to face
FEST	The Familiar Environmental Sound Test
fMRI	Functional magnetic resonance imaging
FPTP	Familiarisation, Pre-Training Test, Training, Post-Training Test
FPTPG	Familiarisation, Pre-Training Test, Training, Post-Training Test, Generalization
HA	Hearing Aid
HHI	Hearing Handicap Inventory
HHIA-M	Malay Hearing Handicap Inventory for adult
HINT	Hearing in Noise Test
Hz	Hertz
IQR	Interquartile range
KAHS	Kulliyyah of Allied Health Sciences
LACE	Listening & Communication Enhancement
MBQ	Music Background Questionnaire
MCI	Melodic contour identification
MII	Musical instrument identification
MLST-A	The Multimodal Lexical Sentence Test for Adults
MMST-AV	Malay Hearing Handicap Inventory for adult

PAT	Paired Associate Memory Test
PLAM	<i>Program Latihan Auditori Melayu</i>
PLAM-S	Screening for <i>Program Latihan Auditori Melayu</i>
PPTMPP	Pre-Training Test 1, Pre-Training Test 2, Training, Mid-Training Test, Post-Training Test 1, Post-Training Test 2
PPTP	Pre-Training Test 1, Pre-Training Test 2, Training, Post-Training Test
PPTPP	Pre-Training Test 1, Pre-Training Test 2, Training, Post-Training 1, Post-Training 2
PTA	Pure-tone Audiometry
PTMP	Pre-Training Test, Training, Mid-Training Test, Post-Training Test
PTMPP	Pre-Training Test, Training, Mid-Training Test, Post-Training Test 1, Post Training Test 2
PTP	Pre-Training, Training, Post-Training
PTPP	Pre-Training, Training, Post-Training 1, Post-Training 2
PRISMA-ScR	Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Review
RMQ	ReadMyQuips
SPATS	Speech Perception Assessment and Training System
ST	Self-training
TOT	Training for trainer
V	Vowel
WAIS-III	Wechsler Adult Intelligence scale 3 rd Edition
WHODAS II	World Health Organization Disability Assessment Schedule II
WIN	Word-in-Noise-test

CHAPTER ONE

INTRODUCTION

1.1 RESEARCH OVERVIEW

Auditory Training (AT) serves as one of the interventions in aural rehabilitation, alongside sensory management, encompassing the provision of hearing aids or cochlear implants (Boothroyd, 2007). Despite its proven effectiveness as an intervention for people with hearing loss, fewer than 10% of audiologists worldwide offer AT to patients with hearing loss (Sweetow & Sabes, 2010). A similar scenario occurs in Malaysia, where Ali et al. (2017) indicated that the only rehabilitation option offered by audiologists in Malaysia for patients with hearing loss is hearing aids intervention, thus neglecting AT services. This could be due to limited equipment for assessment and rehabilitation (Ali et al., 2017). Additionally, despite the vast number of AT programs available in the market for various languages, only a few are actually validated and proven effective (Olson, 2015). Therefore, the development of a validated Malay AT program may serve as a tool to help audiologists in Malaysia offer holistic rehabilitation for adults with hearing loss.

The main objective of this study is to develop and validate the *Program Latihan Auditori Melayu* (PLAM) for individuals with post-lingual hearing impairment who are conversant in Malay, establishing its validity and measuring its effectiveness. This can be achieved through four specific objectives, which include: (1) Conducting a scoping review to compile the AT designs and parameters available in the literature, (2) Developing the items and contents related to PLAM for individuals with post-lingual hearing impairment, (3) Assessing the validity of PLAM for those with post-lingual hearing impairment, and (4) Evaluating the effectiveness of PLAM for individuals with post-lingual hearing impairment.

The study was conducted at the International Islamic University Malaysia (IIUM) Hearing and Speech Clinic (Audiology), Department of Audiology and Speech-language Pathology, Kulliyyah of Allied Health Sciences (DASLP, KAHS), Hospital

Angkatan Tentera Tuanku Mizan (HATTM), and five Hearing Aid companies: Oticon Sdn. Bhd., Global Precision Sales and Services Sdn. Bhd., Eartistic Sdn. Bhd., Audiolab Enterprise Sdn. Bhd., and Hearlife Hearing Care Centre. A total of 10 normal hearing subjects and 20 subjects with hearing loss were involved throughout the study. These subjects were equally divided into a training (experimental) group and a non-training group (control). The study also involved 6 experts (professionals with at least 5 years of experience in providing auditory training) and 8 trainers (professionals or professionals-in-training with experience in working with individuals with post-lingual hearing loss).

Four stages were involved in this study. Initially, in Stage 1, a Scoping Review was conducted to review the auditory training (AT) programs available in the literature. In addition, Stage 2 was developed for the PLAM contents, manual, and PLAM-Screening (PLAM-S) scoring based on the Scoping Review conducted in Stage 1. Content validation, picture validation, pre-testing, and a pilot study to establish normative scores and determine the time needed for a subject to complete PLAM training were carried out in Stage 3. This stage involved a total of 10 normal hearing subjects, together with the finalization of the PLAM contents, manual, and PLAM-S scoring based on the findings. Finally, Stage 4 began with Training of Trainers (TOT) on how to conduct the PLAM. During this stage, 8 trainers conducted 45 to 60 minutes per week of PLAM training over six weeks on 10 active subjects. However, another 10 control subjects did not receive any training. All 20 subjects underwent pre-training and post-training assessments using the Malay Hearing Handicap Inventory for Adults (HHIA-M) (Zam et al., 2019), PLAM-Screening (PLAM-S) developed in this research, and the Malay Auditory-Visual Matrix Sentence Test (MMST-AV) (Jamaluddin, 2016) to measure the effectiveness of PLAM.

The PLAM has been comprehensively developed and has achieved good content validity, picture validity, as well as positive pre-testing results. Training has demonstrated statistically significant improvement, indicating its effectiveness in enhancing auditory skills among individuals with post-lingual hearing impairment. The development of PLAM facilitates its utilization as an auditory training tool for those proficient in Malay.

1.2 LITERATURE REVIEW

In this section, past studies related to auditory training (AT) programs, the essential components of AT, the target groups for AT, AT's significance in aural rehabilitation, current trends in AT services, and the outcomes of current AT will be reviewed and discussed. The literature review is intended to aid in constructing the proposed methodology for this study.

1.2.1 Auditory Training

In general, AT is an intervention method utilized in rehabilitative audiology, aimed at assisting individuals with hearing loss in maximizing their residual hearing. It emphasizes the development of listening skills to enhance the recognition and interpretation of speech sounds despite limited hearing ability. This type of training involves teaching listeners to make perceptual distinctions about systematically presented sounds (Schow & Nerbonne, 2013) and is considered part of habilitation or rehabilitation for the hearing impaired, based on the belief that the peripheral system benefits from the provided stimulation (Gil & Iorio, 2010).

Additionally, AT encourages the allocation of cognitive resources to residual hearing, thereby improving the encoding and decoding processes, which are fundamental to auditory learning (Bamford, 1981). According to Gil and Iorio (2010), AT is effective in enhancing central auditory skills because the introduction of sound into an impaired auditory system alters spectral and temporal cues in the central auditory nervous system. This alteration assists adults with hearing loss in regaining some lost auditory function by integrating various spectral and temporal codes as they recall speech sounds. Consequently, AT aids in compensating for difficulties in understanding, particularly in noisy environments.

1.2.2 Important Components in Auditory Training Programme

There are nine components in the AT: (1) 'methods', (2) 'approach', (3) 'auditory skills', (4) 'auditory stimulus', (5) 'AT activities', (6) 'Ling six sounds', (7) 'AT theme', (8) 'communication strategies' and (9) 'complexity of the training' which will be described based on literature.

Blamey and Alcántara (1994) explained that AT could use four methods which define its approach towards training activities and conducting the training. The methods are namely, (1) Analytic Training, (2) Synthetic Training, (3) Pragmatic Training, and (4) Eclectic Training. A training method is said to be "analytic" if it involves breaking speech into smaller components, such as syllables, phonemes, or segments of speech that share particular segmental or suprasegmental features and training them separately (Blamey & Alcántara, 1994). Pedley et al. (2005) stated that analytic training is based on the assumption that speech is understood by recognizing the smallest distinguishing linguistic features that can be extrapolated and applied to higher-level units of speech, such as sentences and paragraphs.

The task in synthetic training is to focus on comprehending the sentence's meaning without attending to specific acoustic elements (Pedley et al., 2005). This can be achieved by using phrases and sentences to take advantage of the same linguistic and situational redundancy that exists in everyday listening situations. Synthetic training focuses on attention to more global aspects of speech, such as meaning, syntax, and context of the message, which typically include meaningful sentences, phrases, or words, and also emphasizes understanding (Blamey & Alcántara, 1994).

Pragmatic training involves communication training, which trains the listener to obtain necessary information for communication using techniques such as acoustic highlighting, asking questions for clarification, and repair techniques (Blamey & Alcántara, 1994).

Eclectic Training is a method that combines elements of analytic, synthetic, and pragmatic methods to train different aspects of speech perception in the absence of clear

information about which type of training is best suited for a particular situation (Blamey & Alcántara, 1994).

Olson and Canada (2010) reviewed five auditory programs and summarized that four programs utilized analytic and synthetic methods, while one program mostly used the synthetic method. Beier et al. (2015) conducted a systematic review of 17 articles and found that only one study used a type of training that may be analytical, involving auditory tasks exclusively. The study also used a synthetic approach, incorporating communication strategies associated with cognitive functions such as attention, language, memory, and executive functions. In conclusion, the most common methodologies used in AT are analytic and synthetic methods.

1.2.2.1 Auditory Training Approach

The auditory training (AT) approach refers to enhancing cognitive processing through the top-down approach and sensory processing through the bottom-up approach (Moore & Amitay, 2007). Vandergrift (2004) simplified the meaning by comparing the term "bottom-up" as "listening to learn" and "top-down" as "learning to listen." The bottom-up approach involves comprehension built by gradually combining increasingly larger units of meaning from the phoneme-level up to discourse-level features, while the top-down approach involves comprehension based on context or prior knowledge (topic, genre, culture, and other schema knowledge in long-term memory) (Miller et al., 2007; Vandergrift, 2004). Both researchers also suggested that listening comprehension should combine and balance both top-down and bottom-up approaches for efficient and effective listening.

Beier et al. (2015) also stated the possibility of combining bottom-up (guided by stimulus) and top-down (guided by task) approaches with communication strategies associated with cognitive functions of attention, language, memory, and executive functions. The combination of both synthetic and analytic methods was utilized in the study by Hassan et al. (2013), where modifications to AT were made mainly in the words and sentences used to match the Saudi dialect. The modified version was

reviewed by three Saudi speech-language pathologists who documented the good use of Saudi wording.

Analytic training is termed a "bottom-up" approach, where speech features and phonemes are recognized to comprehend the conversation message, while synthetic training is described as "top-down" models of speech perception, postulating that the listener synthesizes possible messages from the context and syntax (Blamey & Alcántara, 1994).

1.2.2.2 Auditory skills

Auditory skills are described by a hierarchy of four levels: (1) Detection, the ability to respond to a sound; (2) Discrimination, the ability to differentiate between two stimuli; (3) Identification, the ability to recognize and label or name what is heard; and (4) Comprehension, the ability to understand the meaning of auditory input (Ukstins & Welling, 2015). This hierarchy, shown in Figure 1.1, was first introduced by Hirsch (1970) and has been widely used by Erber (1980) and Ling (1989).

Olson (2015) stated that the nine AT programs reviewed in their study target different auditory skills. One program targets all four auditory skills: awareness, discrimination, identification, and comprehension. Four programs focus on three auditory skills: discrimination, identification, and comprehension, while another four programs relate to only one auditory skill, which is comprehension. Hassan et al. (2013) further specified the four auditory skills into eight areas of AT in their study which are question statement identification, vowel identification, accent identification, initial consonant identification, spondee discrimination, spondee recognition, sentence identification, and high-context sentence recognition.

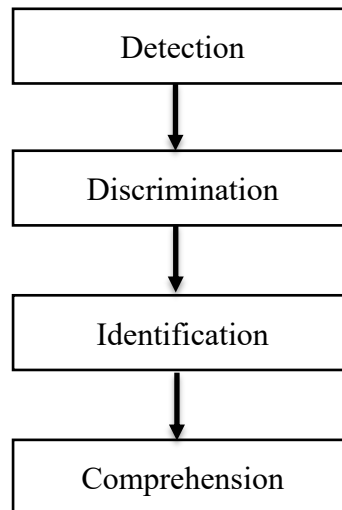


Figure 1.1 Auditory Skills Hierarchy

1.2.2.3 Auditory Training Stimulus

The AT stimulus is divided into two categories: sound stimulus and speech-language stimulus. Sound stimuli encompass any form of stimulus that is not meaningful speech in any AT program (Petersen et al., 2012; Shafiro, 2008; Shafiro et al., 2015). An example of sound stimuli is environmental sounds, as found by Shafiro et al. (2015). Trainees with prolonged deafness recognize environmental sounds as their first auditory experiences after being implanted with Cochlear Implants (CI), but they also face considerable difficulty in perception, which can be trained. Everyday listening involves experiencing events that serve as the foundation for understanding sound, including the source of sounds and the events that produce them (Gaver, 1993). Re-learning environmental sounds is essential for patients because environmental sound perception is among the difficulties faced by hearing-impaired individuals, but it can be improved with AT in a short time; improvement can be observed in just one week of training (Shafiro et al., 2015).

Speech sounds based on frequency should also be developed as part of the sound stimulus in AT programs. This aspect is important, as explained by Munson (2001), who stated that speakers' knowledge of language (in their research, English) includes information about pattern frequency in the mental lexicon. This implies that

phonological pattern frequency is related to speech production, and relearning sounds can help expand mental dictionaries. Additionally, human speech sounds as auditory stimuli have been found to successfully predict several widely shared aspects of music and tone perception (Schwartz et al., 2003). This relationship between human speech sounds and musical perception forms the foundation for modern psychoacoustical theories explained by Helmholtz and Ellis (1895). Figure 1.2 shows speech sounds represented in an audiogram by Northern and Downs (2002).

Mukari and Said (1991) stated that the normal Malay speech audiometry curve was comparable to those of English and Arabic speech audiometry. To date, there is no Malay speech audiometry curve available; therefore, this study will refer to the English speech audiogram by Northern and Downs (2002) to develop its speech sounds based on frequency for PLAM content.

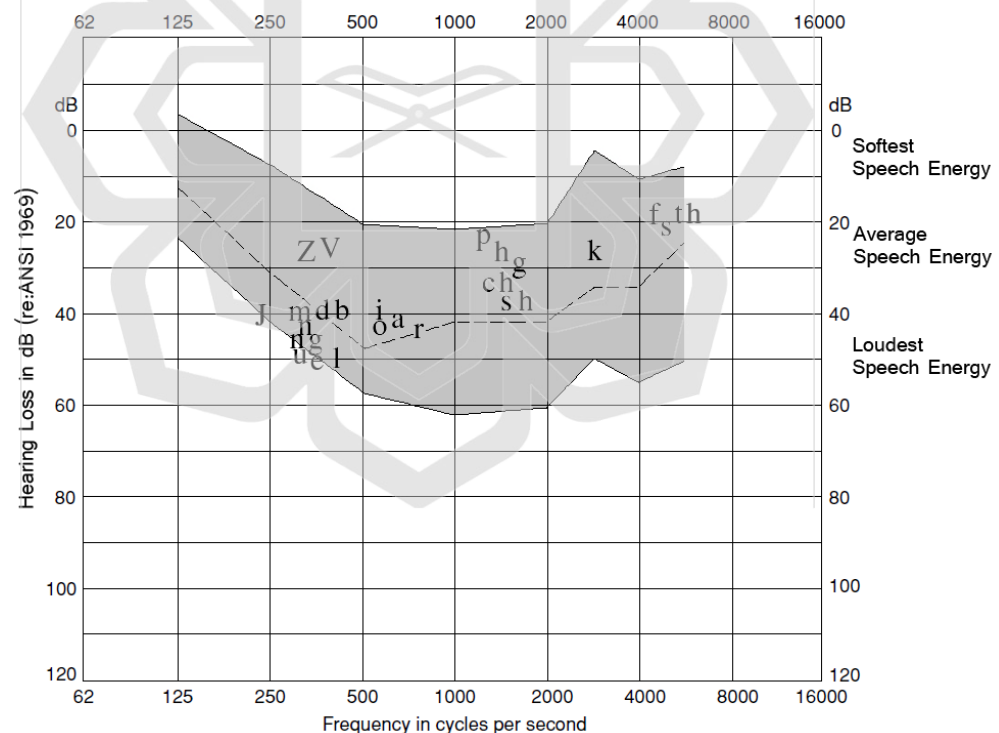


Figure 1.2 Speech Audiogram by Northern and Downs (2002)

Speech stimulus hierarchy by Estabrooks and Marlowe (2000) declares that sound-level consists of the non-speech and speech sounds of language. The second level is syllable-level which consists of the non-segmental and segmental language. Level three in speech stimulus is a word-level which contains the content, function, semantics, and morphology of language. The fourth level is a phrase-level which determines the language as carrier, chunking and clauses. Sentence-level is the fifth level which involves the syntactic, complexity and pragmatics of language. The highest level in the hierarchy is connected discourse level which involves the conversation, narration, explanation, directions, description, question, songs, rhymes and all aspects of language. Ling (1989) suggested that trainee's production or perception of speech can be economically measured by assessing the presence or absence of the speech sound (phonemes). This can be done by using Ling's six sounds and phonemes that represent conversational level elements in a certain acoustic range.

Ukstins and Welling (2015)) emphasized that the development of all four levels of the 'auditory skills' in Figure 1.1 should also be apparent with various levels of 'speech stimulus is shown in Figure 1.3. Speech stimulus is an item that is presented as material to chart a response in any AT programme (Erber, 1980; Humes et al., 2019; Shafiro et al., 2015). Erber (1980) explained that speech stimuli are continuum that at one end are phonemes, syllables and words at the other end are phrases, sentences, and connected discourse. The continuum has a range of complexity that is defined based on their length, linguistic and acoustic structure.

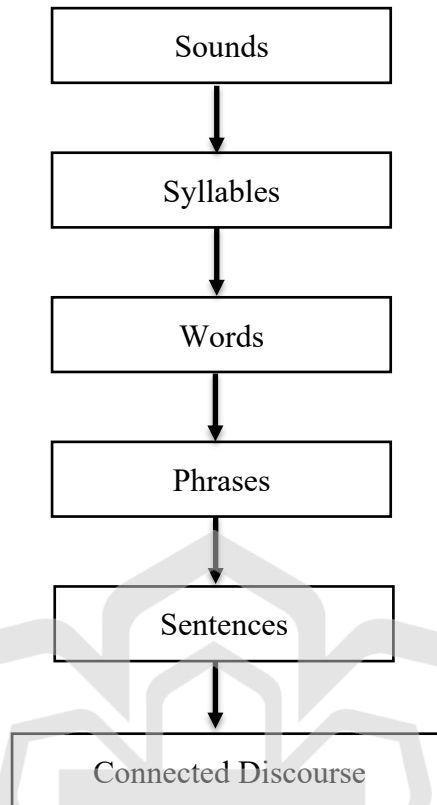


Figure 1.3 Speech Stimulus Hierarchy

The development of PLAM contents should encompass all levels, moving from comprehension and connected discourse in analytic training to detection and sounds in synthetic training. Barcroft et al. (2011) suggested a program with an auditory-only condition focused on one of the three principal types of phonetic contrasts: manner, place, or voicing, occurring in a laboratory setting resembling an audiological clinical testing area.

In this research, the training approach involved the use of multiple talkers to present stimuli to trainees. This choice contrasts with the study by Humes et al. (2009), where the focus was on computer-based training with the introduction of background noise. The use of multiple talkers in this study aimed to expose the trainee to various speakers to help generalize acquired skills to the real world.

Table 1.1 Suggestion on How to Achieve Auditory Training Goal Based on Auditory Skills Level and Speech Stimulus

Auditory Training Content (Goal)	Auditory Skills Level	Speech Stimulus
Question statement identification	Identification	Connected Discourse
Vowel identification	Identification	Sounds, Syllables, Words, Phrases, Sentences
Accent identification	Identification	Sounds, Syllables, Words, Phrases, Sentences
Initial consonant identification	Identification	Sounds, Syllables, Words, Phrases, Sentences
Spondee Discrimination	Discrimination	Sounds, Syllables, Words, Phrases, Sentences
Spondee Recognition	Identification	Sounds, Syllables, Words, Phrases, Sentences
Sentence identification	Identification	Connected Discourse
High context sentence recognition	Identification	Connected Discourse

1.2.2.4 Auditory Training Activities

Training activities are based on principles derived from cognitive psychology to learn to reinterpret the speech information as novel form (Tye-Murray et al., 2011). In addition, training activities have been designed based on auditory skills and stimulus (either sound or speech stimulus) aimed to train trainees and their communication partner to communicate optimally (Preminger & Meeks, 2010; Tye-Murray et al., 2011). Table 1.2 shows the training activities based on the AT method, approach and training stimulus.

Table 1.2 Training activities based on AT Method, Approach and Training Stimulus

Method	Approach	Training Stimulus	Training Activities
Analytic training	Bottom-up	▪ Syllables ▪ Phonemes ▪ Speech segmental ▪ Suprasegmental	▪ To recognize speech features and phonemes in isolation to achieve connected discourse ▪ Identification of a closed set of items ▪ The speech tracking technique (non-conceptual)
Synthetic training	Top-down	▪ Meaning ▪ Syntax ▪ Context of the message	▪ To synthesises possible messages from the context and syntax ▪ To understand meaningful sentences, phrases, or words ▪ The speech tracking technique

1.2.2.5 Ling's Six Sounds

Ling's Six Sounds is a detection task of six speech sounds /u/, /a/, /i/, /m/, /s/, and /ʃ/ introduced by Ling (1989), with each representing critical information in a different frequency range of the speech spectrum. Ling (1989) also recommended using these six sounds as a tool to observe any changes in aided performance among trainees. Kilcullen et al. (2015) suggested the use of Ling's Six Sounds among adults aged 20 to 55 years old, which is beneficial as an objective measurement in identifying hearing loss affecting certain frequencies, as is often seen with age-related high-frequency hearing loss. According to Agung et al. (2005), Ling's Six Sounds can be used as a task in both detection and identification and should be presented at distances of one meter and three meters in randomized order.

For adults, individual phonemes are less context-dependent (Munson, 2001). Therefore, phoneme detection and identification will not require any other speech, such as words or sentences, to be presented among individuals with post-lingual hearing impairment. Ling (1989) explained that the trainer will be able to predict which sounds

the trainee can detect, discriminate, and identify through aided hearing based on speech patterns produced by the trainee. These speech patterns contain information on three acoustic properties: intensity, frequency, and duration, which vary with different types and degrees of hearing impairment.

1.2.2.6 Auditory Training Theme

Tye-Murray et al. (2011) suggested that themes in AT programs should be specific and relevant to one's life, such as themes related to restaurants, travel, family, and sports. Another study by Barcroft et al. (2011) focused on themes related to family, utilizing training activities centred around sound identification.

1.2.2.7 Communication Strategies

Communication strategies involve skills aimed at overcoming communication breakdowns in various ways, such as efficiently repeating what has been said by emphasizing key words (Preminger & Meeks, 2010). These “helpful hints” are necessary in adjunctive therapy to reinforce the auditory skills learned and assist the trainee in generalizing these improvements to other listening tasks (R. W. Sweetow & Sabes, 2007a).

1.2.2.8 The Complexity of The Training

The AT program should also focus on variables that may influence the complexity of training to monitor the patient's performances. Estabrooks and Marlowe (2000) suggested 11 variables called ‘acoustic highlighting,’ which influence the audibility of a message or stimulus when presented to the subject. This study will adopt the ‘acoustic highlighting’ concept by Estabrooks and Marlowe (2000) and use the term ‘the complexity of training’ throughout the research.

Table 1.3 illustrates the transition of variables from the most audible stimulus (the least complex condition) to the least audible stimulus (most complex condition). The least audible condition represents where the ultimate AT goals are established.

Table 1.3 Variables Influencing the Type or Degree of Acoustic Highlighting
(Eastabrooks, 2000)

Variable	Most Audible	➡	Least Audible
Background noise	Absence	➡	Presence (type and/or intensity)
Distance/ location	Close proximity to microphone of hearing aid or cochlear implant	➡	Increased speaker distance
Repetition	Repetition(s) required	➡	Spoken message presented only once
Length	Short utterances	➡	Long utterance
Complexity	Simple utterances	➡	Complex utterance
Rate	Slow rate of utterances	➡	Individual rates of utterance
Suprasegmentals	Speech with emphasis on specific pitch, intensity, and/or duration cues	➡	Little or no specific acoustic emphasis provided
Segmentals	Specific contrasting of acoustic features (place, manner, and/or voicing cues)	➡	Little or no specific acoustic emphasis provided
Target position	End of word, phrase, (middle) sentence, or whole message	➡	Beginning of word, phrase, sentence, or whole message
Set	Closed	➡	Open
Speaker familiarity	Familiar voice(s)	➡	Unfamiliar voice(s)

1.2.3 Target Group of Auditory Training

Hull (2014) defined the differences between aural habilitation and aural rehabilitation based on the target group and goals. Aural habilitation is for pre-lingual children aiming to achieve auditory, cognitive, language, and speech development, whereas aural rehabilitation is for post-lingual individuals aiming to derive benefit from amplification. A part of aural rehabilitation AT focuses on developing auditory skills rather than language skills, as explained by Hull (2014).

Blamey and Alcántara (1994) categorized patients for AT into three groups: (1) individuals who wish to learn additional auditory skills, such as a new language or a musical instrument; (2) individuals whose hearing condition has recently changed, with changes possibly being negative (such as rapid loss of hearing) or positive (such as fitting of an improved hearing aid); and (3) individuals whose auditory skills are stable but inadequate to meet their communication needs.

The AT program is suitable for both children and adults if they meet the criteria mentioned by Blamey and Alcántara (1994) and Hull (2014). However, Moore and Amitay (2007) suggested that an AT program for children should integrate visual-spatial tasks, such as using the computer game Tetris.

This new program will be developed for adults with hearing loss, specifically for post-lingual groups. The contents and items for this program will be selected specifically for adults who need to improve auditory skills for communication.

1.2.4 Auditory Training as the Important Component in Aural Rehabilitation

Hearing aid fitting has traditionally been the first aural rehabilitation service offered to adults with hearing loss. Humes et al. (2009) emphasized that hearing aids should be effective in improving speech understanding, especially in backgrounds of competing speech.

Prendergast and Kelley (2002) identified eight components in aural rehabilitation following hearing aid fitting to address all services needed to improve hearing with the new device. These components include: (1) speechreading training, (2) information on assistive listening devices (ALDs), (3) auditory training (AT), (4) communication strategies, (5) coping strategies training, (6) training for frequent communication partners, (7) information or educational counselling, and (8) psychosocial adjustment counselling. Their study, conducted among 110 audiologists who were members of the American Academy of Audiology, revealed that AT ranked seventh as one of the most provided services, although audiologists agreed that providing more AT could be beneficial. Lack of time was identified as a primary barrier to delivering more AT services, reported by 48% of respondents.

A qualitative study by Archana et al. (2016) involving 30 audiologists and 10 hearing aid users found that hearing aid fitting alone was insufficient to facilitate communication skills, and further AT was needed. According to Humes et al. (2009), the most common communication complaint among older adults with hearing loss is the inability to comprehend speech despite being able to detect speech sounds. This difficulty is particularly pronounced in the presence of competing sounds, typically other speech sounds in the background. Boothroyd (2007) recommended a combination of sensory management, instruction, perceptual training, and counselling in adult aural rehabilitation, based on the four components listed by Prendergast and Kelley (2002): sensory management (information on ALDs), perceptual training (AT and speechreading), instructions (communication strategies, coping strategy training, and training for frequent communication partners), and counselling (educational counselling and psychosocial adjustment counselling).

The components of aural rehabilitation, as mentioned by Prendergast and Kelley (2002) and Boothroyd (2007), are summarized in Table 1.4. Boothroyd (2007) advocated for a holistic approach to adult aural rehabilitation aiming to reduce the deficits induced by hearing loss in function, activity, and participation, ultimately improving the quality of life. This information is crucial when designing a new AT program.

Table 1.4 Components in Adult Aural Rehabilitation

Predergast and Kelley (2002)	Boothroyd (2007)
Information on Assistive Listening Devices (ALDs)	Sensory Management
Auditory Training	Perceptual Training
Communication Strategy Training	Instruction
Coping Strategy Training	Instruction
Frequent Communication Partner Training	Instruction
Information/Educational Counseling	Counselling
Psychosocial Adjustment Counselling	Counselling
Speechreading Training	Perceptual Training

1.2.5 Current Trend of Auditory Training Services

A study review conducted by Sweetow and Sabes (2010) revealed that fewer than 10% of audiologists worldwide offered AT to patients with hearing loss. The low percentage was attributed to several factors: first, professionals tended to focus on hearing aid fitting rather than addressing the communication abilities of patients; second, existing AT programs were perceived as neither time nor cost-effective; and third, professionals viewed AT as uninteresting and faced limited reimbursement. Despite audiologists recognizing the benefits of adult aural rehabilitation programs, access to such programs remains limited (Olson & Canada, 2010). Therefore, there is a pressing need to develop an AT program that is accessible, time-effective, and cost-effective (Olson et al., 2010; R. W. Sweetow & Sabes, 2010).

Gil dan Iorio (2010) argued that AT is underutilized among patients and audiologists due to the misconception that hearing aids alone can fully restore lost auditory function. However, they noted that hearing aids are insufficient in overcoming auditory distortions, such as understanding speech in noisy environments. Audiologists should integrate AT into the hearing aid fitting process. Blamey and Alcántara (1994)

suggested that the function of AT is to accelerate the learning rate and/or elevate the final level of performance beyond what is achievable without training. This insight can boost patients' confidence in adopting hearing aids and utilizing them effectively.

Similarly, Saidi and Castro (2021) observed a low percentage of referred cochlear implant users to training or listening therapy despite extensive research on the importance of AT for such individuals. Reis et al. (2021) underscored the need for cautious consideration before adult cochlear implant users engage in AT, as their study showed limited transfer of learning from trained tasks to untrained tasks after computer-based auditory and visual training programs.

Olson et al. (2010) highlighted the potential of computerized AT to offer more accessible rehabilitation options compared to traditional face-to-face clinical approaches. The advantage of computerized AT lies in its ability to conduct training in the home environment, facilitated by web-based training platforms, mobile smartphone apps, and computer programs.

Furthermore, Saidi and Castro (2021) emphasized the value of long-term auditory rehabilitation conducted in realistic settings resembling everyday environments. They recommended developing an individualized AT program tailored to factors such as computer literacy, personality, motivation, linguistic proficiency, financial status, age, family support, medical condition, duration of deafness, duration of the implant, and level of performance.

The current trend in AT research reveals a broadened focus on related factors affecting hearing aid users, such as health-related quality of life and coping strategies, leading to improved communication (Wilderode et al., 2023). While these studies have shown improvements in trained tasks and speech perception, future training should incorporate more exercises in noise and focus on cognitive control, as the current training paradigms may not be sufficiently challenging for hearing aid users.

1.2.6 Auditory Training in Malaysian Context

Deafness and hearing loss are widespread and found in every region and country. According to the World Health Organization (WHO, 2021), approximately 20% of the global population live with hearing loss, with the majority experiencing mild hearing loss. However, 5.5% of the global population have disabling hearing loss, which, if unaddressed, will likely impact their daily activities and quality of life. According to, Haile et al. (2021) the prevalence of hearing impairment (hearing thresholds >20dB HL) in the South-East Asian region was estimated to be around 21.2%. Similarly in Malaysia, research by Mukari et al. (2016) to determine the prevalence of hearing loss among older adults in Malaysia showed that 24.6% of the population had significant hearing loss. However, the research by Mukari et al. (2016) showed only 5% of them wearing hearing aids.

The low percentage of hearing aid usage among individuals with hearing impairment in Malaysia may be explained by a study conducted by Ali Hanafiah in 2016. This study focused on identifying the factors perceived to influence the uptake of hearing aids among adults with hearing impairment in Malaysia. The findings revealed that Malaysian Malay adults experiencing hearing impairment, when seeking hearing assistance for the first time, consider various factors that affect their decisions to adopt hearing aids. These factors align with those reported worldwide, i.e., personal factors, environmental factors, and factors related to activities and participation. Additionally, new factors specific to the Malaysian context were identified, such as those associated with hearing aid demonstrations, perceptions of hearing aids and their usage, stage of life, cultural practices, and religious beliefs. These findings suggest the complexities surrounding the decision-making process regarding the use of hearing aids in Malaysia, highlighting the need for focused interventions and support systems to address the unique factors influencing hearing aid uptake in this population.

Scoping review by Romli et al. (2023) aimed to identify knowledge gaps in relation to access to, and outcomes from, hearing care services for adults in Malaysia showed that audiologists reported offering a range of diagnostic assessment and rehabilitation services, including hearing aids, assistive listening devices, auditory training, and counselling. However, the uptake of hearing services was low; rates of

hearing aid use among people with at least mild hearing loss were around 2.7%-4.4%; 6.5%-7.3% for those with at least moderate loss. The similar result found in Ali et al. (2017) stated that only 26% of audiologists in Malaysia assessed patients' speech perception, conducted real-ear measurements or used outcomes measures routinely. This study also indicated that provision of hearing aids was the only rehabilitation option offered to patients. Therefore, Romli et al. (2023) scoping review highlighted the limited uptake of hearing services among adults in Malaysia, despite the existence of services. However, the research was unable to explain the factors contributing to this limited uptake. Ali Hanafiah (2016) suggested audiologists to be more perceptive of the clients' needs and issues regarding hearing aids while Romli et al. (2023) urge the need to identify barriers to access, improve access and uptake, and evaluate the benefits of adult hearing services in Malaysia.

The low uptake of hearing aids in Malaysia also reflects the limited availability of rehabilitation services in the country. Regarding rehabilitation, to date, there is one study that has developed a computer-based AT (CBAT) for the elderly by focusing on speech-in-noise skills in Malay (Bani, 2019). However, this CBAT is still at the prototype level and not yet available in the market. There is no other standardized AT program used in Malaysia, or any AT programs available in the Malay language. Samsudin et al. (2017) only listed the tests used to assess auditory performance among children with cochlear implants, which are being used by Malaysia's National Cochlear Implant Team. In the list, however, no specific auditory program was mentioned as being used.

1.2.7 The Outcome of Current Auditory Training

Beier et al. (2015) conducted a systematic review of 17 articles to assess the benefits of auditory training for hearing aid users. Their findings indicated that auditory training, regardless of its formality or approach (e.g., formal, informal, with lip reading or communication strategies, analytic or synthetic), can benefit hearing aid users, particularly when tasks involve cognitive demand.

Individual differences in improvement pre- and post-training are often observed (Beier et al., 2015; Dubno, 2013; Fu et al., 2005; Hassan et al., 2013). Fu et al. (2005) noted improvements in subjects' performance based on individual training items, although most subjects' phoneme recognition performance remained in the poor to fair range. To address this, the study recommended specific training targeting phoneme recognition or phonetic contrasts, moderate daily training sessions (1-2 hours per day, 5 days per week), and the use of visual cues (e.g., lip reading) for speech recognition, which led to improvements in subjects' performance.

Dubno (2013) investigated the benefits of auditory training for aided listening among 14 trained subjects and 15 untrained subjects. The study revealed that only participants who received training showed significant improvements in open-set recognition of trained sounds, words, phrases, and sentences. However, the extent of generalization varied between trained and untrained groups and depended on factors such as the speech-perception task, competing noise, listening strategy, and pre-training performance.

Hassan et al. (2013) conducted a study to determine the effect of intensive auditory training on speech intelligibility among adults with cochlear implants. They compared the performance of 15 adults in a trained group with 15 adults in an untrained group and found that the trained group showed improvements in auditory recognition and discrimination skills. Consequently, the study concluded that the improvements were attributable to the intensive auditory training received by the trained group.

1.3 PROBLEM STATEMENT

The PLAM represents a comprehensive newly developed AT program that is highly valuable for individuals conversant in Malay. Therefore, it is imperative to validate and establish its effectiveness before implementing it in real-world settings.

1.3.1 Limited Comprehensive Auditory Training Program Available

A systematic review conducted by Beier et al. (2015) highlighted a lack of comprehensive AT programs available worldwide. Among the 19 reviewed studies, none offered a fully comprehensive approach to training, encompassing auditory skills, speech stimulus, and control over training stimulation variables. Only two articles reported the use of informal AT, which included evaluation materials such as words, sentences, and recorded speech, while six articles reported formal AT conducted in a soundproof booth. Furthermore, only one article employed a combination method of both analytical (bottom-up) and synthetic (top-down) approaches, incorporating auditory tasks along with communication strategies linked to cognitive functions such as attention, language, memory, and executive functions.

However, in addition to those reviewed by Beier et al. (2015), there are comprehensive AT programs available under cochlear implant and hearing aid companies. Cochlear Limited Company has developed the Adult Aural Rehabilitation program, aimed at cochlear implant professionals (Pedley et al., 2005). Med-el Company offers programs covering various aspects of adult aural rehabilitation across five categories, including Auditrain, Speechtrax, Hear at Home, Syntrain, and Analytika (www.medel.com). Similarly, Neurotone Company has produced the LACE (Listening and Communication Enhancement) program (www.neurotone.com). Although these training programs can be considered comprehensive, they are currently only available in English and limited to users of the respective companies' products.

1.3.2 Limited Validated and Evidence-based Auditory Training Program

Olson (2015) conducted a review of available options for AT geared towards adults with hearing loss. Among the 19 computer or web-based AT programs identified, only 9 had undergone evidence-based research and validation. Similarly, out of 127 identified mobile smartphone apps offering AT, only 1 had evidence-based research supporting its effectiveness. The presence of evidence-based research is crucial as it provides insights into the effectiveness of the training and how it should be implemented to yield positive outcomes. This information is essential for audiologists when

recommending AT programs to their patients. However, due to the limited availability of evidence-based AT programs, audiologists have limited options to choose from when selecting AT for their patients.

1.3.3 Lack of High-Quality Evidence-based Method in Measuring the Effectiveness of Auditory Training Programme

Henshaw and Ferguson (2013) conducted a review of eight databases to assess published evidence-based research on the efficacy of individual computer-based AT. Their findings indicated that AT led to improved performance for trained tasks. While compliance with computer-based AT was reported to be high and retention of learning was observed at post-training follow-ups, the study quality of the published evidence was deemed to be very low to moderate. Several factors contributed to this low level of evidence, including lack of homogeneity in training protocols (such as training stimuli, duration, or frequency), outcome measures, participant samples (including sample size and degree of hearing loss), and study designs, which may have contributed to variations in reported outcomes. They suggested the need for the development of high-level evidence-based AT and the standardization of outcome measures to adequately assess the efficacy of AT as an intervention for people with hearing loss.

Similarly, Dubno (2013) expressed concerns regarding the necessity for additional high-level evidence to support the effectiveness of AT predictors. They noted that initial predictions of training benefits could not be reliably made based on factors such as magnitude of hearing loss, age, hearing-aid characteristics, or cognitive function. Instead, ongoing analyses such as continuous audiological management and periodic AT assessment were deemed necessary to determine the efficacy of AT interventions.

1.3.4 Limited Malaysian Malay Auditory Training Program Available

A study by Olson (2015), which reviewed options for AT for adults with hearing loss, stated that no evidence-based research auditory program is available in Malay

Language. The review revealed that there were five AT programs available in English, one program available in four languages (English, Chinese, Spanish, Japanese), and one program available in two languages (English, Spanish).

Another study by Ali et al. (2017) explored the nature of audiological services for adults with hearing loss in Malaysia, stating that less than 50% of audiologists in Malaysia reported that their workplaces had tools for speech testing materials such as AB Word Lists by Boothroyd (1968), Hearing in Noise Test (HINT) by Nilsson et al. (1994), and material for AT. They reported that some audiology clinics were equipped with Malay-adapted versions of these speech tests but not with materials for Malay AT. However, Bani (2019) has developed a CBAT for Malay-speaking elderly individuals, focusing on speech-in-noise skills. Nevertheless, the AT program produced by Bani (2019) is still at the prototype level, and the application of the program has not yet been made available. Additionally, this AT program focuses on the elderly population and is limited to speech-in-noise skills.

Glasgow et al. (2003) emphasized that health promotion research to practice should be based on cultures, values, and methodological traditions that have developed within the population, to warrant a successful intervention. Therefore, an AT program developed in the Malay language for individuals conversant in Malay is crucial because the program's content depends on language use. As highlighted by Beier et al. (2015), the AT program will exercise auditory abilities using listening tasks and involve materials containing words and sentences. Thus, language will be a major factor influencing the patients' performance.

1.4 STUDY RATIONALE

The study recognized the need for AT among adults with hearing loss to enhance their auditory performance with amplification devices (Beier et al., 2015). Habanec (2013) also emphasized that AT can benefit adults with hearing loss who do not use amplification. Therefore, AT is an important program to assist adults with hearing loss and should be comprehensive and evidence-based.

Henshaw and Ferguson (2013) emphasized that AT should be assessable both for clinical training and for generalization in everyday life, improving speech intelligibility, cognition, and communication. Therefore, a comprehensive AT program is necessary, as adults with hearing loss may face unique and varied challenges. The PLAM should offer a complete AT program that includes auditory skills, speech stimulus, and control over training variables for Malay-speaking adults with hearing loss.

As mentioned, this comprehensive AT program should have evidence-based research. The significance of research in AT programs was demonstrated in the study by Chisolm et al. (2013), which compared the performance of hearing aid users who underwent AT with those who did not. They found that the greatest improvements occurred between 5 to 10 training sessions. Houser and Oman (2011) also advocated for evidence-based practice, which incorporates scientific evidence, clinical experience, and patient preference to ensure clinically effective and acceptable practices. Therefore, the PLAM should be designed with evidence of its effectiveness to scientifically prove improvements in listening abilities among adults with hearing loss in Malaysia.

The effectiveness of the AT program should be of high quality, as mentioned by Henshaw and Ferguson (2013). A high-quality program should demonstrate efficacy across multiple test sessions and skills. Therefore, the development of a high-quality PLAM is crucial for comparison with established programs to showcase its effectiveness.

Currently, the AT program is unavailable in the Malay language, which could be culturally sensitive to the Malaysian context. However, the content targeted in AT involves auditory skills and language stimulus, which are language-dependent. Henshaw and Ferguson (2013) highlighted that intervention stimuli in AT involve language elements such as phonemes, vowels, consonants, syllables, digits, words, or sentences. Archana et al. (2016) also stressed the importance of having AT in the local language based on interviews with audiologists and patients, indicating the need to consider language and cultural background in preparing AT materials. Hence, the PLAM should be developed in Malay to ensure conceptual, semantic, and operational

equivalence, as suggested by Acquadro et al. (2008) and to avoid language biases that could impact patient outcomes.

1.5 RESEARCH QUESTIONS

1. What are the AT design and parameters that can be compiled from scoping review?
2. What are the items and contents that should be included for PLAM for individuals with post-lingual hearing impairment?
3. Is the newly developed PLAM valid to be used among individuals with post-lingual hearing impairment who are conversant in Malay?
4. Is the PLAM effective to improve auditory skills among individuals with post-lingual hearing impairment?

1.6 HYPOTHESIS

1. The PLAM is valid to be used among individuals with post-lingual hearing impairment.
2. The PLAM is effective to improve auditory skills among individuals with post-lingual hearing impairment.

1.7 MAIN OBJECTIVE

To develop and validate an AT programme, named (PLAM), tailored for individuals with post-lingual hearing impairment who are conversant in Malay as a medium of communication, establish its validity, and measure the effectiveness.

1.8 SPECIFIC OBJECTIVES

1. To conduct the scoping review to compile the AT design and parameters that are available in the literature,
2. To develop the items and contents for PLAM for individuals with post-lingual hearing impairment,
3. To measure the validity of the PLAM for individuals with post-lingual hearing impairment,
4. To measure the effectiveness of the PLAM for individuals with post-lingual hearing impairment

1.9 THESIS CONCEPTUAL FRAMEWORK

The thesis conceptual framework, as depicted in Figure 1.4, comprises six chapters: Chapter One: Introduction, Chapter Two: Scoping Review, Chapter Three: The Development of PLAM, Chapter Four: Validation of PLAM, Chapter Five: Preliminary Effectiveness Study for PLAM, and Chapter Six: Conclusion.

Chapter One serves as the introductory chapter, providing an overview of the research area, including its significance, objectives, research questions, and hypotheses. Additionally, it incorporates literature reviews to explore and summarize existing research and theories relevant to the topic of AT. Chapter Two focuses on the initial scoping review, which aims to study AT programs available in the literature. This chapter describes AT programs based on two aspects: (1) AT design and (2) AT parameters. Chapter Three is dedicated to the development of PLAM. This chapter outlines the frameworks, contents, screening instruments, scoring, and manual for PLAM. Chapter Four elaborates on the validation process for PLAM, including content validation, picture validation, pre-testing, and pilot studies. Chapter Five presents the final research work in the thesis, addressing the preliminary study on the effectiveness of PLAM. This chapter includes three studies: (1) comparison of pre and post performances for PLAM, (2) comparison of performance gain for PLAM, and (3) investigation of trainers' perceptions toward PLAM. The concluding chapter, Chapter Six, synthesizes the findings of the study and offers a comprehensive overview of the

research, its implications, limitations, and recommendations for future research or practical applications.

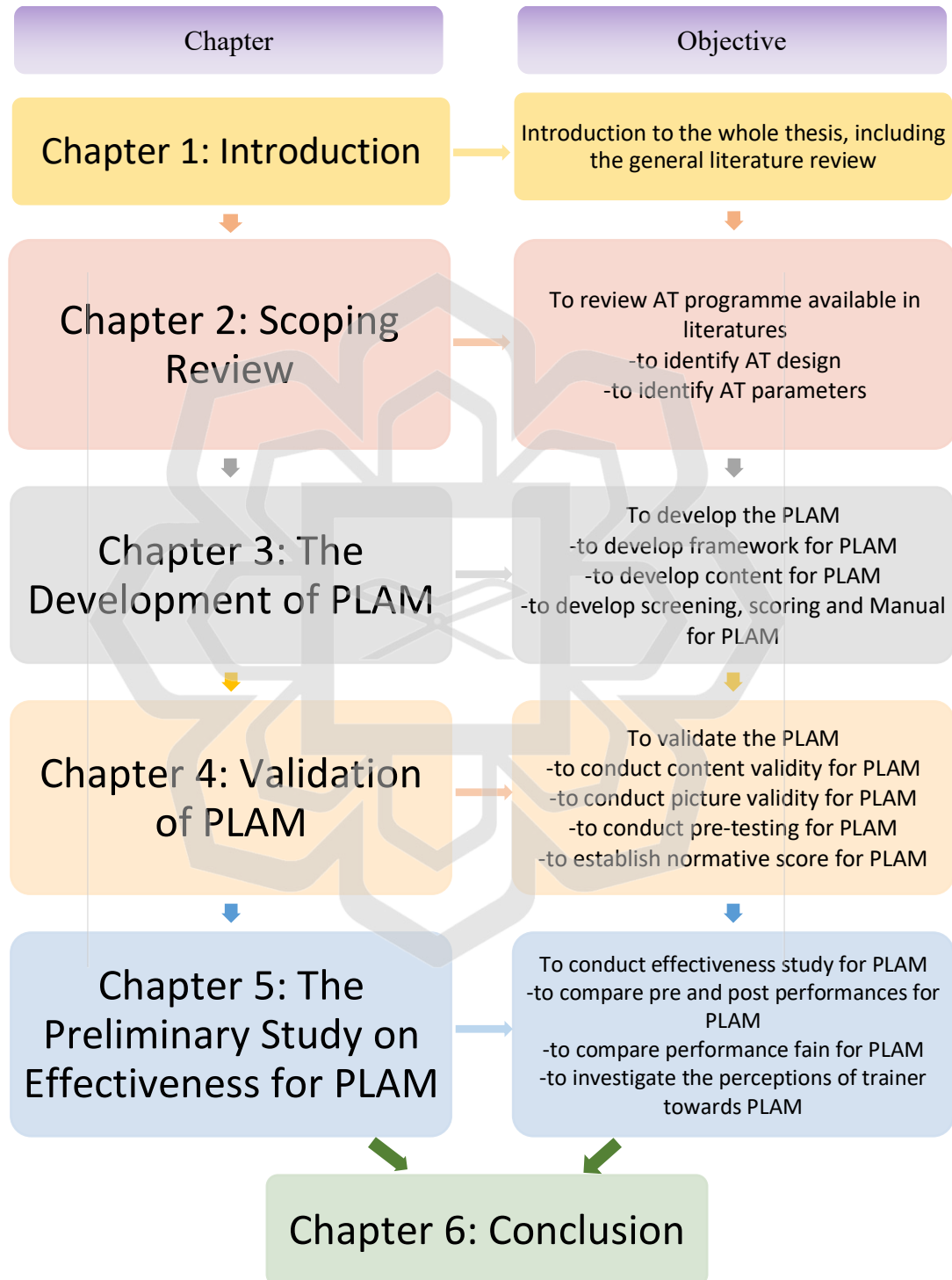


Figure 1.4 Thesis Conceptual Framework

CHAPTER TWO

AT PROGRAM FOR INDIVIDUALS WITH POST-LINGUAL HEARING IMPAIRMENT: A SCOPING REVIEW

2.1 INTRODUCTION

Post-lingual deafness, or post-lingual hearing impairment, as described by Lazard et al. (2014), occurs when deafness manifests after language acquisition and stabilization, typically after the sensitive period of maximal plasticity has elapsed and major brain specializations are fixed. Researchers such as Hughes et al. (2018), Lin et al. (2013) and Strawbridge et al. (2000) have underscored the concerning consequences of sensorineural hearing loss (SNHL) among individuals with post-lingual onset, including cognitive impairment and dementia. Turunen-Taheri et al. (2019) further stated that SNHL can lead to brain atrophy and neuroplasticity, which may hinder auditory rehabilitation, though the use of hearing aids could potentially slow down or improve this pathology. Individuals with post-lingual hearing impairment require reorganisation to maintain their social habits without necessarily resorting to sign language, adapting instead to their handicap with fixed anatomical and functional constraints (Lazard et al., 2014). Blamey and Alcántara (1994) explained that individuals with post-lingual hearing impairment may benefit from AT with specific aims to address the consequences of their hearing impairment.

AT is considered crucial in areas such as aural rehabilitation for individuals with post-lingual hearing impairment. Sommers (2016) and Beier et al. (2015) emphasised that AT serves as a valuable component of auditory rehabilitation, particularly for users of amplification devices such as hearing aids. They highlighted that comprehensive aural rehabilitation is more effective when AT is included in the programme. The main objectives of AT programmes are to enhance user participation and improve the quality of life by mitigating the deficits caused by hearing loss through sensory management, instruction, perceptual training, and counselling (Boothroyd, 2007). Ferguson and Henshaw (2015) proposed two targets for successful listening among hearing-impaired adults through AT which are training stimuli engaging cognitive processes and specifically executing processes such as attention switching and memory updating.

These modules are essential for users to generalise skills to everyday life. The development of AT programmes requires thorough justification of each content to address questions regarding the value and improvement of everyday communication skills (Sweetow & Sabes, 2010).

Many hearing care professionals perceive AT as incompatible with their routine practice protocols due to perceived expense and time constraints (Tye-Murray, 2016). This scoping review aims to examine existing AT literature and identify AT programme protocols that can minimise time and monetary constraints. The review will visualise efficient AT programme content that can be integrated into routine protocols.

A scoping review is chosen for its systematic approach to mapping evidence on a topic and identifying main concepts, theories, sources, and knowledge gaps (Tricco et al., 2018). This method aligns with the study objectives and follows the PRISMA Extension for Scoping Review (PRISMA-ScR) checklist to ensure methodological transparency and reporting quality. The scoping review will inform the development of a framework and operational guideline for the Malay AT programme, incorporating key concepts from reviewed AT programmes.

2.2 PROBLEM STATEMENT AND STUDY RATIONALE

In this research, audiologists and hearing healthcare professionals who perform AT will be referred to as 'trainers', while individuals with post-lingual hearing impairment will be referred to as 'trainees'. It is essential for trainers to have a realistic AT programme that benefits trainees in their everyday lives. However, there are unresolved issues related to trainees and trainers who opt out of AT programmes in their rehabilitation choices. This section will address the problems encountered and provide the rationale for why this scoping review study is necessary.

Through an assessment of past studies, this scoping review aims to develop practical designs and parameters to create a holistic AT programme.

2.2.1 Standard Guidelines for AT Programme Design is not Available

The scoping review serves as a method to examine the current trends in available AT programmes, as recommended by Tye-Murray (2016). Its objective is to equip audiologists and hearing care professionals with new strategies to achieve the goals of delivering quality hearing healthcare. Adhering to the guidelines stipulated for the audiologic management of adult hearing impairment by Valente et al. (2015), which stress the importance of understanding patients' specific communication needs and setting realistic expectations for interventions, the study will establish an AT programme design. This design will encompass factors such as duration, frequency, length, location (computer-based or face-to-face), involvement of a trainer or self-training, and whether it is conducted individually or in groups. It will serve as a blueprint for future AT programmes, ensuring they are tailored to patients' specific needs to accurately measure the benefits of amplification.

Accurate measurement outcomes are crucial for developing evidence-based clinical practice guidelines. However, as noted by Zhang et al. (2014), the provision of AT and the choice of training type should be individualised. In a review on the impacts of aural rehabilitation on the quality of life among older adults, Michaud and Duchesne (2017) found no overarching trends due to the limited clinical applicability of the results. Both the assessments used and the interventions offered were reported to be incomplete and component-based, posing a risk of bias. The scoping review, by providing recommendations for optimal design, will raise awareness among trainees and trainers about the importance of conducting AT programmes for individuals with post-lingual hearing impairment. It will also underscore the need for an updated AT programme design to help both parties achieve maximum benefit.

Cardemil et al. (2014) indicated that the use of hearing aids and individual communication programmes in adults can positively improve listening and speech perception. All AT programmes, as part of auditory rehabilitation strategies, also have the potential to enhance quality of life (Cardemil et al., 2014). This highlights the necessity for a scoping review to describe a comprehensive and practical AT programme design for hearing healthcare professionals and patients. Such a review is crucial to gather more evidence regarding the effectiveness of AT programmes,

specifically in assessing the variables outlined in the expected AT programme design. Additionally, it aims to create a structured AT programme that can be externally assessed and audited to prevent assessment bias. The goal of this research is to produce a set of AT programme designs that will enable users to make informed choices by discussing their strengths and areas for auditory skill improvement with a clinician. This approach is expected to have a high impact and be convenient for both providers and recipients of hearing healthcare services.

2.2.2 Standard Guidelines for Auditory Training Program Parameters is not Available

Generally, AT programme parameters encompass methods, approaches, modes, auditory skills, speech stimulus, sound stimulus, and the complexity of training used for individuals with post-lingual hearing impairment. However, current available AT programmes often do not compile all these parameters for their development. For instance, recent research trends have focused on specific areas or highlighted prominent aspects of AT programme efficacy and benefits. Michaud and Duchesne (2017) reviewed the effects of aural rehabilitation on quality of life in older adults, Beier et al. (2015) focused on AT benefits, Lawrence et al. (2018) examined the efficacy of AT on cognition, Henshaw and Ferguson (2013) studied the efficacy of AT on speech intelligibility, cognition, and communication abilities, and Sweetow and Palmer (2005) investigated the efficacy of AT on communication skills. Therefore, this scoping review aims to compile all parameters of AT programmes to produce a more comprehensive framework.

According to Clark et al. (2008), Boothroyd (2007) and Hull (2014), audiologic management for hearing-impaired adults encompasses various components, including sensory management, AT, and counselling. AT itself consists of diverse training components tailored to individual needs. Sommers (2016) suggested that individual at home using tablet-based devices with game-like formats could significantly enhance the ease and flexibility of administration and maintain training over extended periods. However, training gains may not generalize outside the training materials. Additionally, Sommers (2016) highlighted that AT might be most effective when using the voice of

a specific individual whom the trainee wants to understand, such as a spouse or a teacher. This underscores the importance of compiling all parameters in an AT programme to serve as a guideline for developing a comprehensive programme.

Each parameter in the AT programme will be documented to understand the mechanism of AT. This study aims to gain a clear understanding of the common structures used in most AT programmes, given their wide-ranging targets. The information gathered in this scoping review is expected to address the valid question of which areas are most critical to help patients accordingly. Therefore, this study is essential to assist both trainers (hearing healthcare professionals) and trainees (patients or subjects) in achieving their goals.

2.3 RESEARCH QUESTIONS

1. What is the AT **design** (durations, frequency, length, location, computer based/face to face, with trainer/self-training, individual/group) for the individuals with post-lingual hearing impairment AT programme?
2. What are the AT programme **parameters** (methods, approaches, modes, auditory skills, speech stimulus, sound stimulus and complexity of training) used for the individuals with post-lingual hearing impairment?

2.4 MAIN OBJECTIVES

To review AT programme available in literatures.

2.4.1 Specific Objectives

1. To identify the AT **design** (durations, frequency, length, location, computer based/face to face, with trainer/self-training, individual/group) for the individuals with post-lingual hearing impairment AT programme.
2. To identify the AT programme **parameters** (methods, approaches, modes, auditory skills, speech stimulus, sound stimulus and complexity of training) used for the individuals with post-lingual hearing impairment.

2.5 METHODOLOGY

The reviewing method involved searching databases using various combinations of keywords to identify relevant papers. This process resulted in the identification of themes related to the AT programme. The relevant findings will be presented alongside the methodology and analysis to enhance their significance.

2.5.1 Protocol

The scoping review study was drafted using the Preferred Reporting Items in relation to Systematic Reviews and Meta-analysis extension for Scoping Review (PRISMA-ScR) by Tricco et al. (2018).

2.5.2 Eligibility Criteria

The eligibility criteria to accept or reject paper in this research are derived from a suggestion made by Moher et al. (2009) to use PICOS; with reference to **p**articipants, **i**nterventions, **c**omparisons, **o**utcomes, and **s**tudy design paper.

2.5.2.1 Participants

- Adults aged 18 years and older, as defined by the World Health Organization (2010).
- Individuals with any degree of hearing loss who use hearing aids, cochlear implants, and/or any listening devices.
- Normal-hearing subjects who use a hearing-impaired simulation device.

2.5.2.2 Intervention

- Any AT programmes available in English or Malay.
- Exclude programmes without publications to validate their scientific merit.
- Exclude papers with no intervention for the AT programme. For example, papers providing only general information about AT programmes.
- Exclude review-only papers.

2.5.2.3 Comparisons

Comparison with a control group or repeated measures (pre and post training comparison). However, if the paper has significant relevance to this scoping review, it will be accepted.

2.5.2.4 Outcomes

Outcome measures related to listening skills, speech intelligibility, cognition, and communication (either behavioural measures or self-reported outcomes).

2.1.1.1 Study design

Randomised controlled trials, non-randomised controlled trials, cohort studies, repeated measures (pre and post training comparisons), case studies, reliability tests, and validity tests.

2.5.3 Information Sources

The paper selection process involved searching four databases: **PubMed**, **ScienceDirect**, **Scopus**, and **ProQuest** (medical & health). Only papers published between **2007** and **2017** were included in this study. Grey literature was also searched as it may contain relevant information related to accepted papers from the databases. Additionally, papers deemed important for further understanding of the AT programme were included based on their significance to the topic.

2.5.4 Search

The Keywords used for database search included: *hearing loss*, *AT*, *hearing aids*, *cochlear implants*, *perceptual learning*, *aural rehabilitation*, *auditory rehabilitation*, and *adults*. These keywords were selected based on the objectives and literature review of the study.

2.5.5 Selection of Sources of Evidence

The selection of sources of evidence was conducted by a team consisting of one speech-language pathologist (Reviewer 1), one audiologist with a Ph.D. (Reviewer 2), one audiologist (Reviewer 3), and one undergraduate audiology student (Reviewer 4). The decision to accept or remove a paper was made by the reviewers through discussions and meetings. The background of the reviewers is presented in Table 2.1. It is important to note that working experience was not the sole criterion for inclusion as a reviewer;

rather, reviewers were selected based on their experience in reviewing papers, particularly for scoping reviews.

Table 2.1 Reviewers Background

Background	Information
Range of working experiences	13 to 20 years for reviewer 1, 2 and 3 Reviewer 4 has no working experience but is in the final year (4 th year) of studying and has experience in reviewing papers for scoping reviews.
Institution	All four reviewers are from academic institution

All the articles underwent three phases of processing. The first phase involved an identification process where all paper titles were screened and identified using the searched keywords (*hearing loss, auditory training, hearing aids, cochlear implants, perceptual learning, aural rehabilitation, auditory rehabilitation, adults*). Any duplications in the contents of the papers were also screened during this phase, resulting in the identification of 209 papers, with 10 duplicates subsequently removed.

In the second phase, Reviewer 1 and Reviewer 3 screened the abstracts of the 199 papers, agreeing to remove 154 papers because they did not meet the eligibility criteria outlined in section 3.2. This left a total of 45 papers for further processing in the next phase.

The third phase involved Reviewer 1 and Reviewer 2 screening the full texts of the 45 selected papers. During this phase, 24 papers were excluded, while another three papers from the grey search were included. These three papers were included because they provided relevant information for the final selection to explain the AT programme used in their research. In total, 24 papers were included in this study. The selection process is illustrated in Figure 2.1.

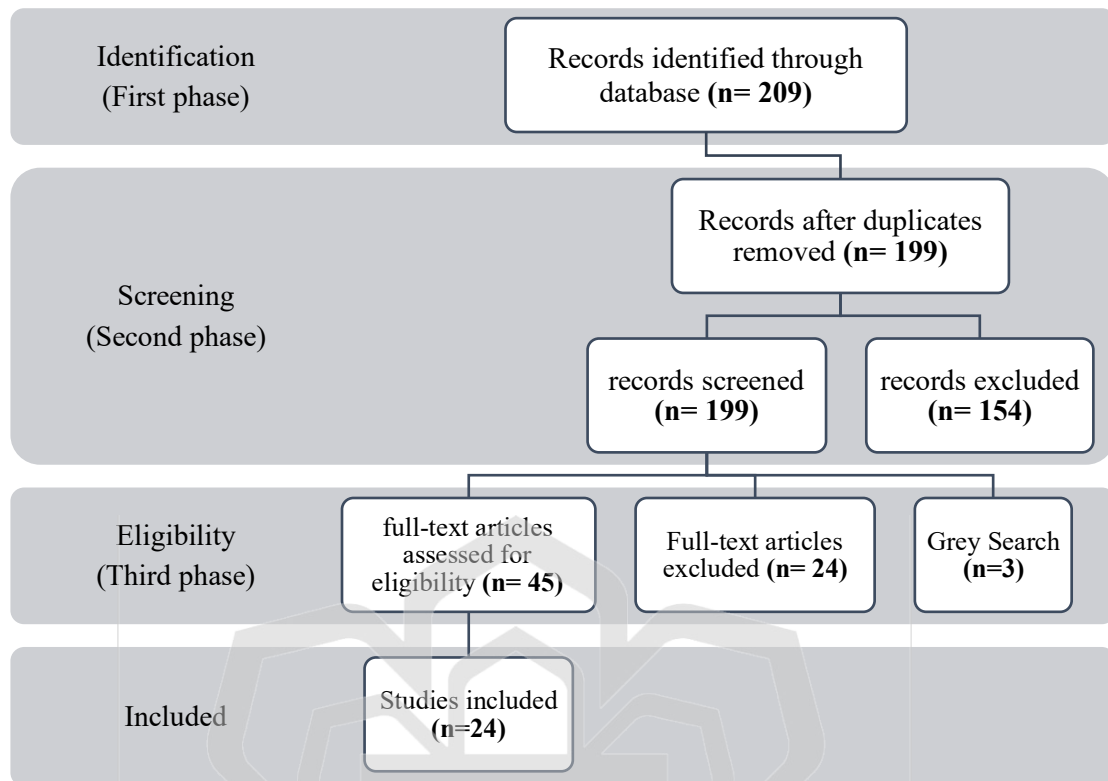


Figure 2.1 The Findings of Papers Searching

2.5.6 Data Charting Process

The data charting process utilises thematic analysis following the approach outlined by Braun and Clarke (2006) as further elucidated by Maguire and Delahunt (2017), to extract the content of the AT programme. This process of identifying themes entailed six steps: (1) Familiarising with the data, (2) Generating initial codes, (3) Searching for themes, (4) Reviewing themes, (5) Finalising themes, and (6) Defining themes.

2.5.6.1 Step 1: Familiarising with Data

All 24 papers have been assigned identity numbers (ID) from ID01 to ID24 for distinctive recognition. Out of these 24 papers, 15 AT programmes have been identified, each of which has been given a unique ID from P01 to P15 (where “P” denotes programme).

The panel responsible for the full-text review comprised Reviewer 1, Reviewer 3, and Reviewer 4. They meticulously read and re-read all papers to gain a comprehensive understanding of the entire body of data, as recommended by Maguire and Delahunt (2017). If any unfamiliar terms or concepts were encountered, the reviewers sought consultation from relevant professionals to ensure a thorough comprehension of the paper. This consultation was deemed necessary to familiarise themselves with any terminology or concepts introduced in the paper, facilitating a deeper understanding of the key ideas. The process of familiarisation is detailed in Table 2.2.

Throughout the study, a total of 24 papers were reviewed to extract data, including bibliographical information, aims, and results from the primary papers. This process led to the identification of categories, the assignment of codes, and the generation of themes. Additionally, the team analysed the data and held several meetings to validate the findings. Early impressions and immediate thoughts were recorded to establish an initial framework for further analysis.

Table 2.2 Example of Familiarizing Data Process

Summary from paper	Key ideas	Immediate Thoughts
Objective of this investigation was to compare the efficacy of meaning-oriented AT when administered with a spaced versus massed practice schedule (Tye-Murray et al., 2017)	Efficacy of AT	To note any positive, negative or no differences effect of training
	Spaced practice group	To understand ‘time’ and ‘duration of training as parameters used in this study.
	Massed practice group	To understands ‘frequency’ of training as parameter used in this study

2.5.6.2 Step 2: Generating Initial Codes

Generating initial codes was conducted in two stages. In the first stage, the coding process was organised in a meaningful and systematic manner using the main categories formed during the data familiarisation process which are research background, AT program and outcomes measurement (Table 2.3) . These categories served as an outline for generating preliminary ideas about codes during the full-text review. Each category was tested for applicability across all 24 papers, with the researcher generating codes from every segment of text relevant to addressing the research question (Maguire & Delahunt, 2017). The categories provided a framework for inducing codes from the papers, with potential codes derived within each category. Despite the establishment of categories, an open coding process was employed by the reviewers. While the search for codes primarily aligned with the categories, it was not restricted solely to them, ensuring a strategic and comprehensive approach to achieving the research goals.

In the second stage of generating initial codes, the process involved examining and refining the codes. Codes were compared, discussed, and modified iteratively, progressing from one paper to another. This manual process utilised both hard and soft copies of the papers, employing pens and highlighters as necessary. Through this process, a hierarchical structure of codes was established, with Code 1 derived from the main category, Code 2 from Code 1, and so forth. The number of codes derived from each category was documented, facilitating an organised and systematic approach to data analysis. Specifically, a total of 24 codes were derived from the 'research background' category, 145 codes from the 'AT programme' category, and 29 codes from the 'outcomes measurement' category. The names for the set of codes and categories generated from this process were outlined in Appendix XVIII.

Table 2.3 A set of codes generated from reviewing

Main Category	Number of Code 1	Number of Code 2	Number of Code 3	Number of Code 4	Number of Code 5	Total
Research background	3	10	11	0	0	24
Auditory training program	4	11	24	58	48	145
Outcomes measurement	7	24	0	0	0	31
Total	14	45	35	58	48	200

2.5.6.3 Step 3: Searching for Themes

A theme is characterised by its significance (Braun and Clarke, 2006). The preliminary themes were identified from the initial codes. The reviewers examined the codes and found a clear fit with each theme. Upon further review of the codes, the team agreed to refine the categories and consolidate them into two main categories: AT programme design and AT programme parameters. All codes which were considered to be the sub-themes were analysed and categorised into these main categories, which were then transformed into themes.

2.5.6.4 Step 4: Reviewing themes

All initial themes derived in 2.5.6.3 were reviewed, modified, and associated with each theme in all papers. The team considered whether the data were workable in the context of the entire dataset (Maguire and Delahunt, 2017), and then the themes were accepted.

However, four conditions could occur during this process: (1) The themes did not make sense, (2) The data did not support the themes, (3) The themes overlapped, and (4) Themes within themes. For each condition, the researcher had to take three

actions to address the data, as shown in Table 2.4. Decisions needed to be made whether to remove, place them in other related themes, or form new themes. All these decisions were based on discussions among team members.

Table 2.4 Conditions of Themes and How to Treat it

Conditions	Treatment (either one)
1. The themes do not make sense	• To remove the themes • To move to any other related themes • To form new themes or sub theme
2. The data does not support the themes	
3. The themes overlap	
4. Themes within themes	

Below are examples of treatment done for each theme that met the conditions as stated in Table 2.4:

1. **Condition:** The themes do not make sense and themes overlap
 - a. **Example:** Goal, aims, and purpose
 - b. **Treatment:** Use "objective." Removed the themes because all of that has same meaning with objective and will not make any sense if the themes are kept.
2. **Condition:** Themes within themes
 - a. **Example:** The descriptive information about subjects has multiple information that need to be explained such as age, gender, hearing level, hearing age, and hearing devices. Each of these items has its own descriptions, for example, hearing level is described as normal hearing and hearing loss.
 - b. **Treatment:** Introduced new category; Sub-theme 1 and Sub-theme 2 for each sub-category of each theme (refer figure 3.3)

3. **Condition:** Data does not support themes and make no sense
 - a. **Example:** Other Diseases or Pathological Problems
 - b. **Treatment:** Removed this theme because this information will be redundant with eligibility criteria.

All 200 codes were translated into themes and sub-themes through a thorough and comprehensive review of all 24 papers. The themes were cross-checked against each other and corroborated with the data from the original papers to ensure alignment with key ideas. Throughout this process, themes underwent treatment and encountered the four conditions outlined above. Table 2.5 illustrates the number of themes that were accepted and treated, either by assigning a new name or by removal. This process aimed to produce coherent, consistent, and distinctive themes (Cruzes & Dybå, 2011).

Table 2.5 Number and Percentage of Theme during Review Process Codes, N=251

Review process	Number of themes	Percentage of themes (%)
Accepted theme	50	25
New themes name	50	25
Removed themes	100	50

2.1.1.2 Step 5: Finalising Themes

The final themes were compared across all papers and interpreted to form a model comprising two higher-order themes: AT programme design and AT programme parameters. The model consists of 23 themes and 77 sub-themes. These were reviewed in relation to the research questions and were found to clearly describe their relationship. The model and its relationships are illustrated in Table 2.6.

Table 2.6 Themes Model

Higher-order Themes	Theme	Sub-theme
AT Program Design	Author	None
	Year	None
	Sample Size	Total (N)
		Total subject complies
		Training group
		Control group
	Hearing	Hearing Status
		Hearing Devices
		Hearing Age
	AT Name or Description	None
	Measurement Test	None
	Research Sequence/procedure	None
	Duration	None
	Frequency	None
	Location	Home
		Laboratory
	AT Technique	computer based
		with trainer
		individual
		Group
	Findings	Positive
		Negative
		No difference

AT Programme Parameters	Retention	None
	Training Activities	None
	Training topic	None
	Communication Strategies	None
	Methods	Synthetic
		Analytic
	Approach	bottom-up
		top-down
		Increase difficulties when correct
		Decrease difficulties when incorrect
	Mode	Auditory-Only without Visual display/aid item
		Auditory-Visual without Visual display/aid item
		Auditory-Only with Visual display/aid item
		Auditory-Visual with Visual display/aid item
	Auditory Skills	Discrimination
		Identification
		Comprehension
		Auditory memory
		Localizations
	Speech Stimulus	Vowel
		Phoneme
		Syllables
		Monosyllable
		Spondee
		Nonsense word
		Word
		Phrases
		Sentence
		Paragraph
		Story
		Speech
		Rhymes
		Song
		Narratives

	Sound Stimulus	Environmental Sounds
		Melodic contour
		Pitch
		Rhythm
		Timbre
		Monophonic melodies
		Complex sounds
		Beats
		Pattern
		Dynamic expression
		Musical instruments
		Clapping
		Tapping
		Drumming
	Complexity of Training	Background noise (absence/ presence)
		Distance (close/ distance)
		Repetition (repeated/ once)
		Length of Utterance (short/ long)
		Complexity of utterances (simple/ complex)
		Rate of utterances (slow/ individual)
		Suprasegmental (emphasis/ little or no emphasis)
		Segmental (emphasis/ little or no emphasis)
		Target position (end/ middle / initial)
		Set (close/ open)
		Speaker Familiarity (familiar/ unfamiliar)
		Authenticity of sounds (degraded/ undegraded)
		Sounds Origin (live/ recorded)
		Learning Effect (adapted/ new)
		Learning Style (active/ passive)
		Stimulus presentation (in-sequence/ random)
		Stimulus Context (in-context/ out of-context)
N=2	N=23	N=77

2.5.6.5 Step 6: Defining themes

This represents the final refinement of the themes, aimed at identifying the essence of each theme (Braun & Clarke, 2006). The team's panel analysed the themes, assigning each one a name and definition as outlined in Table 2.7. The definition for each name was based on descriptions found in the dictionary, suggestions from literature (with all references provided), and newly developed names that accurately described the themes presented in the papers. Accepted definitions were those that aligned and harmonised with the key concepts presented in the papers.

Table 2.7 The Theme Name and Definition for AT Program Scoping Review

Themes (name)	Definition
analytic method	Recognizing the speech features and phonemes to comprehend the conversation message. Pedley et al. (2005) stated that analytic training is based on the assumption that speech is understood by recognizing the smallest distinguishing linguistic features that can be extrapolated and applied to higher-level units of speech such as sentences and paragraphs.
auditory skills	Ukstins and Welling (2015) described a hierarchy of auditory skills in four levels which are: 1. detection: ability to conditioned to a sound 2. discrimination: ability to determine whether two stimuli are the same or different 3. identification: ability to identify what has been labelled or named 4. comprehension: ability to understand the meaning of auditory input.
AT programme	AT is an intervention method used in rehabilitative audiology that aims to help individuals with hearing loss use their residual hearing maximally. It emphasises the development of listening skills to improve the recognition and interpretation of speech sounds despite limited hearing ability. AT can be described as an intervention in which listeners are taught to make perceptual distinctions about sounds that are presented systematically (Schow & Nerbonne, 2013).

AT programme parameters	Properties whose values determine the characteristics of an AT programme element.
auditory-only mode	Hearing training; uni-sensory training. No visual/other cue will be added.
auditory-visual mode	Auditory stimulation is assisted with visual cues e.g., speech reading.
authenticity of sounds	The sound quality is being genuine or true. Consist of degraded sounds (speech that has been altered to reduce its acoustic redundancy) and undegraded sounds (speech that maintained originality).
background noise	Ambient noise, often in competition with a speech signal; a major complaint of hearing aid users. Consist of with background noise or no background noise (silent).
bimodal hearing	The use of two different hearing devices (modalities) simultaneously (e.g., hearing aid and cochlear implant simultaneously at opposite ears (Mendel et al., 1999).
bottom-up approach	Bottom-up processing; information processing that is data driven properties of the data are primary determinants of higher-level representation and constructions.
cochlear implant	A device that delivers electrical stimulation to cranial nerve VIII (auditory nerve) via an electrode array surgically implanted in the cochlea; consists of a microphone, signal processor, and electrode system, used in cases of profound and total deafness (Mendel et al., 1999).
communication strategies	a course of action taken to enhance communication (Singh & Kent, 2000).
complexity of training	Variables that may influence the contents of an AT programme to monitor the patient's performances (Estabrooks & Marlowe, 2000).
complexity of utterances	The utterance is having various language rules and being difficult to understand or find an answer. Consists of simple utterances and complex utterances
control group	A group of people who are used for comparing training group in a test or experiment (Cambridge Dictionary, 2021)

distance/location	The amount of space between two places or things. Location; A place or position. Consist of close or distance
hearing / implant age (months/ years)	Hearing experiences (duration) using hearing aids or cochlear implants
hearing aids	An electronic device for amplifying sound delivered to the ear consisting minimally of a microphone, amplifier, and receiver (e.g.; behind-the-ear (BTE), completely-in-canal (CIC), in-the-canal (ITC), in-the-ear (ITE) (Mendel et al., 1999)
hearing loss	Abnormal or reduced hearing sensitivity. Measured as the number of decibels that the intensity of a tone must be raised beyond the normal threshold value for that tone to be detected. The percentage of hearing loss at a given frequency is 100 times the ratio of the hearing loss in decibels to the number of the decibels between the normal thresholds of audibility and of feeling at those frequencies; also know hearing impairment (Mendel et al., 1999)
hearing status	A decibel scale of sound intensity in which the reference, or zero point, is the intensity corresponding to average normal hearing for the particular acoustic signal under consideration; the threshold of an individual relative to the average threshold of normal youth adults; similar to hearing threshold level (HTL) (Mendel et al., 1999)
learning effect	Performance on a test improves as a function of familiarity with the test, procedures and test items and not because of a change inability. Consist of newly introduce items or adapted items
learning style	An individual's characteristic cognitive, affective, modalities, and physiological behaviours and preferences employed in perceiving, interacting with, and responding to the learning environment. Consist of active learning (self-training or train by trainer) or passive learning (no direct training received)
length of utterances	The measurement of utterances from one word per utterances to a complete sentence. Consists of short utterances and long utterances
negative findings	Findings that do not agree with what the researchers hypothesised.
no differences findings	Findings that neither agree or disagree with what the researchers hypothesised

normal hearing	Standard against which to compare hearing loss; in an audiometric test booth it is approximately 0 dB for a pure-tone test and nearly 100 % for word identification (Mendel et al., 1999)
positive findings	Findings that agree with what the researchers hypothesised
rate of utterances	A measurement of utterances speed at which something happens. Consists of slow rate of utterances and individual rates of utterances
repetition	The act of doing or saying something again. Consist of repeated and once
retention effect	The ability to keep or storing something or the ability to remember ideas or facts
segmental	Individual segment in spoken language; can be sentences, words, or syllables with their constituent phonetic units
set	a number of similar things that are used together or that belong with one another. Consists of closed set (a stimulus or response set that contains a fixed number of items that are known to a patient) and open set (a stimulus or response set that has no prior restrictions on its members)
sound stimulus	All type of sounds e.g., musical instruments/ environmental sounds/ silence/ noise others
sounds origin	The place or moments where sounds begin to exist. Consist of live sounds or recorded sounds
speaker familiarity	The state of knowing and recognizing the speaker's voice. Consist of familiar voice(s) and unfamiliar voice(s)
speech stimulus	All type of speech e.g. speech sounds of language, syllable-level which consist of the non- segmentals and segmental of language, word-level which contains the content, function, semantics and morphology of language, phrase-level which determine the language the carrier, chunking and clauses, sentence-level which involve the syntactic, complexity and pragmatics of language, connected discourse level which involves the conversation, narration, explanation, directions, description, question, songs, rhymes (Estabrooks & Marlowe, 2000).
stimulus context	The overall collection of discourse stimuli that illuminate meaning; the interconnected circumstances within which something exists or happens. Consists of stimulus in context or stimulus out of context.

stimulus sequence	The stimulus was given in a set of events, actions, numbers, etc. which have a particular order and which lead to a particular result. Consist of stimulus in sequence or stimulus in random
suprasegmental	Information about the level of individual sounds; prosodic aspects of speech including variation of pitch, rate, intensity, rhythm, intonation, and stress pattern
synthetic method	Speech perception which postulates that the listener synthesises possible messages from the context and syntax. Pedley et al. (2005) suggested the task in synthetic training is to focus on comprehending the sentence's meaning without attending to specific acoustic elements. This can be achieved through the use of phrases and sentences to take advantage of the same linguistic and situational redundancy that exists in everyday listening situations.
target position	The important message was place and highlighted at different position; Either at the beginning, middle or end of word, phrase, sentence, or whole message
technique of AT	Two techniques for providing AT 1. Face to face (either individual or group); uses a resource such as a program manual, appropriate set up, clinical personnel (trainer) 2. computer-based training; either at home or laboratory and either with trainer or with no trainer
top-down approach	Top-down processing; information processing that is knowledge or concept driven with higher level constraint guiding data processing leading to data interpretation consistent with the constraints
trainer	A person who teaches skills to people and prepares them for a job, activity, or sport (Cambridge Dictionary, 2021)
training activity	The training function or duties
training approach	The training style of listening process either bottom-up approach or top-down process
training feedback	information or statements of opinion about training, that can tell you if it is successful or liked
training group	Also known as experimental group; is a group of subjects who are exposed to the variable under study (receive or are exposed to the treatment variable)

training methods	A particular way of doing something.
training mode	The training style of using listening sensory either auditory/ visual/ auditory with visual etc.
training topic	The training subject matter
visual-only mode	Communication using visual mode without auditory input. e.g., lip reading or speechreading.

2.6 ANALYSIS AND RESULTS FOR SCOPING REVIEW

The results for 24 final selected articles based on themes model are the AT design (durations, frequency, length, location, computer based/face to face, with trainer/self-training, individual/group) is as shown in table 2.8, The AT programme parameters (methods, approaches, modes, auditory skills, speech stimulus, sound stimulus and complexity of training) have been based on objectives stated in 2.4 which will be main part of the analysis and results for the scoping review study.

2.6.1 Results of Auditory Training Design (N=24)

The AT design of selected studies presented in Table 4.0: (1) Paper's author(s) and year of the paper published, (2) Sample Size Total (N) showing the number of subjects that complies in the research, total number of training group and control group, (3) Hearing status showing hearing devices used and hearing age, (4) AT name or description (if the programme was not given a specific name), (5) Measurement test used in the research, (6) The research sequence and procedure, (7) The training duration and frequency in the research, (8) The training location either at home or in laboratory, (9) AT delivery style either computer based, with trainer, individual or in group, (10) The findings either positive findings, negative findings, no differences findings, or findings which are not available, and (11) The retention effect if available. In this part, each of all 24 papers has been identified based on the ID number.

ID	Author and year	Sample Size		Hearing Status			AT Name or Description	Measurement Test	Research Sequence/ procedure	Duration, frequency and length of training	Location	Findings	Retention
		Total (N)	Training group	Hearing Status	Hearing Devices	Hearing Age					AT Delivery Style		
1	Saunders et al. (2016)	243	206	Mild to Moderate	Hearing aid (HA)	i. 4weeks (wk) to 6months (mo) ii. ≥6mo	Listening & Communication Enhancement (LACE)	<u>Standardized test</u> i. Word-in-Noise-test (WIN) (Wilson et al. 2003; Wilson & McArdle 2007) ii. NU-6-word lists (Wilson et al. 1994) iii. Modified NU-20 test (Olsen & Carhat, 1967) iv. Wechsler Adult Intelligence scale 3 rd Edition, WAIS-III (Wechsler, 1997) v. The Low Predictability Sentences performance on the multi-SNR R-SPIN (Wilson et al. 2012) vi. Abbreviated Profile of Hearing Aid Performance (APHAP) (The; Cox & Alexander 1995) vii. Hearing Handicap Inventory (HHI) for the elderly and adults (Ventry & Weinstein 1982; Newman et al. 1990)	i. Pre-training test 1: Inclusion assessment ii. Pre-training test 2: Baseline (within 6wk of pre-test 1) iii. Training: 2wk to 4wk iv. Post-training test 1: Immediate post training: Within 2wk of the end of the training period. v. Post-training test 2: 6mo post training: occurred 6mo to 8mo following	30 minutes (min) 10-20 sessions 2wk to 4wk	Home	ND	No 6mo
		243	73								Computer based ST Individual		

Table 2.8 Descriptive Summary of the Auditory Training Design

2.	Tye-Murray et al., 2017)	47	47	HL (hearing loss) but degree was not specified (NS)	HA	NS	Customized Learning: Exercises for Aural Rehabilitation (cLEAR) formerly known as: I Hear What You Mean	<u>Standardized test</u> i. Transfer-Appropriate Processing (TAP) style measure of improvement (Barcroft et. al., 2011b, 2016) ii. The Build-a-Sentence test (BAS) (Tye-Murray et al., 2008)	i. Pre-training test ii. Training: • The spaced group; began training within 1wk of completing the Pre-test, • The massed group; started at the 8 th wk iii. Post-training test 1 iv. Post-training test 2: 3mo after the post-training test 1	60 min 20 sessions 5 th wk and 10 th wk	Lab	ND	Yes 3mo
		47	0								Computer based ST Individual		
3.	Rishiq et al. (2016)	24	12	Mild to Moderate	HA	NS	ReadMyQuips (RMQ)	<u>Standardized test</u> The Multimodal Lexical Sentence Test for Adults (MLST-A) (Kirk et al., 2012)	i. Pre-training test 1: on the day of hearing aid fitting ii. Pre-training test 2: after 4wk of hearing aid use prior to RMQ training iii. Training or no training: 4wk iv. Post-training test 2: after 4wk of RMQ training or no training	30 min 20 sessions 1 to 4wk	Lab: 1wk (first) Home: 3wk	ND	No 4wk
		24	12								Computer based Trainer: 1wk ST: 3wk Individual		

4.	Preminger & Ziegler (2008)	50	>16	Hearing Loss (NS)	HA	≥3m	Audiologic Rehabilitation Classes	<u>Standardized test</u> i. City University of New York (CUNY) AB Isophonemic Word Lists (Boothroyd, 1984; Boothroyd, Hnath-Chisolm, Hanin, & Kishon-Rabin, 1988) ii. CUNY Topic Related Sentences (Boothroyd et al., 1988) iii. Hearing Handicap Inventory (HHI) for the elderly and adults (Ventry & Weinstein 1982; Newman et al. 1990) iv. World Health Organization Disability Assessment Schedule II (WHODAS II) <u>Newly developed test</u> Class evaluation form: A subjective class evaluation form	i. Pre-training test: 2-wk prior first class ii. Training or no training: 6wk iii. Post-training test 1: 2-wk after training or no training iv. Post-training test 2: 6mo after training or no training	60 to 90 min 6 sessions 6wk	Lab	ND	Yes 3m
		47	≥16								F2F Two trainers Group		
5.	Shafiro (2008)	7	7	Normal Hearing	None	NS	Environmental Sounds Training	<u>Newly developed test</u> Tested using the entire stimulus set (40 sound sources, 4 exemplars each, for a total of 160 stimuli)	i. Pre-training test ii. Training iii. Post-training test	30 min	Lab	+	NT
		7	0							5 sessions 2wk	Computer based ST Individual		
6.	Loebach et al. (2010)	144	96	Normal Hearing	Cochlear Implant (CI)	NS	Speech Processed Training	<u>Newly developed test</u> Transcribe 20 spectrally degraded meaningful sentences	i. Familiarization ii. Pre-training test iii. Training iv. Post-training test v. Generalization	NS	Lab	+	NT
		144	48								Computer based ST Individual		
7.	Driscoll et al. (2009)	66	66	Normal Hearing	CI	NS	Musical Instruments Training	<u>Newly developed test</u> i. Music Background Questionnaire (MBQ) ii. Paired Associate Memory Test (PAT) iii. Instrumental Simulation Recognition Test	i. Pre-training test: 1st wk ii. Training: 5wk training iii. Mid-training Test: 3rd wk of training	12 minutes	Home	+	Yes 7w
		66	0							15 sessions 5wk	Computer based ST Individual		

									iv. Post-training test 1: 5th wk v. Post-training test 2: 7th wk				
8.	Shafiro et al. (2015)	14	14	Mild	CI	≥12m	Environmental Sound Training	<u>Standardized test</u> i. The Familiar Environmental Sound Test (FEST) (Shafiro, 2008; Shafiro et al., 2012) ii. Consonant-Nucleus-Consonant (CNC), monosyllabic word recognition test (Peterson & Lehiste, 1962) iii. Speech-in-Noise (SPIN-R) sentence test (Elliott, 1995)	i. Pre-training test 1 ii. Pre-training test 2: (1wk interval from pre-test 1) iii. Training: (4wk) iv. Post-training test 1 v. Post-training test 2: (1wk after training)	40 to 60 min 8 sessions 1wk	Home	ND	Yes 1w
		14	0								Computer based ST Individual		
9.	Preminger & Meeks, (2010)	72	36	Moderate	HA and CI	≥3m	Audiologic Rehabilitation Classes	<u>Standardized test</u> i. Hearing Handicap Inventory (HHI) Elderly (Ventry and Weinstein, 1982) ii. Modified HHI-Adult (Newman et al, 1990) iii. Modified HHI-Spouse (Newman and Weinstein, 1988) iv. 10-item Perceived Stress Scale (PSS) (Cohen and Williamson, 1988) v. Philadelphia Geriatric Center Positive and Negative Affect Rating Scale (Affect Rating Scale, or ARS) (Lawton et al, 1992) vi. Communication in the Marriage Primary Communication Inventory (PCI) (Navran, 1967)	i. Pre-training test: 4wk before AR program ii. Training: AR Class for 4wk iii. Post-training test 1: within 2wk after completing AR program iv. Post-training test 2: 6mo after training	90 min weekly	Home	ND	Yes 6m
		72	36								F2F Trainer with and without spouse		

10	Miller et al. (2015)	240	240	Mild to moderate	HA	≥3m	Speech Perception Assessment and Training System (SPATS)	Standardized test i. The Win (word-in-Noise-test; Wilson & McArdle 2007) ii. Quick Speech-in-Noise Test (Killian et. al. 2004) iii. CID Monosyllabic Word Test in Quiet and in Noise (Hirsch et.al. 1952) iv. Connected Speech Test (listen Only) (Cox et.al. 1987 and 1988) v. Connected Speech Test (Look and Listen) (Cox et.al. 1989) vi. The abbreviated profile of hearing aid performance (APHAP) (Cox & Alexander 1995) Newly developed test Speech-Perception Tests (Speech Perception Assessment and Training System-Related)	i. Pre-training test ii. Training: (30 hours) iii. Post-training test 1 iv. Post-training test 2: after 2-3mo post training	90 to 120 min 15 to 20 sessions	Lab: 6 sites	NA	NA
			0								Computer based Trainer Individual		
11	Smith et al. (2016)	279	193	Mild to Moderate	HA		Listening & Communication Enhancement (LACE)	Standardized test i. Word-in-Noise-test (WIN) (Wilson et al. 2003) ii. Hearing Handicap Inventory (HHI) for the elderly and adults (Ventry & Weinstein 1982; Newman et al. 1990) iii. The abbreviated profile of hearing aid performance (APHAP) (Cox & Alexander 1995)	i. Pre-training test 1 ii. Pre-training test 2: baseline iii. Training: immediate after pre-test 2 iv. Post-training test 1: immediate after training v. Post-training test 2: 6-month	30 min 10-20 sessions 2 to 4wk	Home	+	NA
		263	70								Computer based ST Individual		

12	Tyler et al. (2010)	12 12	6 6	Mild to Profound	CI	3y – 8y	Speech-in-noise and Localization Training	Standardized test i. Nucleus-consonant monosyllabic words (CNC) (Tillman and Carhart, 1966) ii. CUNY sentences (Boothroyd et al, 1985) iii. Hearing in Noise Test (HINT) sentences (Nilsson et al, 1994) iv. Everyday sounds localization test (Dunn et al, 2005) Newly developed Real-world listening test for localization and recognition	i. Pre-training test: 38-96mo post-implantation ii. Training: 1 to 3mo iii. Post-training test	30min Frequency at own control 4 to 12wk	Home Computer based ST Individual	+	Yes 7m
13	Anderson et al. (2012)	77 77	38 39	Mild to profound	None	NS	The Brain Fitness™ Cognitive Training	Standardized test Quick Speech-in-Noise Test (Killian et al. 2004) Newly developed test i. Two subtests of the Woodcock–Johnson Tests of Cognitive Abilities ii. The Integrated Visual and Auditory Continuous Performance Test iii. Electrophysiology test	i. Pre-training test ii. Training iii. Post-training test	60min 40 sessions 8wk	Home Computer based ST Individual	+	NT
14	Rao et al. (2017)	38 22	11 11	Mild to Moderate	HA	4w	ReadMyQuips (RMQ)	Standardized test i. Cortical late event-related potentials (ERPs) ii. Hearing in Noise Test (HINT) sentences (Nilsson et al, 1994)	i. Pre-training test ii. Training (4 weeks) iii. Post-training test	30min 20 sessions 4wk	Lab: 1wk Home: 4wk Computer based T: 1wk ST: 3wk Individual	+	NT

15	Yu et al. (2017)	2	2	Mild to Moderate	HA	NS	ReadMyQuips (RMQ)	<u>Standardized test</u> Multimodal Lexical Sentence Test for Adults (MLST-A; Kirk et al., 2012) <u>Newly developed test</u> Functional magnetic resonance imaging (fMRI)	i. Pre-training test ii. Training: HA uses for 8wk and one subject receive 4wk training iii. Post-training test	NS	Lab	+	NT
		2	0								Computer based ST Individual		
16	Fu & Galvin (2007)	13	13	Hearing Loss (NS)	CI	Several years	Computer-Assisted Speech Training (CAST)	<u>Standardized test</u> i. HINT sentence recognition thresholds in steady, speech-shaped noise ii. IEEE21 sentence recognition in quiet <u>Newly developed test</u> i. Multitalker vowel recognition in quiet ii. Multitalker consonant recognition in quiet	i. Passive learning: • Pre-training test (baseline): every 3mo • adaptation period: 18mo • Post-training test: Retesting every 2wk ii. Active 1. Pre-training test (baseline): at least 2wk 2. Training: 1mo or longer 3. Post-training test: Retesting every 2wk	60min 20 sessions >4wk	Home	+	NT
		13	0								Computer based ST Individual		
17	Petersen et al. (2012)	24	15	Severe	CI and HA	NS	The Musical Ear-Training	<u>Newly developed test</u> i. Musical instrument identification (MII) ii. Melodic contour identification (MCI) iii. Pitch ranking (PR) iv. Rhythmic discrimination (RD) v. Melodic discrimination (MD) vi. The Hagerman speech perception test (HAG) vii. An emotional prosody recognition test (EPR)	i. Pre-training test (baseline): within 14dy after CI switch-on ii. Training or no training: 6mo iii. Mid-training test: within 3mo training or no training iv. Post-training test: after training or no training	60min 24wk	Home and Lab	+	NT
		24	9								Computer based and F2F ST and with Trainer Individual		

18	Wayne & Johnsruide (2012)	144	144	Normal Hearing	None	NS	Perceptual Learning of Degraded Speech Training	Newly developed test Word-report task	i. Pre-training test ii. Training iii. Post-training test: testing (report) after each training item (given 25s for report after each sentence during both training and test)	NS	Lab	ND	NT
		144	0								Computer based Trainer Individual		
19	Krull et al. (2012)	30	24	Normal Hearing	CI or CI and HA	NS	Talker-identification Training	Newly developed test i. Sentence-recognition using two lists of sentences (in quiet and in noise) ii. Emotion-recognition performance using 100 tokens in quiet	i. Pre-training test (first day) ii. Training (4 days) or no training iii. Post-training test 1 (at day 4) iv. Post-training test 2 (after 30 days)	4 sessions 45 to 60min 4dy	Lab	+	Yes 1m
		30	6								Computer based ST Individual		
20	Richie & Kewley-Port (2008)	14	7	Normal Hearing	None	NS	Vowel identification Training	Newly developed test i. Closed-set vowel identification test (vowels in CVC context) ii. An open-set monosyllable word recognition test iii. An open-set sentence recognition test (Central Institute for the Deaf Everyday Sentences)	i. Pre-training test: First day: designed to assess the participants' untrained auditory-visual speech perception abilities ii. Training: 6 sessions or no training iii. Post-training test: final day of testing.	60min 6dy	Lab	+	NT
		14	7								Computer based ST Individual		
21	Loebach et al. (2009)	48	24	Normal Hearing	None	NS	Speech Processed Training	Newly developed test i. Environmental sound identification ii. Talker- gender identification iii. Talker discrimination	i. Familiarization (brief) ii. Pre-training test iii. Training iv. Post-training test	1 session	Lab	+	NT
		48	24								Computer based ST Individual		

22	Sweetow & Sabes (2007)	65 65	65 0	Hearing Loss (NS)	HA	6m to 44y (year)	Listening & Communication Enhancement (LACE)	Standardized test i. Quick Speech-in-Noise Test (Killion et al. 2004) ii. Hearing Handicap Scale for the Elderly (HHIE) (Ventry & Weinstein 1982; Newman et al. 1990) iii. Communication Scale for Older Adults (CSOA)	Group One (immediately trained) i. Pre-training Test: Baseline ii. Training: 4wk iii. Mid-training test iv. Post-training test 1 v. post-training test 2: 4wk after post-test Group two (crossover period subjects); i. Pre-training test: Baseline ii. Pre-training test (after 4wk from baseline) iii. Training: 2wk iv. Mid-training test v. Post-training test vi. Post-training test 2: 4wk after post-test 1	20 sessions 30min 4wk	Home Computer based ST Individual	+	Yes 8w
23	Tye-Murray et al. (2011)	>100 >100	>100 0	Hearing Loss (NS)	HA	NS	I Hear What You Mean	NS	NS	60min	Lab Computer based ST Individual	+	NT
24	Miller et al. (2007)	65 65	65 0	Hearing Loss (NS)	NS	NS	Speech Perception Assessment and Training System (SPATS)	NS	NS	NS	Lab Computer based ST Individual	+	NT

Notes: Face to face (F2F), Self-training (ST), + (positive), Not specified (NS), No Differences (ND), Not Applicable (NA), Not tested (NT), months (mo), hearing aid (HA), cochlear implant (CI), week (wk), minute (min)

2.6.1.1 Paper's Author and Year

This scoping review covers papers produced from 2007 to 2017. However, only eight papers obtained from database research, whereas the remaining 13 papers were found from years 2007 to 2011 which were caught during the same database research, following all other eligible criteria. The papers were included due to information and data found to be significant for this current study. Another three papers from grey search were also included from 2007 (two papers) and 2011 (one paper) since this paper explained in detail the programme used in the study from the database research.

2.6.1.2 Sample Size

In this study, AT shows large variation in terms of sample size (between $n=2$ to $n=279$). However, the majority of the study utilised sample size < 100 (18 out of 24 studies). It was found that study using large sample size (> 100) normally governs to the efficacy using self-training computer-based with audiologist as supervisor as shown in a number of studies including, ID01, ID06, ID10, ID11 AND ID23. These research works will use face-to-face methods using trainers; therefore, this study will refer to study ID04 with 47 subjects and ID09 with 72 subjects.

Regarding study compliance, the majority of the study showed a 100% compliance rate where all subjects recruited at the beginning followed the whole research process until final results were gathered. The lowest compliance rate recorded is in study ID 14 with 22 subjects compiled from 49 subjects recruited because most of the subjects did not pass the qualification tests required by the research at an early stage.

A total of 13 papers in this review have been compared on improvement of the AT programme between groups; a training group and a control group with 8 papers have 1:1 ratio of subjects in both groups. The other 5 papers have a training group number larger than the control group, while 11 papers have not compared their research with the control group. This research will adopt the 1:1 ratio of training and control group.

2.6.1.3 Hearing Status

Majority of research used subjects with hearing loss (17 out of 24 papers) and the remaining seven used normal hearing subjects. The hearing loss range was mostly mild to moderate hearing loss subjects. Least papers used severe to profound hearing loss subjects because most papers in this review were investigated hearing aids users (14 out of 24 studies).

About hearing age, the majority of the studies did not specify the hearing age (14 out of 24 research). The studies that showed hearing age were randomly from one month to 44 years which give suggestion to this study not to specify the hearing age as one of the inclusion criteria.

2.6.1.4 Auditory Training Program Name

There were 15 AT programmes identified from 24 papers. Each programme has been given a new ID number since it needs individual discussion and to be separated from papers. The ID will start from P01 to P15 as shown in table 4.1.

2.6.1.5 Measurement Test

In this review, three types of measurement have been used; standardised test, newly developed test and combination of these two types of measurement. The standardised tests were administered to measure either speech-perception, hearing handicap-perception or cognitive-performance. While the newly developed test was done to measure the specific area trained in the programs.

2.6.1.6 Research Sequence and Procedure

The research sequence and procedure are defined to show how the research and training has been conducted in each research. Nine models of procedure were found in 24

papers; (1) PTP (pre-training, training, post-training), (2) PTPP (pre-training, training, post-training 1, post-training 2), (3) PPTPP (pre-training test 1, pre-training test 2, training, post-training 1, post-training 2), (4) PPTP (pre-training test 1, pre-training test 2, training, post-training test), (5) PTMP (pre-training test, training, mid-training test, post-training test), (6) PTMPP (pre-training test, training, mid-training test, post-training test 1, post-training test 2), (7) PPTMPP (pre-training test 1, pre-training test 2, training, mid-training test, post-training test 1, post-training test 2), (8) FFTP (familiarization, pre-training test, training, post-training test), (9) FFTPG (familiarization, pre-training test, training, post-training test, generalization).

Pre-training and post-training will be measured using the same measurement test and tested according to the research's sequence and procedure. Training part will be given to training group or all subjects if the research has no objectives to compare between training and control group. The process of familiarization and generalization is to get the subjects to be familiar with training content or to use the training content in everyday life. Based on this review, majority of studies used PTP sequence in their study (eight out of 24).

2.6.1.7 The Training Duration, Frequency and Length

Each AT was designed to be in a specific time duration per session, with specific frequency of training and in stipulated length of time. Most studies conducted training ≤ 30 min and 31 to 60 min per session with most studies were conducted between 10 to 20 session in ≤ 4 weeks.

2.6.1.8 The Training Location and Auditory Training Delivery Style

This review found that the majority of the studies were done in laboratories as compared to homes. While training delivery style explained AT either in computer based, face-to-face (F2F), with trainer, self-training (ST) individual or group showed 13 programmes are computer-based programmes with only two used face-to-face programmes. The programmes were mostly focused on speech-perception training in which 11

programmes were trained in speech, two programmes trained in musical perception and one in environmental sounds. Only one programme trained in cognitive-perception. Based on this review, most of the training (17 out of 24) were self-training and majority of the studies (19 out of 24 studies) were done individually.

2.6.1.9 Effectiveness of the Auditory Training Program

Research findings in each paper has been classified as either positive findings, no differences findings or findings which are not available. Positive findings are when the training has shown better training effects. Majority of the studies showed positive findings for their training (16 out of 24 studies). However, seven papers found no differences between pre and post training.

2.6.1.10 The Retention Effect

The retention effect is to see if the training remains as a post-training. Only ten papers studied the retention effect; eight papers showed retention effects and two papers showed no retention effects. A total of 12 papers did not carry out research on retention effect and two are still on-going. Therefore, the result was not available.

2.6.2 Result of The Auditory Training Program Parameters (N=15)

Table 2.9 shows the parameter found from 15 programs, consists of (1) Training activities, (2) Training theme, (3) Communication Strategies, (4) Methods, (5) Approach, (6) Mode, (7) Auditory Skills, (8) Speech Stimulus, (9). Sound Stimulus, and (10) Complexity of training.

ID	AT Name	ID	Training Activities	Training theme	Method	Approach	Mode	Auditory Skills	Speech Stimulus	Sound Stimulus	Complexity of Training
P01	Listening and Communication Enhancement (LACE) (Sweetow and Sabes, 2007)	1 11 22	to choose a response from a choice on screen after listening to auditory stimuli	Topics - health - issues - money matters - exercise	NS	-when correct: increase difficulties -when wrong: decrease difficulties	Auditory-only and auditory-visual with visual aid/feedback	- identification - comprehension - auditory memory	- word - sentence - speech	none	- background noise - length of utterance - complexity of utterances - rate of utterances - speaker familiarity - authenticity of sounds - sounds origin - learning effect - learning style - stimulus presentation - stimulus context
P02	Customized Learning: Exercises for Aural Rehabilitation (cLEAR) formerly known as: I Hear What You Mean Tye-Murray, Sommers, & Barcroft, 2011)	2 23	to choose a response from a choice on screen after listening to auditory stimuli	Topics - restaurant - travel - family - sports	NS	bottom-up and top-down	Auditory-only with visual aid/feedback	- identification - discrimination - comprehension	- phoneme - word - sentence - paragraph	none	- background noise - repetition - length of utterance - complexity of utterances - target position - set - speaker familiarity - sounds origin - learning effect - learning style - stimulus presentation - stimulus context

Table 2.9 Descriptive Summary of The Auditory Training Program Parameters

P03	ReadMyQuips (RMQ; http://sensesynergy.com/)	3 14 15	to complete modified crossword puzzles after listening to video recordings of quips	NS	NS	bottom-up and top-down	Auditory-only, Visual-only and Auditory-visual with visual aid/feedback	- identification - discrimination - comprehension	- syllable - word - narrative	none	- background noise - distance - complexity of utterances - rate of utterances - segmental - sounds origin - stimulus presentation
P04	Audiologic Rehabilitation Classes (Preminger and Ziegler, 2008)	4 9	Face to face activities with trainer - Analytic exercises: to discriminate and identify phonemes - synthetic exercises: (topic will be introduced for each exercise), i. answering questions about presented paragraph and ii. repeating sentences (varies in length)	NS	Analytic and synthetic	NS	Auditory-only and Auditory-visual	- discrimination - identification - comprehension	- phoneme - syllable - sentence - paragraph	none	- background noise - distance - repetition - length of utterance - speaker familiarity - sounds origin - learning style - stimulus presentation - stimulus context
P05	Environmental Sound Training (Shafiro, 2008)	5 8	to choose a response from a choice on screen after listening to auditory stimuli	Sounds - human and animal vocalizations and bodily sounds - mechanical sounds of interacting inanimate solids - water-related sounds - aerodynamic sounds - electric and acoustic signalling sounds	NS	NS	Auditory-only with visual aid/feedback	identification	none	environmental sounds	- repetition - authenticity of sounds - sounds origin - learning effect - learning style - stimulus presentation

P06	Speech Processed Training (Loebach, Pisoni and Svirsky, 2009)	6 21	to transcribe by typing on keyboard after listening to auditory stimuli	Songs and Spoken Language - familiar nursery rhymes - 140 meaningful Harvard sentences contained five keywords e.g., the <u>ripe taste of cheese improves</u> with <u>age</u> . - 60 meaningful sentences contained four keywords e.g., <u>fresh bread smells great</u> - environmental context in four categories: general home, kitchen, office, and outdoors	NS	NS	Auditory-only and auditory-visual with visual aid/feedback	- discrimination - identification - comprehension	- sentence - nursery rhymes	environmental sounds	- repetition - rate of utterances - speaker familiarity - authenticity of sounds - sounds origin - learning effect - learning style
P07	Musical Instruments training program (Driscoll et.al, 2009)	7	to choose a response from a choice on screen after listening to auditory stimuli	Sounds three simple melodic patterns from 8 musical instruments; - flute - clarinet - saxophone - trumpet - trombone - violin - cello - piano	NS	NS	Auditory-only with visual aid/feedback	identification	none	environmental sounds	- repetition - sounds origin - learning effect - learning style
P08	Speech Perception Assessment and Training System (SPATS) (Miller et.al., 2007)	10 24	to choose a response from a choice on screen after listening to auditory stimuli	Spoken Language - the sentence module; contains spoken words (target words) in the onset, nucleus or coda e.g., if a target word was "pat", a foil might be "brat", "path" or "pit" - syllable constituent module; 45 onsets, 28 nuclei and 36 codas (onsets in word initial syllables, of nuclei in the stressed syllables of words, and of the word-final codas)	NS	bottom-up and top-down	Auditory-only with visual aid/feedback	- discrimination - identification - comprehension	- sentence - narrative - phoneme - syllable - word	none	- background noise - repetition - length of utterance - complexity of utterances - suprasegmental - segmental - set - sounds origin - learning effect - learning style - stimulus context

P09	Speech-in-noise and Localization Training (Tyler et.al. 2010)	12	to choose a response from a choice on screen after listening to auditory stimuli	Spoken Language and Sounds - 12 spondee words - sounds: fog horn, car horn, crowd cheering, drums, door knock, ocean waves, police siren, train, applause, bugle, cat meowing, children laughing, elephant trumpeting, motorcycle engine, bell ringing, and warning siren	NS	-when correct: increase difficulties -when wrong: decrease difficulties	Auditory-only and auditory-visual with visual aid/feedback	- localizations - comprehension	spondee	environmental sounds	- background noise - distance - repetition - suprasegmental - set - sounds origin - learning effect - learning style - stimulus presentation
P10	The Brain Fitness™ cognitive Training (Posit Science Corporation, San Francisco, California)	13	to complete multiple-choice questions on personal computer after listening to auditory stimuli	Topics - history - art - science	NS	NS	NS	- comprehension - auditory memory	- syllable - sentence	none	- background noise - repetition - suprasegmental - set - sounds origin - stimulus context
P11	Computer-Assisted Speech Training (CAST) program developed at House Ear Institute	16	to choose a response from a choice on screen after listening to auditory stimuli	Spoken Language - vowel and consonant contrasts were trained, using monosyllable words (i.e., “seed” versus “said” versus “sad” versus “sawed”)	NS	bottom-up and top-down	Auditory-only with visual aid/feedback	- Discrimination - Identification - comprehension	- phoneme - syllable - word - sentence - speech	melodic contour	- suprasegmental - sounds origin - learning style

P12	The Musical Ear-Training Program (Petersen et.al. 2012)	17	- Music-training session by professional music teacher - to choose a response from a choice on screen after listening to auditory stimuli	Spoken Language and Sounds - singing: to vocalize and imitate short phrases with a range of vowels. - playing: to imitate short phrases and to play well-known folk and children's songs with a limited range of notes on the piano. - listening: to identify and distinguish simple well-known monophonic melodies played on piano.	NS	-when correct: increase difficulties -when wrong: decrease difficulties	Auditory-only with visual aid/ feedback	- discrimination - identification - comprehension	- phrase - song - vowel	melodic contour	- repetition - length of utterance - complexity of utterances - rate of utterances - suprasegmental - segmental - sounds origin - learning effect - learning style - stimulus presentation
P13	Perceptual Learning of Degraded Speech Training (Wayne and Johnsrude, 2012)	18	to choose a response from a choice on screen after listening to auditory stimuli	Spoken Language - 30 simple, declarative sentences with a range of lengths (6 to 13 words per sentence) - sentences were assigned to six sets of five sentences each, such that they were matched item by item for number of words, spoken duration, naturalness, and imageability	NS	NS	Auditory-only and auditory-visual with visual aid/ feedback	- identification - comprehension	- word - sentence	none	- repetition - length of utterance - complexity of utterances - rate of utterances - suprasegmental - segmental - authenticity of sounds - sounds origin - learning effect - learning style
P14	Talker-identification Training (Krull and Luo, 2012)	19	to choose a response from a choice on screen after listening to auditory stimuli	Spoken Language - 320 sentences (80 sentences x 4 lexical categories each). - key words in each sentence are controlled for word frequency (i.e., how often the word occurs in English) and neighbourhood density (i.e., the number of phonemically similar words).	NS	NS	Auditory-only with visual aid/ feedback	Identification	- word - sentence	none	- background noise - repetition - length of utterance - rate of utterances - suprasegmental - segmental - sounds origin - learning style

				- key words belong to one of four lexical categories representing orthogonal combinations of word frequency (high or low)							
P15	Vowel identification Training Program (Richie and Kewley-Port, 2008)	20	to choose a response from a choice on screen after listening to auditory stimuli	Spoken Language - 10 English vowels /i, i, e, e, æ, a, â, o, o, u/ in isolated monosyllables presented in a variety of cvc contexts; either some real words, such as bib /bib/, and phonotactically plausible nonwords, such as beeb /bib/ - the words were composed of cve, cvce, and ccvc strings. the words were balanced for the 10 vowels; in the set of 40 words, there were four instances of each vowel. - 10 sentences spoken by the female talker and a different 10 sentences spoken by the male talker were used.	NS	NS	Auditory-only with visual aid/ feedback	- discrimination - Identification - comprehension	- vowel - syllable - sentence	none	- background noise - repetition - length of utterance - rate of utterances - suprasegmental - segmental - set - speaker familiarity - sounds origin - learning effect - learning style

Notes: Not specified (NS)

2.6.2.1 Training Activities

In every AT programme, they have a specific training activity and different types of activities conducted in each training. A total of 11 studies conducted training activity by “choosing a response from a choice on screen after listening to auditory stimuli”, Among the training activities conducted in the studies were “to complete modified crossword puzzles after listening to video recordings of quips”, “face-to-face activities with trainer to do analytic and synthetic exercises”, “to transcribe by typing on keyboard after listening to auditory stimuli”, “to complete multiple-choice questions on personal computer after listening to auditory stimuli” and “music-training session by professional music teacher”.

2.6.2.2 Training Theme

This research work has reviewed themes used for AT in each study paper and found out that most of the studies did not specify themes for their training but instead explained the materials used in their training. As such, this study categorises the research themes in four training groups which are topics, sounds, spoken language and song. The topics used in the studies vary from multiple subjects such as health issues, money matters, exercise, restaurant, travel, family, sports, history, art and science. The sounds will include all human, animals, environmental and musical instruments. In addition, spoken language also included and covered all speech-language chunks from phonotactics, syllables and sentences. Selected songs were nursery rhymes and well-known folk songs.

2.6.2.3 Communication Strategies

In helping the subjects to achieve auditory skills after attending the AT, most research has used various communication strategies such as using helpful hints or clues, interactive communicative strategies and giving support or encouragement to subjects to continue the training. However, seven programs (P06, P08, P10, P11, P13, P14, P15) did not specify any communication strategies.

2.6.2.4 Methods

From literature, the AT method was defined by two trainings: analytic training and synthetic training. However, this study showed only one programme used analytic and synthetic methods in the training. Other 14 programmes did not specify any methods used.

2.6.2.5 Approach

Most studies did not state clearly what type of approach (either bottom up or top-down approach) that they used in their programmes. Only four programmes stated they used bottom up or top-down approach, but another three programmes stated they “increased difficulties when correct responses were given and decreased difficulties when wrong response were given:”

2.6.2.6 Mode

Three modes of AT were found from 15 programmes namely, auditory-only (AO), auditory-visual (AV) and visual-only (VO). Some programmes combined the mode with visual aid or feedback (VAF). In general, AT programmes used AO with VAF.

2.6.2.7 Auditory Skills

Five auditory skills focused and targeted found in 15 programmes are discrimination, identification, comprehension, auditory memory and localization.

2.6.2.8 Speech Stimulus

Eleven speech stimuli were targeted in 15 programmes including vowel, phoneme, syllable, word, spondee, sentence, paragraph, narrative, nursery rhymes, song and speech. Speech stimuli is based on the language of the speaker.

2.6.2.9 Sound Stimulus

There was also a programme that targeted sound stimulus, using environmental sounds stimulus and melodic contour. However, the majority of the AT programmes (nine out of 15) did not use any sound stimulus.

2.6.2.10 Complexity of Training

A total 17 parameters on how stimulus was presented in training named 'complexity of training' has been found in 15 programmes which presented from most audible to least audible in training: (1) Background noise (absence/ presence) found in nine programmes, (2) Distance (close/ distance) found in three programmes, (3) Repetition (repeated/ once) found in 12 programmes, (4) Length of Utterance (short/ long) found in eight programmes, (5) Complexity of utterances (simple/ complex) found in six programmes, (6) Rate of utterances (slow/ individual) found in seven programmes, (7) Suprasegmental (emphasis/ little or no emphasis) found in eight programmes, (8) Segmental (emphasis/ little or no emphasis) found in six programmes, (9) Target position (end/ middle / initial) found in one programme, (10) Set (close/ open) found in five programmes, (11). Speaker Familiarity (familiar/ unfamiliar) found in five programmes, (12). Authenticity of sounds (degraded/ undegraded) found in four programmes, (13) Sounds Origin (live/ recorded) found in 15 programmes, (14) Learning Effect (adapted/ new) found in ten programmes, (15) Learning Style (active/ passive) found in 13 programmes, (16). Stimulus presentation (in-sequence/ random) found in seven programmes, and (17) Stimulus Context (in-context/ out of-context) found in five programmes.

2.7 DISCUSSION

This study covered a total of 24 papers from 2007 to 2018 and 3 papers from grey search. The grey search papers were included due to their significance in describing the programmes used: Listening and Communication Enhancement (LACE) (Sweetow & Sabes, 2007), I Hear What You Mean or Customised Learning Exercise for Aural Rehabilitation (cIEAR) (Tye-Murray et al., 2011) and Speech Perception Assessment and Training System (SPATS) (Miller et al., 2007). Other established programmes found in the study include ReadMyQuips (RMQ) (Rishiq et al., 2016), The Brain FitnessTM Cognitive Training (Anderson, 2012) and Computer-Assisted Speech Training (CAST) (Q.-J. Fu & Galvin, 2007). Additionally, nine newly developed programmes were identified: Audiologic Rehabilitation Classes (Preminger & Meeks, 2010; Preminger & Ziegler, 2008), Environmental Sound Training (Shafiro, 2008; Shafiro et al., 2015), Speech Processed Training (Loebach et al., 2009), Musical Instruments Training (Driscoll et al., 2009), Speech-in-noise and Localization Training (Tyler et al., 2010), The Musical Ear Training (Petersen et al., 2012), Perceptual Learning of Degraded Speech Training (Wayne & Johnsrude, 2012), Talker Identification Training (Krull et al., 2012), and Vowel Identification Training (Richie & Kewley-Port, 2008).

Based on the findings of the scoping review, this study identified two categories to explain AT programmes: AT design and parameters. The AT design included sample size, hearing status, measurement test, research sequence, duration, frequency, length of training, location of training, AT delivery style (either face-to-face, with or without a trainer, individual or group training), findings, and retention effect. On the other hand, AT parameters included AT name, training activities, training theme, method, approach, mode, auditory skills, speech stimulus, sound stimulus, and complexity of training.

The sample sizes in the studies varied from 2 to 279 subjects. Even with small sample sizes, some studies showed positive findings. For instance, Rao et al. (2017) concluded that two subjects trained using RMQ showed marked improvement in speech perception in noise when tested with the Hearing in Noise Test (HINT). Another study by Richie & Kewley-Port (2008) compared two groups, each consisting of seven subjects, and found improvements in vowel identification in auditory-visual speech

recognition under difficult listening conditions. A larger sample size was used in a study by Saunders et al. (2016), comparing 279 subjects in the training group with 263 subjects in the control group, which yielded positive findings.

It can be concluded that the effectiveness of AT programmes can be demonstrated even with small sample sizes. However, Saunders et al. (2016) suggested that subjects with poorer baselines may experience greater gains when tested using tests like Words-in-Noise (WIN), Hearing Handicap Inventory for Adults/Elderly (HHIA/E), or Abbreviated Profile of Hearing Aid Performance (APHAP). This highlights the importance of considering baseline abilities when assessing programme effectiveness. Therefore, this study plans to incorporate normalized gain calculations to evaluate effectiveness in Chapter 5. Normalized gain allows for a fair evaluation by considering each participant's starting point, ensuring that improvements are measured accurately relative to their initial abilities (Coletta & Phillips, 2005).

With regard to hearing status, 17 studies used subjects with hearing loss ranging from mild to profound hearing loss. Tyler et al. (2010) stated that systematic hearing training is viable for subjects with hearing loss from mild to profound hearing loss by improving binaural hearing in noise and localization. However, most studies used subjects with mild to moderate hearing loss (8 studies) and explained that most devices used were hearing aids because Ferguson et al. (2017) stated that hearing aids are most effective for those with mild to moderate hearing loss. Some studies investigated normal hearing subjects using simulation devices to represent hearing-impaired subjects. Findings from studies on normal hearing subjects revealed that it would be practical and useful to generalize auditory rehabilitation for hearing-impaired subjects (Gfeller et al., 2015; Loebach et al., 2009). Therefore, studies using normal hearing subjects were included in this scoping review since the results have significant implications for hearing-impaired subjects and can be used to design a new AT programme. Concerning hearing age, most studies did not state the subjects' hearing age. Only 11 studies used hearing age as part of their study, ranging from one month to 44 years. However, a minimum of 4 weeks of hearing age is recommended to be included in research to allow acclimatization to hearing devices (Rishiq et al., 2016; Saunders et al., 2016).

Standardized tests, newly developed tests for research work, or a combination of both measurements were used to measure the AT performances in each study. The tests used included Word-in-noise test (WIN) (Miller et al., 2015; Saunders et al., 2016; Smith, Saunders, et al., 2016), Handicap Inventory (HHI) (Preminger & Meeks, 2010; Saunders et al., 2016), Hearing-in-noise Test (HINT) (Q.-J. Fu & Galvin, 2007; Rao et al., 2017; Tyler et al., 2010), The Abbreviated Profile of Hearing Aid Performance (APHAP) (Miller et al., 2015; Saunders et al., 2016; Smith et al., 2016) and Multimodal Lexical Sentence Test for Adults (MLST-A) (Rishiq et al., 2016; Yu et al., 2017). Some studies used the training stimulus itself to test subjects' performances, as seen in the studies by Shafiro (2008), Driscoll et al. (2009), Loebach et al. (2010) and Petersen et al. (2012). To ensure an effective method of measuring the programme's impact and efficacy, a dedicated assessment tool, known as PLAM-S, was incorporated into the development of PLAM. The decision to create a unique assessment tool, PLAM-S, was rooted in recommendations by Sweetow and Palmer in their work from 2005. According to these experts, it is essential for AT programmes to utilize a measurement system that is highly sensitive and capable of accurately gauging the programme's effectiveness.

The training sequence in each study depended on the objectives of their research. For example, research by Shafiro et al. (2015), Tyler et al. (2010), and Rao et al. (2017) used 30 minutes per session training with a pre-training test, training, and post-training sequence to assess the effect of the training by comparing pre and post-training findings. Some studies investigated retention effects with a second post-training test, as seen in studies by Saunders et al. (2016) and Smith et al. (2016), which conducted a second post-training test after six months of training. Other studies conducted additional tests before the pre-training test to establish baselines for all subjects, as shown in studies by Shafiro (2008) and Rishiq et al. (2016). Some studies introduced a familiarization step before pre-testing to allow subjects to acclimatize to the training materials and avoid bias, as seen in studies by Loebach et al. (2009, 2010). Therefore, this study review suggests that all training should be well-prepared for the research sequence based on the research objectives to achieve anticipated goals. To ensure the effectiveness of PLAM, the study suggests using a program sequence of: 1. Pre-training test, 2. Training, and 3. Post-training test, which allows for comparison of subjects' performances between pre and post-training.

Based on research, most studies (91%) leaned towards using computer-based programmes or a computer-based style. Sweetow and Sabes (2007), Fu and Galvin, (2007) and Shafiro et al. (2015) stated that using self-training computer-based methods is cost-effective in terms of money and time. However, studies by Preminger and Meeks (2010) and Preminger and Ziegler (2008) used face-to-face styles, focusing on group studies and involving spouses to evaluate the quality of life among hearing-impaired adults. In conclusion, it may be suggested that computer-based programmes are more cost and time-effective, but traditional face-to-face training provides closeness to real-life situations, using real voices, settings, and feedback from trainers

Therefore, this study suggests developing face-to-face training for a new programme to ensure trainers can address trainees' emotional and practical aspects of AT. The training should also be held in a clinical setting or laboratory to control all variables that may affect training. This is based on a suggestion by Boothroyd (2007) that adult aural rehabilitation should optimize auditory function by controlling the listening environment in training and the need for counselling to address emotional and practical aspects among individuals with post-lingual hearing loss.

Regarding training duration, frequency, and length, most studies stated that they set their studies within specific stipulated times for two reasons: (1) They determined training duration, frequency, and length based on research protocol (Rishiq et al., 2016), or (2) They integrated their studies with a duration to finish the AT programme, as stated in previous studies (Richie & Kewley-Port, 2008). Based on the findings of the scoping review, the ideal training duration, frequency, and length for face-to-face training are around 30 to 60 minutes, with a minimum of 10 sessions in 4 to 12 weeks recommended.

The nine parameters explained the strategy in each programme: (1) Training activities, (2) Training theme, (3) Method, (4) Approach, (5) Mode, (6) Auditory skills, (7) Stimulus (speech or sound), and (8) Complexity of training. All parameters should be set according to research objectives or the AT programme aims. Established programmes such as cLEAR (Tye-Murray et al., 2011), LACE (Sweetow & Sabes, 2007), and SPATS (Miller et al., 2007) have specific parameters and are conducted in the laboratory. A suggestion has been made to not only acknowledge the importance of

traditional styles for AT programmes but also to help both trainees and trainers achieve the best possible outcomes when conducting a standardized AT programme.

2.8 CONCLUSIONS

The main objective of this scoping review was to review the AT programmes in literature and investigate the programme trends. To achieve its specific goals, the AT programmes were meticulously designed by reviewing 24 papers included in this study and identifying 15 AT programmes, each with an exceptional design but practically sharing the same parameters. Saidi and Castro (2021) believed that AT, when chosen specifically according to each patient's needs, can enhance speech understanding.

The AT programme design was explained as follows: (1) sample size, (2) hearing status, (3) hearing devices, (4) hearing age, (5) measurement test, (6) training sequence, (7) training durations, (8) Training frequency, (9) length of training, (10) location of training, (11) training delivery style; either computer-based or face-to-face, with a trainer or self-training, and individual or group training, (12) findings, and (13) retention effects.

The parameters are the structure that scaffold the programme, making AT as it is meant to be. Therefore, the parameters that build AT programmes need to be produced uniformly but tailored to the individual who needs it. The parameters used in the AT programme contain: (1) Training activities, (2) Training theme, (3) Communication strategies, (4) Methods, (5) Approaches, (6) Mode, (7) Auditory skills, (8) Speech stimulus, (9) Sound stimulus, and (10) Complexity of training.

Research findings are optional to use as guidelines to develop an AT programme design and parameters. However, the design and parameters should be carefully chosen for individuals with hearing impairment to heighten the improvement gain, benefiting both trainer and trainee.

CHAPTER THREE

THE DEVELOPMENT OF PROGRAM LATIHAN AUDIOTORI MELAYU (PLAM)

3.1 INTRODUCTION

The AT programme, as explained in Chapter Two, reviewed 24 papers and identified 15 unique AT programmes through scoping review. Articles from 2013 to 2018 were included; however, systematic or scoping review papers were excluded. The study focused on the trend, and the findings were used as a guideline to develop a new AT programme named PLAM.

In this chapter, the development process of PLAM was thoroughly described and discussed. The process started with the development of a practical framework and determination of PLAM parameters, stimulus, scoring procedure, and manuals. Then, the preliminary draft of PLAM underwent an expert review through a focus group discussion, and modifications were made to produce the first draft of PLAM. Subsequently, the PLAM was ready for validation testing.

The PLAM was expected to be a comprehensive and holistic AT programme for individuals with post-lingual hearing impairment (trainee) who were conversant in Malay. Hearing healthcare professionals, such as audiologists, speech-language pathologists, or teachers for the deaf, were among the professionals (trainers) expected to deliver an effective AT programme to trainees.

3.2 LITERATURE REVIEW

Literature review in this chapter explains about the components and the Malay language system that has been included in the development of PLAM.

3.2.1 The Development of a New AT Module: Several Important Considerations

Several important aspects should be considered and discussed when developing a new AT programme. The topics to be discussed are aspects of the Malay language system and designing content. In the following subsection, these aspects will be discussed in greater details in relation to the process involved in developing a new AT.

3.2.1.1 The Malay Language System

In Malaysia, the government chose Malay language as the only national and official language, explicitly enacted in the Malaysian Constitution, Article 152: National Language and Other Language (Mansor et al., 2018; Soon & Loi, 2019). The language is taught in all schools in Malaysia as part of fostering unity, despite the country's diverse racial and cultural diversity (Shaari et al., 2003). Malay language serves as the medium for advanced knowledge, embodying the highest level of national identity, culture, and heritage (Mansor et al., 2018). Shaari et al. (2003) outlined seven functions of the Malay language, which include: (1) Instrumental, (2) Regulatory, (3) Representational, (4) Interactional, (5) Personal, (6) Heuristic, and (7) Imaginative, as shown in Table 3.1, along with explanations and examples.

Table 3.1 Communication function in Malay Language

No.	Function	Explanation	Example
1.	Instrumental	To express needs	<i>Ayuh kita bergerak sekarang</i>
2.	Regulatory	To influence the behaviors of others	<i>kalau kamu mencuri, kamu pasti dihukum</i>
3.	Representational	To give information facts and information	<i>Matahari panas</i>
4.	Interactional	To form relationships	<i>Adakah awak suka bermain bola juga?</i>
5.	Personal	To express opinions or emotions	<i>saya berasa sangat letih</i>
6.	Heuristic	To seek information and ask questions	<i>Mengapakah ayam berkokok</i>
7.	Imaginative	To express creative language	<i>cuba bayangkan</i>

The Malay language comprises four types of discourse, as outlined in Table 3.2: form, media, utterances and placement (Shaari et al., 2003). The Malay language system is comprehensive and robust, encompassing phonology to discourse, which includes intonation and meaning to fulfil the speaker's requirements (Onn, 1988).

Table 3.2 Type of Discourse in Malay Language

Type	Example
Form	drama, poem, prose
Media	written and oral
Utterances	direct and indirect
Placement	spoken and presentation

Onn (1988) opinionated that Malay language has six vowels and 18 consonants. This opinion is acknowledged by Teoh (1994) that standard Malay also has six vowels but 19 phonemes which include glottal stop (/ʔ/). The list of standard Malay phonemes is stated in table 3.3. However, based on Kamus Dewan Perdana (Jabbar et al., 2021) there are another four phonemes that available in Malay language. The four phonemes are /f/, /v/, /z/ and /ʃ/.

Table 3.3 Malay Phonemes based on Onn (1988)

Item	Phoneme
Vowels	/i/, /u/, /ə/, /e/, /o/ and /a/
Consonants based on manner	Stop: /p/, /b/, /t/, /d/, /k/, /g/, /ʔ/ Affricate: /tʃ/, /dʒ/ Continuant: /s/, Liquid: /l/, /r/ Nasal: /m/, /n/, /ɲ/, /ŋ/, Glide: /j/, /h/, /w/

Malay standard has monosyllabic, disyllabic, trisyllabic and four syllables and more in its language with disyllabic is by far the most common and numerous (Teoh, 1994). The vowel distribution and syllabification rules with its example are shown in table 3.4.

Table 3.4 Vowels distribution and syllabification rules in Malay Standard

No.	Vowel distribution and syllabification rules	Example
Monosyllabic		
1.	CV	<i>ru</i>
2.	CVC	<i>wang</i>
Disyllabic		
1.	VCV	<i>ibu</i>
2.	CVCV	<i>saya</i>
3.	CVCCV	<i>tentu</i>
4.	VCCV	<i>inti</i>
5.	VCVC	<i>ikat</i>
6.	VCCVC	<i>ambil</i>
7.	CVCVC	<i>bulan</i>
8.	CVCCVC	<i>sumpah</i>
Trisyllabic		
1.	CVVCV	<i>tuala</i>
2.	CVVCVC	<i>biawak</i>
3.	VCVV	<i>usia</i>
4.	CVCVV	<i>semua</i>
5.	CVCCVV	<i>tempua</i>
6.	CVCVVC	<i>cecair</i>
7.	CVCCVCV	<i>mengkuang</i>
8.	VCVCV	<i>utara</i>
9.	VCCVCV	<i>istana</i>
10.	CVCVCV	<i>binasa</i>
11.	CVCCVCV	<i>kemboja</i>
12.	VCVCVC	<i>ijazah</i>
13.	VCCVCVC	<i>ilmiah</i>
14.	CVCVCVC	<i>binatang</i>
15.	CVCCVCVC	<i>tempurung</i>
16.	CVCVCCV	<i>belanja</i>
17.	CVCCVCCV	<i>sempurna</i>
18.	CVCVCCVC	<i>gelanggang</i>
Four syllables or more		
1.	CVCVVCCV	<i>keluarga</i>
2.	CVCVCCVCV	<i>sederhana</i>
3.	CVCCVCVCV	<i>laksamana</i>
4.	CVCVCCVVCV	<i>senantiasa</i>
5.	CVCVCVCVC	<i>hulubalang</i>
6.	CVCVCVCVCV	<i>University</i>

All Malay consonants are present at the initial and middle positions within words, and the Malay language has no elongation characters that serve as morphemes (Onn, 1988). According to Teoh (1994), the vowel distribution and syllabification rules in Standard Malay indicate that vowels occur in all positions within a syllable, whether it is an open or closed syllable, or in the initial, medial, or final position. This system is illustrated in Table 3.5.

Table 3.5 System and rules of phonology system in Malay Language

Systems and rules		Phonemes
Onn (1988)	Appear at initial and middle word	All consonants
	Elongated vowels and consonants	Not appear in any phonemes
Teoh (1994)	Vowels will occur in all positions in syllable 1. Open or closed syllable 2. Initial, medial or final syllable	All vowels

Holt and Carney (2005) utilised speech contrast in their research to compare techniques for speech discrimination, aiming to bridge the gap between results from speech perception research and those from psychoacoustic research. They found that the best discrimination performance occurred with higher numbers of stimulus repetitions. Teoh (1994) outlined that Malay Standard comprises five contrasts observable in minimal pairs of words. These contrasts include (1) Voicing contrast, (2) Dental/labial contrast, (3) Fricatives, affricates/stop contrast, (4) Nasal/oral contrast, and (5) Liquids contrasting with other sounds, as illustrated in Table 3.6.

Table 3.6 Sounds Contrast in Malay Standard

Sounds Contrast	Phonemes	Words Selected	
voicing contrast	/b/ vs /p/	<i>bagi</i>	<i>pagi</i>
	/d/ vs /t/	<i>dari</i>	<i>tari</i>
	/g/ vs /k/	<i>gaya</i>	<i>kaya</i>
	/b, d, g/ vs /p, t, k/	<i>had</i>	<i>Hak</i>
dental/labial contrast	/t/ vs /b/	<i>itu</i>	<i>ibu</i>
	/d/ vs /p/	<i>darah</i>	<i>parah</i>
	/d/ vs /b/	<i>daki</i>	<i>baki</i>
	/t/ vs /p/	<i>titi</i>	<i>pipi</i>
fricatives, affricates/stop contrast	/f/ vs /v/	<i>feri</i>	<i>veri</i>
	/s/ vs /z/	<i>sat</i>	<i>zat</i>
	/tʃ/ vs /dʒ/	<i>cari</i>	<i>jari</i>
	/h/ vs /ʔ/	<i>sesah</i>	<i>sesak</i>
	/s/ vs /ʃ/	<i>sarat</i>	<i>syarat</i>
	/s/ vs /dʒ/	<i>silat</i>	<i>jilat</i>
	/s/ vs /ʃ/	<i>satu</i>	<i>Catu</i>
nasal/oral contrast	/m/ vs /p, b/	<i>mati</i>	<i>pati</i>
	/n/ vs /t, d/	<i>nak</i>	<i>tak</i>
	/ŋ/ vs /k, g/	<i>sangat</i>	<i>sagat</i>
	/ɲ/ vs /k, g/	<i>nyata</i>	<i>kata</i>
liquids contrasting with other sounds	/l/ vs /r/	<i>lalat</i>	<i>ralat</i>
	/l/ vs /j/	<i>bali</i>	<i>bayi</i>
	/r/ vs /j/	<i>sarang</i>	<i>sayang</i>
	/l/ vs /j, r/	<i>balu</i>	<i>bayu</i>

3.2.1.2 Continuous Discourse Tracking

Continuous discourse tracking (*penjejakan wacana berterusan*) is a method for training and evaluating the reception of ongoing speech receptive abilities among hearing-impaired individuals (De Filippo & Scott, 1978; Hochberg et al., 1989). This method also aids talkers in maintaining conversation by seeking additional information and clarification during conversation (Hellermann & Lee, 2021). Choosing a children's story is recommended to avoid intelligibility challenges (Speaks et al., 1972) because tracking rates increase with decreasing text complexity (Hochberg et al., 1989). The

trainer reads a prepared text to the trainee segment by segment, and the trainee repeats back the last word that is read to them. This task is categorised as an auditory identification task.

Learning discourse or sentences helps a communicator function as group members in group conversations and learn to engage in communication activities (Hellermann & Lee, 2021). In this aspect, training progresses from detection and identification to comprehension of sentences. Speaks et al. (1972) explained that intelligibility of connected discourse should not be tested using the analytic-synthetic continuum because running speech does not depend solely on acoustics, linguistics, or articulation. Therefore, the training should employ a scaling technique where the trainee is gradually exposed to the discourse, allowing them to learn to estimate the presented message (Speaks et al., 1972).

The difficulty level gradually increases in the final part of the task. This type of task requires trainees to identify and understand whole sentences. A study by Kynette et al. (1990) utilised a list of five words per sentence with three variations: one-syllable words, two-syllable words, and three-syllable words, to examine the effects of word length on adult recall span. This study found that adults could recall fewer three-syllable words than one-syllable words, with stimuli ranging from five syllables to 15 syllables per sentence. This forms the basis of PLAM's selection of sentences containing around five to 16 syllables per sentence, considering that the majority of Malay words have two syllables (Teoh, 1994), necessitating more syllables to create a complete sentence.

3.2.1.3 Designing the Content of the Malay Auditory Training Programme

Blamey and Alcántara (1994) stated that AT protocols vary widely because professionals have their own ideas about the effectiveness and importance of training procedures, materials, and styles. Sweetow and Sabes (2010) suggested developing a comprehensive AT programme based on nine considerations; 1. Cost-effectiveness, 2. Practicality and accessibility, 3. Interactivity, which requires the participation of the patient, 4. Challenges to maintain interest without being too difficult to avoid fatigue or frustration, 5. Incorporation of training that adapts according to the patient's

performance threshold, 6. Ability to follow the patient's optimal pace, 7. Integration of listening with communication repair strategies, 8. Ability to measure feedback from the patient regarding progress or lack of progress, and 9. The patient's performance being gatherable and verifiable through data logging to provide feedback to other professionals.

Based on all of the aforementioned suggestions by Blamey and Alcántara (1994) and Sweetow and Sabes (2010), it has been determined that the development of a new Malay AT programme would involve; 1. A combination of analytic and synthetic methods, 2. Target goals based on the auditory skills hierarchy and speech stimulus mentioned in Figures 1.1 and 1.2, 3. Stimulus presentation defined based on variables mentioned in Table 1.3, and 4. Following or considering suggestions made by Sweetow and Sabes (2010) because the suggestions are applicable to the scope of this study, which aimed to develop a comprehensive AT programme.

3.3 PROBLEM STATEMENT AND STUDY RATIONALE

The rationales for why PLAM was needed and related issues pertaining to the development of PLAM will be presented in this subsection,

3.3.1 No Standard Practical Framework to Build AT Programme

Research has revealed the importance of developing an AT programme, yet there are no standard practical frameworks available for constructing one. For instance, Petersen et al. (2012) developed a new programme to investigate the effects of musical ear training among cochlear implant patients, while Saunders et al. (2016) used the established LACE (Listening and Communication Enhancement) programme by Sweetow and Sabes (2007) to supplement standard-of-care hearing aid intervention in a veteran population. However, neither study reported their frameworks for developing the AT programme. With no established framework readily available as a reference, this study aims to develop a framework that can be used as a reference for building the PLAM.

Sommers (2016) highlighted the importance of having a solid framework that can predict the magnitude of AT gains. Such prediction is crucial for providing specific counselling and developing individualised training procedures to maximise training gains (M. Sommers, 2016). However, most studies have focused on researching the efficacy of AT programmes without providing a standard solid framework to predict AT gains (Beier et al., 2015; Henshaw & Ferguson, 2013; Michaud & Duchesne, 2017; R. Sweetow & Palmer, 2005). Therefore, this study aims to establish a solid framework as a reference for constructing a new programme and predicting its intended outcomes.

3.3.2 Limited Auditory Training Program that Represents Real-world Situations

Sweetow and Sabes (2007b) suggested that an AT programme is paramount when it closely represents real-world situations and is also time and cost-effective. Therefore, it is important to ensure that the AT programme embodies real-life situations. For instance, the programme must be sensitive enough to predict hearing-loss difficulties and help trainers focus on areas of listening skills that need more attention and specific counselling. As such, the development of the PLAM will focus on producing: (1) an AT programme in the Malay language to serve individuals conversant in Malay, (2) an AT programme using face-to-face methods, (3) an AT programme using live voice, and (4) an AT programme conducted in situations that mimic real-world scenarios with quantifiable outcomes.

Based on the results of the scoping review on available AT programmes, it was found that there were no existing Malay AT programmes. The unavailability of AT programmes in the Malay language could affect meaning-based AT, as explained by Sommers et al. (2015), where meaning-based approaches in any language can improve speech recognition in noise and reduce perceptual effort in understanding spoken language. Thus, in this study, an AT programme for Malay speakers would be developed, as Malay is the official language of Malaysia and widely spoken across the Malaysian population regardless of ethnicity or race (Ghazali, 2012). The Malay AT programme would also use live-voice and face-to-face strategies, as stated by Tye-Murray (2016), indicating that individualised AT programmes are crucial for

understanding a patient's hearing predicament, including their frequent partners and community.

3.3.3 The Newly-Developed AT Programme Have No Scoring System and Manual

Audiologic management guidelines in Valente et al. (2006) proposed that a successful comprehensive treatment for adults with hearing loss should be determined through outcome assessment using a variety of tools to assess the programme effectiveness in hearing handicap perception and/or speech perception to quantify the benefits of amplification. The outcomes of AT programmes in studies found in the scoping review were measured either subjectively or objectively using either standardized or newly developed assessment tools. However, despite the growing knowledge on AT programmes found from the scoping review, the practical implementation of AT in audiological rehabilitation faces significant challenges in Malaysia. Due to inadequate infrastructure, resources, and facilities in Malaysia, the majority of audiologists did not routinely incorporate AT in their audiological rehabilitation (Ali et al., 2017). Therefore, this study aimed to develop scoring and manuals for PLAM to fill the gaps of inadequate AT materials in Malaysia and to provide an effective tool to be incorporated in audiological rehabilitation in Malaysia.

In the case of PLAM, which focuses on AT in the Malay language, the absence of standardized scoring systems presents a notable challenge. To evaluate the outcomes of PLAM comprehensively and effectively, the development of a dedicated scoring tool and manual becomes essential. This need is underscored by insights from research, including the study conducted by Tyler et al. (2010) and research by Anderson et al. (2012). Tyler et al. (2010) embarked on a study centred around an AT programme designed to enhance the ability of cochlear implant recipients to comprehend speech in the presence of background noise while also improving sound localization. To gauge the effectiveness of this programme, the researchers employed well-established standardized tests. These included: 1. Nucleus-Consonant Monosyllabic Words (CNC): Developed by Tillman and Carhart in 1966, this test assesses speech recognition using monosyllabic words, 2. CUNY Sentences: Created by Boothroyd et al. in 1985, these sentences evaluate speech perception and comprehension under various acoustic

conditions, 3. Hearing in Noise Test (HINT) Sentences: Developed by Nilsson et al. in 1994, this test measures speech perception in noisy environments, a crucial skill for real-world communication, and 4. Everyday Sounds Localization Test: Developed by Dunn et al. in 2005, this test assesses sound localization abilities in everyday auditory scenarios. While these standardized tests are valuable for assessing specific aspects of the program's impact, they may not fully capture the complexity of real-world listening environments and the unique challenges faced by PLAM participants. Thus, the researchers introduced a novel “real-world listening test” to assess sound localization and recognition in contexts that closely mirrored the challenges faced in everyday life, something not adequately addressed by the standardized tools. This approach mirrors that of Anderson et al. (2012), who recognized that successful hearing in noisy environments depends on a complex interplay of sensory and cognitive factors. They, too, used a combination of standardized tests and newly developed assessments to measure cognitive function, acknowledging the multifaceted nature of the hearing process. Given the unique objectives and challenges of PLAM, a standardized assessment and a new scoring system are indeed necessary to ensure that outcomes can be accurately, comprehensively, and reliably measured. The development of such tools tailored specifically for PLAM would allow for a more precise evaluation of the program's effectiveness in enhancing auditory skills in the Malay language. This would be vital for both optimizing PLAM and contributing to the broader understanding of AT among individuals with post-lingual hearing impairment.

The development of the dedicated PLAM manual is a crucial step in ensuring the successful implementation of the PLAM. The primary purpose of this manual is to provide comprehensive details on the scoring system and thorough instructions for the newly introduced AT programme. It serves as an indispensable resource for individuals involved in the programme, including trainers and trainees, and plays a vital role in facilitating a clear understanding of the programme's procedures and objectives. By providing explicit instructions, it will ensure that all parties involved follow a standardized approach. The PLAM manual also empowers trainers and educators with the knowledge and tools necessary to effectively guide participants through the PLAM. Detailed explanations of scoring criteria enable them to accurately measure progress. With a comprehensive scoring system outlined in the manual, trainers can gain insights

into participant performance and progress. This information allows for the fine-tuning of the programme to optimize outcomes.

In summary, the development of the PLAM manual is essential for the success of the AT programme to ensure uniformity in assessment and, most importantly, enhance the overall learning experience for participants. In addition, it supports research efforts, and over time, it can continuously improve programme outcomes.

3.4 MAIN OBJECTIVES

To develop a comprehensive PLAM for individuals with post-lingual hearing impairment.

3.4.1 Specific Objectives

1. To develop the framework for PLAM
2. To develop the sound stimuli for PLAM
3. To develop the speech stimuli for PLAM
4. To develop the scoring procedures and manual for PLAM
5. To review PLAM through the conduct of focus group discussion

3.5 METHODOLOGY AND ANALYSIS

There were five stages in the development of PLAM as shown in Figure 3.1; Stage 1: Development of framework for PLAM, Stage 2: Development of sound stimuli for PLAM, Stage 3: Development of Scoring Procedure and Manual for PLAM and Stage 5: Review PLAM through the conduct of focus group discussion.

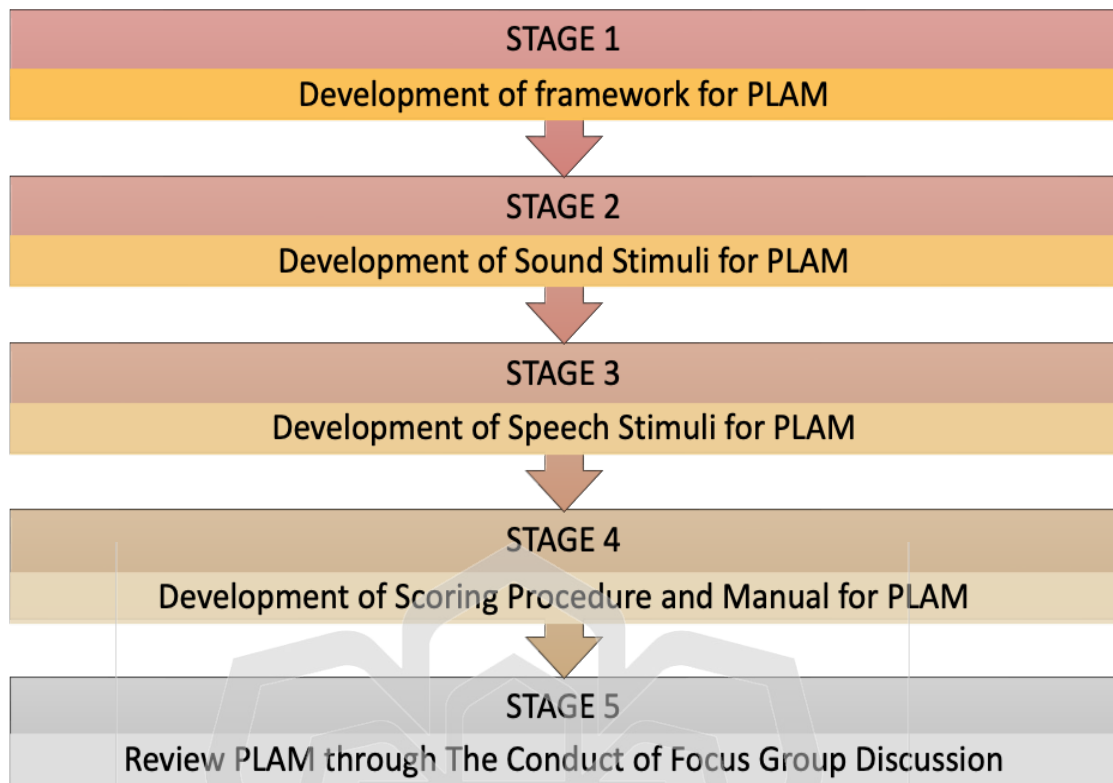


Figure 3.1 The Development of PLAM Methodology and Analysis

3.5.1 The Development of the Framework for PLAM

The first stage of development PLAM was to design a framework. The framework was an essential supporting structure aiming to ensure that PLAM had a sound construction for becoming an effective AT programme. The framework will be derived from AT parameters as described in Chapter Two.

3.5.1.1 Selection of Parameters for PLAM

The development of the framework process started with selection of parameters that should be included. The parameters were selected based on scoping review in Chapter 2. Summary of the parameters selected is as shown in Table 3.7.

Table 3.7 Summary of parameters selected to be included in the framework of PLAM

No.	Items	Sub-items
1.	Training Activities	Depending on auditory level and stimulus
2.	Training Theme	Depending on one's culture and environment
3.	Communication strategies	Integrated with 'complexity of training'
4.	Approach	● Bottom-up ● top down
5.	Mode	Integrated with 'complexity of training'
6.	Auditory skills	● Detection ● Discrimination ● Identification ● Comprehension
7.	Speech stimulus	● Phonemes ● Syllables ● Words ● Connected discourse ● Sentences
8.	Sound stimulus	● Ling's Six Sounds ● Environmental sounds ● Sounds based on phoneme
9.	Complexity of training	● Background noise ● Distance ● Repetition ● Rate of utterances ● Verbal cue

Training activities, training themes, and communication strategies for every AT programme could not be standalone items in an AT programme, but they should be delivered under other parameters. Training activities should be described together with auditory skills and stimulus programs. Additionally, training themes will be selected based on the trainees' culture and environment, while communication strategies should be explained together with the 'complexity of training' item. These three parameters are

to be excluded from the PLAM's framework but will be included in PLAM training content.

The approaches selected to be applied to the framework were bottom-up and top-down approaches. Both approaches would act as strategies and be used by the trainer to plan PLAM training. These approaches were also important to help the trainer plan for homework and communication strategies for trainees to use in real life. For instance, if the trainee was not able to identify conversation, trainers might help the trainee to build communication strategies using the bottom-up approach; by starting with learning the phoneme, words, sentences, and then progressing to conversation.

The modes of AT programmes commonly used in past studies were auditory-only (AO), visual-only (VO), auditory-visual (AV), or a combination of any. In the current work, however, a combination of modes would be used as part of the complexity of training to maintain framework flexibility, giving options for trainees to increase their skills based on their abilities. For example, the target for all trainees is to respond to PLAM training without visual cues (auditory-only). However, if the trainee is unable to communicate auditory-only, visual cues will be given as part of the communication strategy to facilitate meaningful conversation. Gradually, PLAM will train the trainee to use the auditory-only mode for conversation.

Four levels of auditory skills were selected based on Erber (1980), including detection, discrimination, identification, and comprehension because these four levels were the main types of response contributing to the perception of conversational speech.

For this framework, the speech stimulus selected includes phonemes, syllables, words, connected discourse, and sentences. The stimuli were constructed based on the Malay language system.

This study has chosen sound stimuli from environmental sounds, Ling's Six Sounds, and sounds based on phonemes as stimulus for this framework.

A total of four complexities of training were selected for this framework: background noise, distance, repetition, and rate of utterances. One complexity of

training has been added based on the mode of training: verbal cue. These five complexities of training were selected because they could be controlled by meaningful stimulation, and the responses are countable. Trainers can, for example, set background noise as present or absent, distance as at one meter or six inches from the speaker, repetition as present or absent, rate of utterances as slow or normal, and verbal cue as present or absent. Therefore, two uncountable responses of complexities of training were excluded: suprasegmental (difficult to set the same attributes in all speakers) and segmental (having multiple attributes that are not easy to count in training).

The other six complexities of training compiled from the scoping review (refer to Chapter 2) were excluded because they can be represented and controlled by constructing different speech stimuli. The complexities were: length of utterances, complexity of utterances, target position of stimulus, set of stimuli, sequence of stimulus and stimulus context.

The origin of sounds (degraded/undegraded) and the authenticity of sounds were excluded because this framework will only use live voice. Another three complexities of training, speaker familiarity, learning effect, and learning style were excluded because these complexities of training are reflected in the training outcomes.

3.5.1.2 Development of Framework for Auditory Training Program

By carefully examining all parameters, a framework for the AT programme was developed using four parameters: approach, auditory skills, stimulus, and complexity of training. These four parameters possess valuable traits that can scaffold the AT programme and formulate from the parameters to achieve desired goals. Figure 3.2 shows the developed framework. This framework is suitable for use with any language because it is capable of accommodating different forms of AT programmes.

The framework was revised by two experts: an audiologist and a speech-language pathologist. A set of contents was then tested within the framework. The framework was mapped to develop practical goals, as explained below.

3.5.1.2.1 Goals

The goals for AT programme should consist of three parameters; (1) Skills (auditory skills parameter) using sentences (stimulus parameter), (2) Specific condition (complexity of training parameters), and (3) Environment, (in one-meter distant, long rate of utterances and with no repetition).

Individual goals would be able to be interchangeable and fit with trainee needs particularly to assist the trainee difficulties in communication.

3.5.1.2.2 Auditory Skills and Complexity of Training

Each auditory skill has its own hierarchy and complexity of training that governs by its own strictures. These characters can make the goals substitutable according to trainees' need and expectation.

3.5.1.2.3 Stimulus

Stimulus is countable for the progress of objectives and the desired goals. The stimulus suggested for the study is based on the language system that was intended to be developed using this framework. The Malay language system to be inserted in this framework contains sound stimulus and speech stimulus which will be explained further in 3.3.

3.5.1.2.4 Approach

Generally, approach governs the whole process of AT. One goal moves to another goal either following bottom-up approach or top-down approach depending on several factors; (1) Trainees acceptance towards training, should increase their confident and are allowed to choose either bottom-up or top-down stimulus, (2) If there is any

evidence that the trainees will have greater gain using either bottom-up or top-down stimulus, or (3) If the trainees showed progression or regression in their performance, changing approach which it might help. Therefore, approach should act like an umbrella to cover all goals.

3.5.1.3 Finalisation of Framework for PLAM

After mapping the framework to formulate practical PLAM goals, it was finally developed as shown in Figure 3.2. The framework suggests that an AT programme be produced as an open type, where the trainer and trainee would be able to start the training at any stage according to the trainee's abilities. This includes the trainees' auditory skills at any level of stimulus, using any related complexity of training. As a result, the goals for training and communication strategy will be formulated based on their abilities using the framework. Consequently, the PLAM training can commence and move either from phoneme to conversation (bottom-up) or from conversation to phoneme (top-down), according to the trainees' abilities and needs. Therefore, this study has decided to provide general instructions where the trainer and trainee can choose any approaches that suit the trainee's ability.

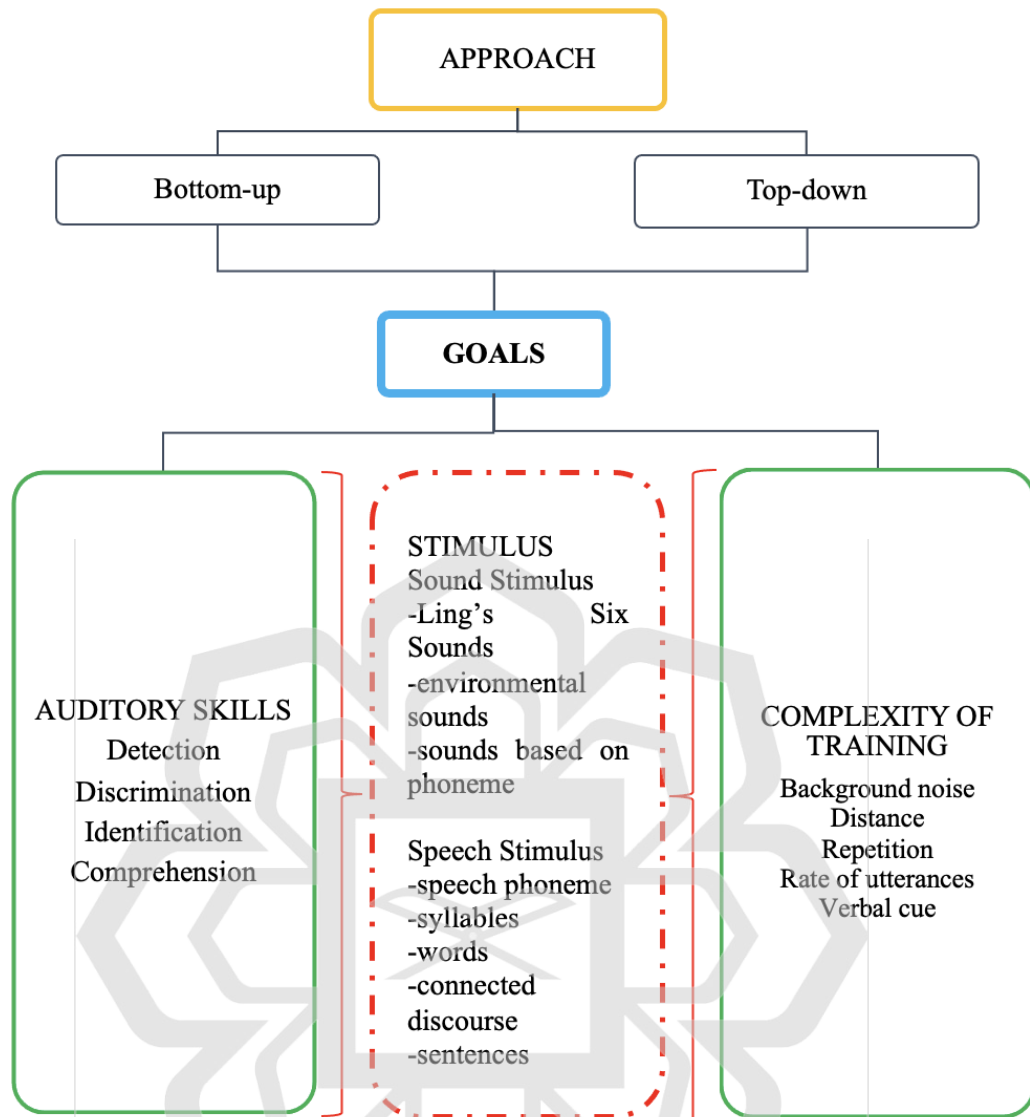


Figure 3.2 Framework for AT Programme

3.5.2 Development of Sound Stimuli for PLAM

The PLAM has been developed for users conversant in Malay, so the stimuli in this programme should include all speech and sound stimuli representing the Malay language. Sound stimuli were divided into three parts, which are Ling's Six Sounds, environmental sounds, and sounds based on phoneme.

3.5.2.1 Ling's Six Sounds

Ling's Six Sounds is a detection task of six speech sounds /u/, /a/, /i/, /m/, /s/, and /ʃ/, introduced by Daniel Ling, where each of the speech sounds represents critical information in a different frequency range of the speech spectrum (Ling, 1989). The decision to include this task in PLAM is based on Ling's (1989) recommendation to use these six sounds as a tool to observe any changes in aided performance among trainees. Kilcullen et al. (2015) also suggested the use of Ling's Six Sounds among adults aged 20 to 55 years old, which is beneficial for objective measurement in identifying a hearing loss that affects some frequencies, as is often the case with age-related high-frequency hearing loss. A set of illustrations of Ling's Six Sounds was prepared by one designer-illustrator, as shown in Appendix XII. These illustrations will act as visual stimuli for trainees during training. For example, /a/ is illustrated as an aeroplane, shown in Figure 3.3.

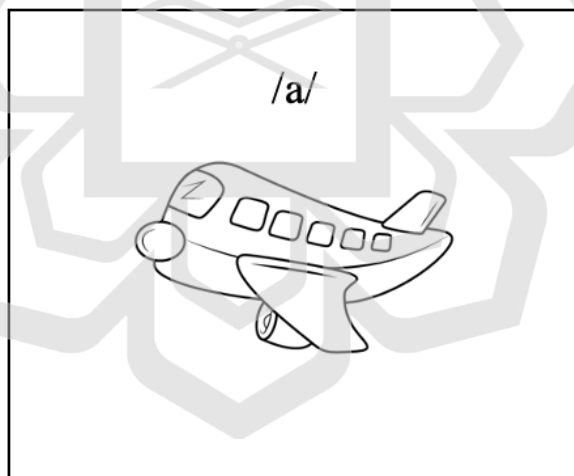


Figure 3.3 /a/ Illustrated as an Aeroplane

3.5.2.2 Environmental Sounds

Environmental sounds stimuli were selected from two sources: SoundBible.com and SoundEffectsFactory on YouTube (permission given through email). SoundBible.com is a free platform that offers sound clips for download in either WAV or MP3 format (<https://soundbible.com/>).

SoundEffectsFactory (<https://www.youtube.com/@SoundEffectsFactory/>) is another free platform that specializes in creating original sounds, including sound effects, ambiance, background noise, cinematic movie sounds, and horror soundtracks.

Six sounds were downloaded from SoundEffectsFactory, and 18 sounds were downloaded from SoundBible.com. An additional sound (key sound) was recorded directly from the source. The environmental sounds chosen included sounds from animals (such as cat sounds), objects (like knocking door sounds), vehicles (including car engine start-up), nature (such as thunder), and human sounds (typically baby crying). The sounds were selected based on their familiarity and relevance to individuals conversant in Malay. All sounds were saved as "unedited sounds" in Waveform Audio File Format (WAV file). Some of the sounds were repetitive in nature, so the length of each sound was edited to create a meaningful cycle. The sound names, sources, original lengths, and edited lengths are shown in Appendix XIV.

3.5.2.2.1 The Environmental Sounds Stimuli Calibration

All sounds were measured using Sound Level Meter (SLM) 3M™ SoundPro™ Datalogging Octave RTA Kit, SP-DL-2-1/3-AC3 AC300 Calibrator in a soundproof room at IIUM Hearing and Speech Clinic (Audiology), Jalan Hospital Building. The diagram of measurement shown in Figure 3.4; the sound presented using MacBook Air M1, 2020 through soundcard Live Broadcast Equipment Set L8 and amplified using speaker Vinnfier Ecco 2 RGB. The measurement was recorded in Leq dBA, the average intensity through frequency in one meter distant from SLM to speaker.

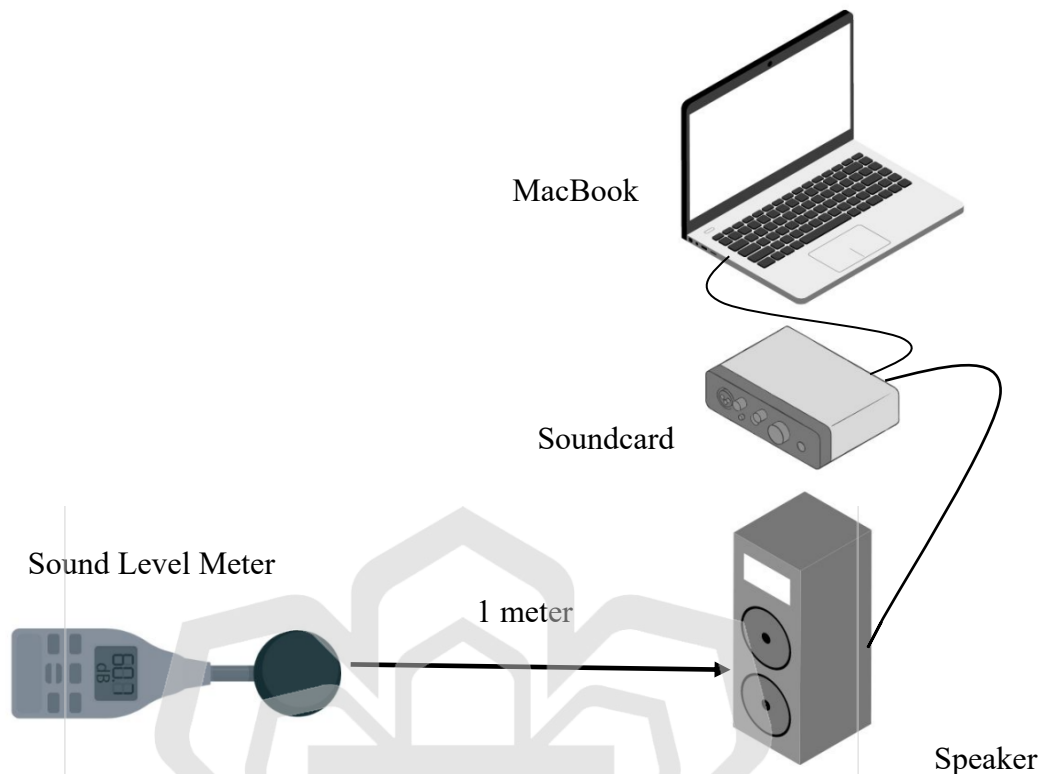


Figure 3.4 Environmental Sounds Stimuli Calibration

The calibration process commenced with the measurement of the original sound intensity using Audacity software. Audacity was chosen for its ability to adjust the intensity level of sounds while preserving sound quality. All sounds were adjusted using Audacity to achieve four desired intensities (Leq dBA) as measured from a Sound Level Meter (SLM): 60 dBA, 65 dBA, 70 dBA, and 75 dBA. The amplification adjustments made were recorded and documented (see Appendix XIV).

Subsequently, all 25 selected environmental sounds were presented at a level of 65 dBA through a speaker positioned approximately one meter from the listener/trainee (refer to Figure 3.2 for the sound presentation setup). The intensity of 65 dBA was chosen based on research indicating that sound levels between 55 and 66 dBA are considered typical speech levels in various settings, such as schools, homes, hospitals, and department stores (Olsen, 1998). Additionally, 65 dBA falls within a range that is not excessively loud or disruptive, as levels above 75 dBA are generally considered very loud and potentially annoying (Skagerstrand et al., 2017).

3.5.2.2.2 Calibration sound

A white noise sound was chosen as the calibration sound for PLAM, following the procedure outlined in Amirullah et al. (2021). White noise is selected for calibration purposes due to its characteristics, including equal energy per cycle (Mendel et al., 1999) and its resemblance to environmental sounds with a broad energy spectrum (Katz et al., 2015).

The calibration process involves adjusting the speaker setup to ensure that environmental sounds are consistently presented at 65 dB A through a speaker placed at the calibrated spot. This step is crucial to maintain consistency in sound levels across all test sessions and study participants. By ensuring consistent sound calibration, variations in sound presentation do not become a factor affecting the AT performance of study participants.

3.5.2.3 Speech Sounds Based on Frequency

A set of phonemes has been selected for frequency <500Hz (low frequency range), 501 to 2000 Hz (mid frequency range) and >2000 Hz (high frequency range) based on speech audiogram by Northern and Downs (2002) shows in figure 3.5. The phonemes selected are as shown in figure 3.5; /u/, /e/, /z/, /v/, /dʒ/, /m/, /d/, /b/, /n/, /ŋ/, /l/ for frequency <500 Hz, phoneme /o/, /i/, /a/, /r/, /p/, /h/, /g/ selected for frequency 501 to 2000 Hz and phoneme /tʃ/, /f/, /k/, /f/, /s/ selected for frequency >2000 Hz.

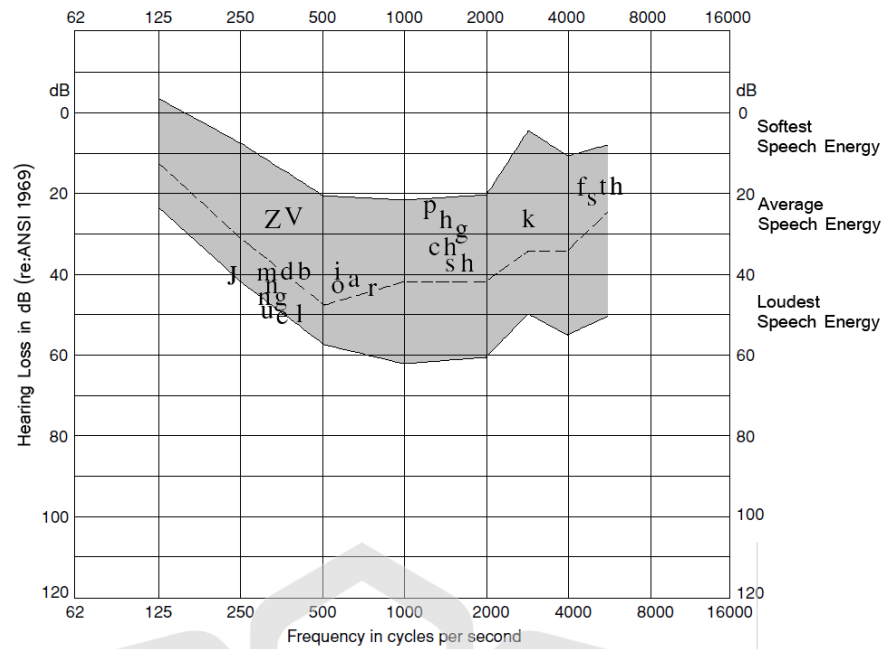


Figure 3.5 Speech Audiogram by Northern and Downs (2002)

3.5.3 The Development of Speech Stimuli for PLAM

The Malay language system is complete and robust from phonology to discourse since it covers intonation and meaning that may justify the speaker's need (Onn, 1988). Hence, speech stimuli for PLAM will be developed based on the Malay language system which consists of phonemes, words, connected discourses and sentences.

3.5.3.1 Speech Phoneme Stimuli

A total of 29 phonemes were included in PLAM. Each of the phonemes is associated with sound descriptions and meaning for example, 1. Speech phoneme is /i/, 2. Meaningful sound is "iii" and 3. Descriptions is "dirty" or "*kotor*". The phonemes with its description showed in Appendix XII.

3.5.3.2 Words Stimuli

Words stimuli are divided into three parts; (1) Words based on syllabification, (2) Words based on Phonemes, and (3) Words with sounds contrast.

3.5.3.2.1 Words based on Syllabification Selection

The Malay language features monosyllabic, disyllabic, trisyllabic and four or more syllable words in its lexicon with disyllabic words being by far the most common and numerous (Teoh, 1994). Based on the rules of syllabification stated by Teoh (1994), 20 monosyllabic words included (example: *bank, gam, hak, jam*), 24 disyllabic words included (example: *angkat, undi, ombak, bimbang*), 24 trisyllabic words included (example: *bahasa, tempurung, belanja, basikal*) and 24 four or more syllables' words included (example: *tanggungjawab, istimewa, operasi, warganegara*). The full list chosen for each syllable is shown in Appendix XII. All words were checked and collected from Kamus Dewan Perdana (Jabbar et al., 2021).

3.5.3.2.2 Words based on Phonemes Selection

Words with 22 phonemes combined with vowels /i/, /u/, /e/, /o/, /a/ at initial syllables were selected. Words selected for combination of phoneme /ʔ/ and those five vowels are at final syllable. All words were selected from Kamus Dewan Perdana (Jabbar et al., 2021). However, for vowels /ə/, only 19 phonemes combined with this vowel were selected because there is no word in Malay that has combination of /zə/, /jə/, /fə/ and /əʔ/ according to the referred dictionary. All words selected are shown in Appendix XII.

3.5.3.2.3 Words with Sounds Contrast Selection

Teoh (1994) stated that the Malay language has five contrasts that can be seen in a minimal pair of words. All contrasts were included in PLAM at initial and medial pair.

The contrasts are voicing contrast (example at initial contrast: *badan* vs *padan*), dental/labial contrast (example at medial contrast: *itu* vs *ibu*), fricatives, affricates/stop contrast (example at initial contrast: *firus* vs *virus*), nasal/oral contrast (example at medial contrast: *ingat* vs *ikat*), and liquids contrasting with other sounds (example at medial contrast: *bayu* vs *balu*). Five minimal pair words has been selected for each minimal pair phoneme. The phonemes and selected words for PLAM of each contrast showed in Appendix XII.

3.5.3.3 Continuous Discourse Tracking Stimuli

A story title: ***Gajah Sejati*** (Ismail, 1997) by awards winner for the best story book national and international level, Mr. Mohd Yusof Ismail (Yusof Gajah) was selected for PLAM (permission was given by late Mr. Yusof Gajah). A children's story was chosen to avoid intelligibility challenges (Speaks et al., 1972) because tracking rates increased with decreasing text complexity (Hochberg et al., 1989). The full text of the story which contains 44 keywords is included in PLAM as shown in Appendix XII.

3.5.3.4 Sentences Stimuli

To facilitate the scoring process for PLAM and to maintain a balanced selection of sentence stimuli, it is necessary to divide the sentence stimuli section into three distinct parts which are Keywords in Sentences, 'Missing Words' in Sentences (Fill in The Blank), and Various Type Sentences. This division allows for a more organised and manageable approach when evaluating the participants' performance and ensures that the stimuli remain consistent and equitable across the assessment. Each of these segments incorporates training activities that include different types of words with varying syllable counts. This is to make the scoring process more comprehensive and the sentences are covered with all varieties of words.

3.5.3.4.1 Selection of Keywords in Sentences Stimuli

A total of 54 sentences were built in three different categories (final of sentence, initial of sentence and middle of sentence) using three rules in each category (random words, words that have same syllables counting and words in minimal pairs). For example, in category 'final of sentence', the example words for random words are *Setiap pagi jangan lupa buka tingkap or langsir*, while for words that have same syllables counting is *Ali sedang mendengar bunyi ombak or tembak* and words in minimal pairs is *Bilik itu gelap kerana keadaan malap or malam*. The full set of selected sentences were shown in Appendix XII.

3.5.3.4.2 Selection of 'Missing Words' in Sentences Stimuli (Fill in The Blank)

For this task, the trainee will not be given any choices of missing words in sentences. Trainer will read the whole sentences and the trainee is needed to identify (auditory identification) the word(s) that is missing in the visual cue given; the visual cue is the written stimulus presented to the trainees. The word(s) that need to be filled is either one word, two words or three words at final, initial or middle sentence. A total of 60 sentences were built as shown in Appendix XII. Example of the stimuli at final sentences; *Lakukan senaman seperti berjalan di sekitar rumah pada setiap hari (underlined is the missing words)*. Another example is at initial sentence; *Terdapat pelbagai jenis pekerjaan di Malaysia and random position in sentence; *Saya mempunyai alahan terhadap makanan laut**.

3.5.3.4.3 Selection of Various Type of Sentences in Sentences Stimuli

Sentences selected were all the ones between five to 16 syllables. They were divided into four types of sentences which are statement sentences, question sentences, command sentences and random sentences. For each type of sentence, a picture was prepared to assist the task (Appendix XII). A total of 60 sentences were built with 15 sentences for each type. For 'statement sentences', the trainee is required to repeat the

whole sentences, for example; *Adik sedang menconteng* (a total of seven syllables). For ‘question sentences’, the trainee needs to answer the question using the picture given; example: *Apa yang di jual di sini?* (nine syllables). While for ‘command sentences’ the trainee needs to follow command based on the picture given; example; *Kira semua rumah dua tingkat* (11 syllables). For ‘random sentences’, all three types of sentences were included and the trainee needs to respond based on the sentences.

The last stimuli in PLAM are for open set auditory comprehension task. Trainer will ask short questions based on the theme (about self) and without theme (random questions) and the trainee is required to answer the question. There is no right or wrong answer. Trainer needs to check if the trainee understands the questions by evaluate his/her respond; example: if the trainee said “I don’t know the answer”, trainer need to ask, “do you understand the question?” to confirm that the trainee understood the question but didn’t know the answer. The aim is to give a score if the trainee is able to understand questions rather than giving correct answers. The example of selected questions is *Bagaimana cuaca hari ini?*

3.5.3.5 Summary of PLAM Content

Based on the selected sound and speech stimulus that presented in this chapter, a content that previously fit (in 3.62 and 3.63) in the AT framework has been developed to show the whole stimulus movement (Figure 3.6). The framework consists of the stimulus and its auditory skills targeted arranging as sounds-phoneme-words-continuous discourse-sentences. The training can start from sounds (bottom-up approach) or sentences (top-down approach), depending on the trainee's difficulties or strength to help him/her to relearn the auditory stimulus.

Each of the stimuli was also followed by a numbering system to prepare the module for scoring procedure development in the next step. The numbering for stimulus is given as; Part E, for Sounds stimulus training and Part F, for speech stimulus training.

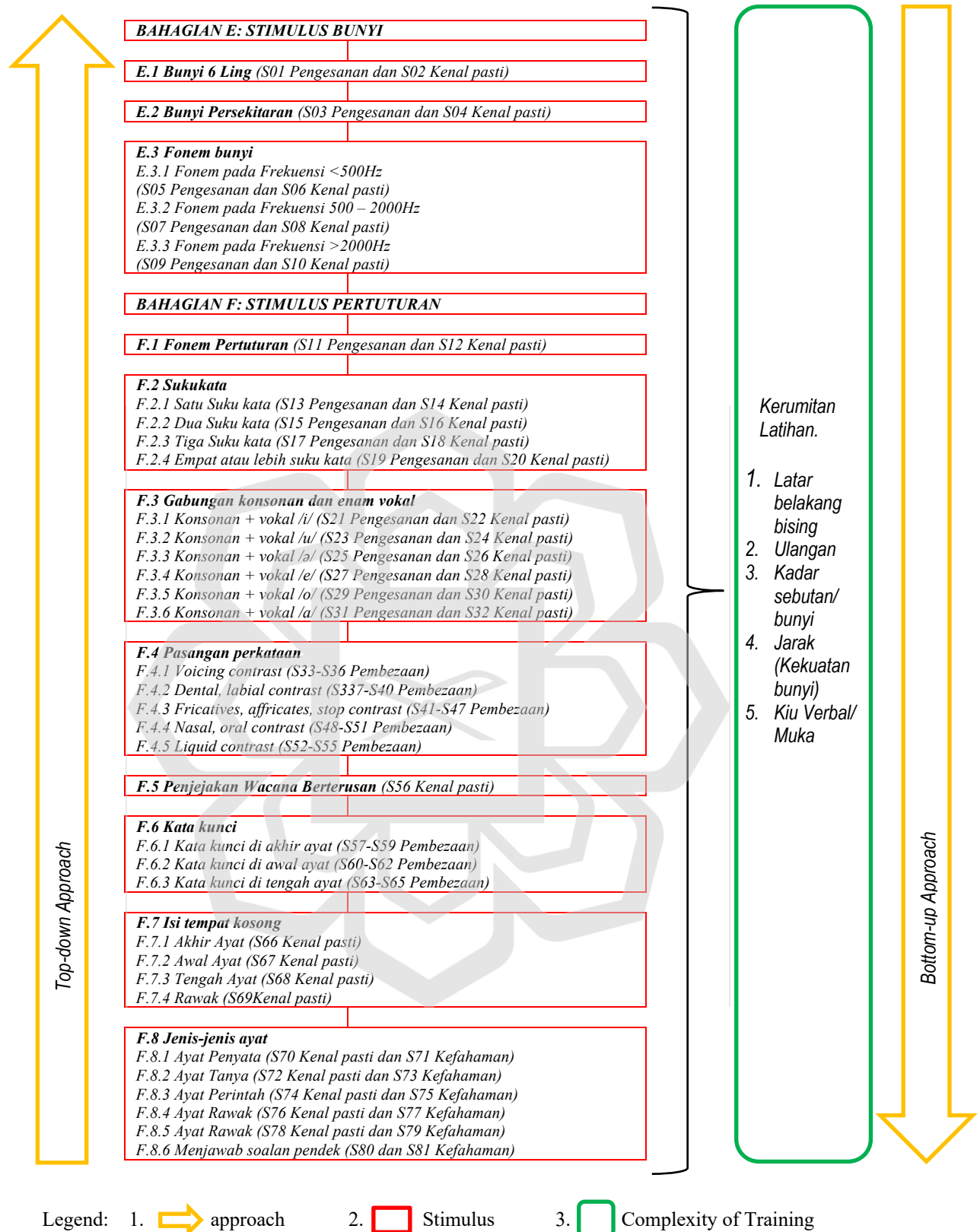


Figure 3.6 PLAM Content Fit in the AT Framework

3.5.4 Development of Scoring System and Manual for PLAM

A scoring system was developed with the objective to enable the trainer to easily track the performance and progress of the trainee. The manual of PLAM was developed as a standardised user guide for trainers.

3.5.4.1 Scoring Procedures

Based on the summary of stimuli in figure 3.6, a scoring table is developed for each stimulus. The example of the scoring form is as shown in Table 3.8. From the table, stimuli will be inserted in each row whereas the complexity of training (how the stimulus is presented to trainees) is inserted in each of the columns. There are four complexities that have been arranged from left to right to represent the most easily heard situations to the most difficult to hear situations (without noise in background or with noise in background). The four complexities are; (1) Repetition (*ulangan*), (2) Rate of utterances (*kadar sebutan*), (3) Distance (*jarak*), and (4) Verbal Cue (*Kiu verbal/muka*). The stimulus should be presented in different complexity starting from the left to the right column.

There are 81 stimuli in PLAM. Each stimulus in PLAM has been given a unique number from S01 to S81 as shown in Appendix XI. This number is called ID Score (*skor ID*). The session practice score (*skor latihan sesi*) is the score obtained for each training performed on the trainee. Each score form has been numbered from S01 to S81. Mark (1) for each correct response given by the trainee and mark (0) for an incorrect response or not showing the desired response as stated in each section.

Table 3.8 Form Score (general)

Kerumitan Latihan Stimulus	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
Stimulus																
Stimulus																
Stimulus																
Stimulus																
JUMLAH																JUMLAH SEMUA

3.5.4.1.1 Scoring method

In accordance with the complexity level specified in each set of instructions, it is essential for the trainer to pronounce each stimulus in PLAM appropriately. This ensures that the AT is closely aligned with the intended difficulties and objectives, ultimately providing participants with a tailored and effective learning experience. In normal circumstances, the trainer must always use the actual voice, voice strength and normal volume except as required in training. The explanation on how to score for each complexity is shown in table 3.9.

Table 3.9 Complexity of Training Instructions

Complexity of Training	Training Delivery and Scoring Instructions
Noisy background	Deliver stimulus while presenting the noise or environmental sound through speaker that was placed in the calibrated spot Record the response under the "with noise" box. If the trainee was unable to respond with noise, present the stimulus in silence. Record the response under the "no noise" box.
Repeat	Deliver the stimulus without repetition. If the trainee is able to repeat, Record the response under the "no repeat" box. If the trainee was unable to respond without repetition, deliver the stimulus with repetition. Record the response under the "repeats" box
Pronunciation/sound rate	Deliver the stimulus at a normal rate. If the trainee is able to repeat, Record the response under the "regular" box. If the trainee was unable to respond with normal rate, deliver the stimulus for 3-5 seconds. Record the response under the "long" box.
Distance	Deliver the stimulus at a distance of 1 meter using a normal voice without any emphasis. Record the response under the "1 meter" box. If the trainee was unable to respond in 1 metre distant, deliver the stimulus at a distance of 6 inches using a normal voice without any emphasis. Record the response under the "6 inch" box.
Verbal Cues/Facial Cues	Deliver the stimulus without any visual cue. Record the respond under "no cue" if no verbal/facial cues. If the trainee was unable to respond without visual cue, deliver the stimulus by showing facial cues such as lip movements or facial expressions. Record the response under the "with cue" box.

The PLAM recommends that the training should start with the most complicated situation such as, delivering a stimulus with background noise, without the help of repetition, at normal rate of pronunciation, from 1 meter distance and without verbal/facial cues. If the trainee is able to respond correctly to this complexity, the trainee will get 1 mark for each condition stated in each column. The stimulus is suggested to be delivered following these flows:

Start giving stimulus with the following complexity of training:

With noise in background (1 mark for both *ada* and *tiada*), without repetition (1 mark for both *ada* and *tiada*), with normal rate (1 mark for both *biasa* and *panjang*), at 1 metre distant (1 mark for both *1 meter* and *6 inci*) and without verbal/facial cue (1 mark for both *ada* and *tiada*).

If the trainee was unable to respond correctly, change to:

With noise in background (1 mark for both *ada* and *tiada*), with repetition (1 mark for *ada* and 0 mark for *tiada*), with normal rate (1 mark for both *biasa* and *panjang*), at 1 metre distant (1 mark for both *1 meter* and *6 inci*) and without verbal/facial cue (1 mark for both *ada* and *tiada*).

If the trainee was unable to respond correctly, change to:

With noise in background (1 mark for both *ada* and *tiada*), with repetition (1 mark for *ada* and 0 mark for *tiada*), with long rate (0 mark for *biasa* and 1 *panjang*), at 1 metre distant (1 mark for both *1 meter* and *6 inci*) and without verbal/facial cue (1 mark for both *ada* and *tiada*).

If the trainee was unable to respond correctly, change to:

With noise in background (1 mark for both *ada* and *tiada*), with repetition (1 mark for *ada* and 0 mark for *tiada*), with long rate (0 mark for *biasa* and 1 *panjang*), at 6 inches distant (0 mark for *1 metre* and 1 mark for *6 inci*) and without verbal/facial cue (1 mark for both *ada* and *tiada*).

If the trainee was unable to respond correctly, change to:

With noise in background (1 mark for both *ada* and *tiada*), with repetition (1 mark for *ada* and 0 mark for *tiada*), with long rate (0 mark for *biasa* and 1 *panjang*), at 6 inches distant (0 mark for *1 meter* and 1 mark for *6 inci*) and with verbal/facial cue (1 mark for *ada* and 0 mark for *tiada*).

If the trainee was unable to respond correctly, change to:

The same procedure from 1 to 5 is repeated but without background noise.

If the trainee was unable to respond correctly, change the content to another stimuli level. For example, if the trainee failed in all complexities of the training for phonemes, move to sentence level and start again from 1 to 6.

Training does not need to be repeated if trainee is able to respond correctly at first attempt. The trainee obtains '1' mark for each column because the trainee is considered to be able to listen in the most difficult situations. The explanation for this scoring procedure is explained for trainers in PLAM manual in Appendix X.

3.5.4.1.2 Score Interpretations

Tables 3.10 shows examples of the scores obtained for the phoneme identification exercise at frequencies >2000Hz. Based on the responses in this Table 3.10, it is found that the trainee is able to:

1. Identify /k/ in noise, with no repetition, at normal rate, at 1 metre distant and without verbal/facial cues. 1 mark is given for all items.
2. Identify /tʃ/ and /f/ without noise, with no repetition, normal rate, at 1 metre distant and without verbal/facial cues. 1 mark is given for all items under without noise and 0 mark for all items under with noise.
3. Identify /f/ without noise, with repetition, long speech rate, at 6 inches and without verbal/facial cues. 1 mark is given for without noise for 6 inches distant and without verbal/facial cues. 0 mark for other items.
4. Identify /s/ without noise, with repetition, with long rate and with verbal/facial cues. 1 mark is given for item under without noise and with verbal/facial cues.

Based on the above results, it can be construed that the trainee's ability to identify phoneme at frequency >2000 Hz is dependent on complexity of training as stated above. The complexity of training mastered by the trainee is considered as the trainee's strength and any complexities of training that are yet to be grasped by trainee is considered as the trainee's weakness. Trainee progress and confidence can be

increased by adding or reducing the complexity of training to help the trainee to listen. For example, if the trainee needs repetition to give the correct response, the trainer may suggest the trainee to confidently request for repetition when communicating in real situations. The trainee is suggested to give extra listening attention when the stimulus is converse for the second time. This is called a communication strategy that trainees can use in real communication outside training sessions.

Table 3.10 Scoring and Interpretations

S11 Phoneme at frequency >2000Hz Identification Training

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising									
	Ulangan		Kadar sebutan		Jarak		Kiu verbal// muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal// muka			
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada		
/tʃ/	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		
/ʃ/	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1		
/k/	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
/f/	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		
/s/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	JUMLAH SEMUA	
JUMLAH	1/5	1/5	1/5	1/5	1/5	1/5	1/5	1/5	3/5	3/5	3/5	3/5	3/5	4/5	4/5	5/5	36/80	

3.5.4.1.3 Overall Pass Score

Overall pass score refers to all scores obtained by trainees. The passing score is the score obtained for each exercise calculated as a percentage. Table 3.11 shows the examples of score and percentage obtained. The passing percentage reveals that trainees have the potential to master the basics of auditory skills in the areas that are being trained. The passing score percentages were determined in 4.4.4 Pilot Study to get Normative Score Findings.

Table 3.7 shows the examples of scores and percentages obtained for phoneme stimuli at frequencies >2000hz. Based on this example, the trainee has managed to

master the detection ability and achieved a score of 97.5%. However, the trainee showed limited basic ability to identify the phoneme because he had a score of 47.5%.

Table 3.11 Examples of Scores and Percentages Obtained

No.			Stimulus		Tarikh	Jumlah Skor Penuh	Skor lulus 50%	Jumlah Skor di peroleh	% Skor di peroleh
Bahagian E Latihan berkaitan jenis bunyi	E.3 Fonem Bunyi	E.3.3 Fonem pada frekuensi >2000 hz	S09	Pengesanan	10/08/21	80	60	78	97.5
			S10	Kenalpasti	10/08/21	80	60	38	47.5

The score percentage should be also inserted in a 'score graph' to chart the trainee's overall progress. Figure 3.7 shows examples of obtained scores compared to passing scores. Through this chart it indicates that trainees have achieved a passing score of 50% for S09 detecting phonemes at frequencies >2000 hz and not achieving a passing score for S10 identifying phonemes at frequencies >2000 hz.

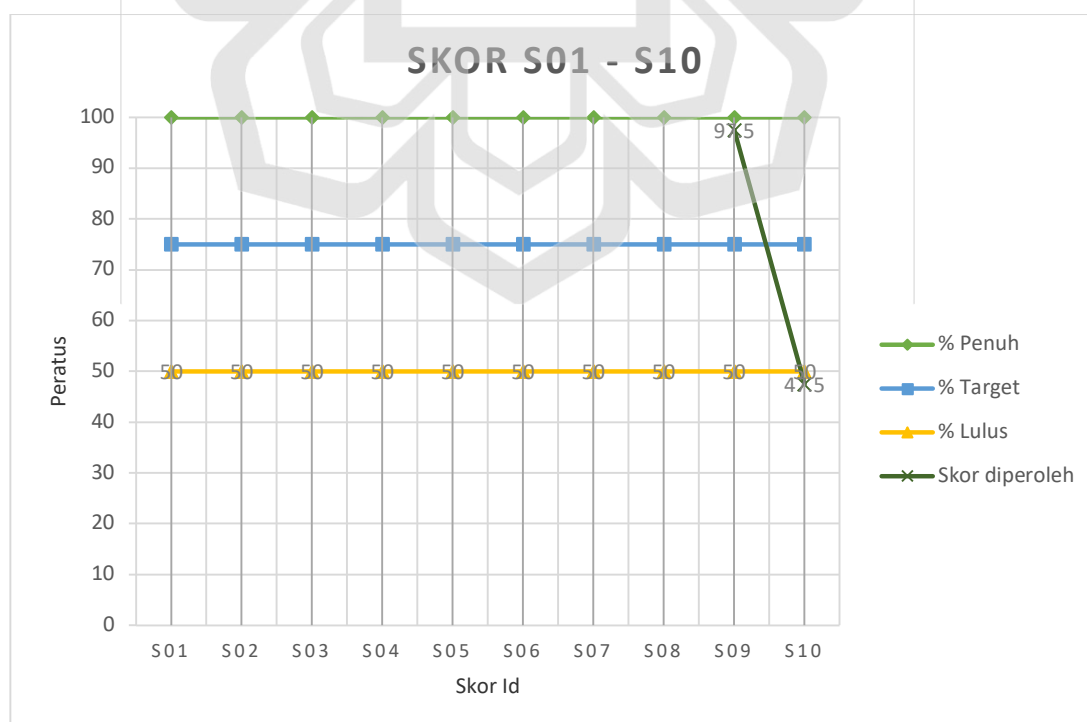


Figure 3.7 Score Graph Example

3.5.4.1.4 Auditory Skills Score

The auditory skill score is a score calculated specifically to see the trainee's auditory ability. Table 3.12 shows an example of the marks obtained by a trainee, which include 130 marks for random sentences (S77) and 98 marks for the self-topic sentences (S80), totalling 228 scores. There are no marks for general information topics because no exercises were conducted. The score is only calculated based on the exercise done (S77 Random Sentences + S80 self-topic sentences). Therefore, the trainee obtained a score of 228 out of 300 (the maximum score for this part) resulting in an auditory skills percentage calculated as 76%. Based on this score, it could be concluded that this trainee has passed (achieved a score greater than 75%) in the 'kefahaman' part of the PLAM programme.

PASSING SCORE:
$$\frac{\text{Total score obtained}}{\text{Total score}} \times 100$$
$$\frac{228}{300} \times 100 = 76\%$$

Table 3.12 Example of Auditory Skills Score

Kebolehan Auditori	No.	Stimulus	Jumlah Skor Penuh	Jumlah Skor diperoleh
Kefahaman	S71	Ayat nyata	150	Tiada latihan
	S73	Ayat tanya	150	Tiada latihan
	S75	Ayat perintah	150	Tiada latihan
	S77	Ayat rawak	150	130
	S79	Ayat rawak	150	Tiada latihan
	S80	Topik: Diri Sendiri	150	98
	S81	Topik: Informasi Umum	150	Tiada latihan
JUMLAH KESELURUHAN SKOR DIPEROLEHI (Hanya Latihan yang dibuat)				228
JUMLAH KESELURUHAN SKOR PENUH (Hanya Latihan yang dibuat)			300	
SKOR LULUS: $\frac{\text{JUMLAH KESELURUHAN SKOR DIPEROLEH} \times 100}{\text{JUMLAH KESELURUHAN SKOR PENUH}}$				76%

3.5.4.2 PLAM Form

The PLAM form covers six areas; (1) Part A, Demographic form, (2) Part B, PLAM Screening Form, (3) Part C, Overall pass score, (4) Part D, Auditory skills score, (5) Part E, Sound Stimulus and Part F, Speech Stimulus. An example of the PLAM form is provided in Appendix XI.

3.5.4.2.1 Part A: Demographic form

Demographic form was developed to collect information about trainee and trainer. The form contains; (1) Trainee name, (2) date of birth, (3) Age, (4) Telephone number, (5) Occupation, (6) Address, (7) Referred by who? (8) Hearing Impairment Diagnosis, (9) Hearing Devices Information, (10) Five difficult situations to hear, (11) Training expectations, and (12) Trainer information. The demographic form is attached in Appendix XI.

3.5.4.2.2 Part B: PLAM Screening (PLAM-S) Form

The PLAM-Screening (PLAM-S) form has been specifically designed to document and assess a trainee's baseline performance through the utilisation of screening tests. This form serves as a valuable tool for recording and measuring the trainee's initial abilities, providing a foundational reference point for the training process. Further explanation of PLAM-S will be discussed in 3.3.8

3.5.4.2.3 Part C: Overall Pass Score Form

Overall pass score form is a form to record all score obtained by trainees.

3.5.4.2.4 Part D: Auditory Skills Score Form

The auditory ability score form is a form to record and specifically calculate trainee's auditory ability scores.

3.5.4.2.5 Sound Stimulus and Speech Stimulus Form

This form is a set of scoring forms for training that contains all sound stimulus and speech stimulus.

3.5.4.3 PLAM Flowchart

The PLAM flowchart in Figure 3.8 has been designed to provide a clear overview of the entire PLAM process for both trainers and trainees. According to the flowchart, the PLAM training programme begins with the completion of a demographic form through an interview with the trainee. Subsequently, the PLAM process progresses to screening tests, followed by the administration of PLAM training based on the findings of the screening results. The training sessions are conducted over six weeks, with each session lasting between 45 to 60 minutes per week.

After the six-week training period, all scores are recorded in the overall score form and auditory skills form. If the trainee successfully completes all training requirements, recommendations are provided regarding whether to continue to different parts of the training or to end the training. Conversely, if the trainee does not pass the training within the six-week period, recommendations are made regarding whether to continue the training or refer the trainee for further evaluation.

Training concludes either when the trainee's scores reach a passing score or when it is determined that PLAM is not suitable for the trainee.

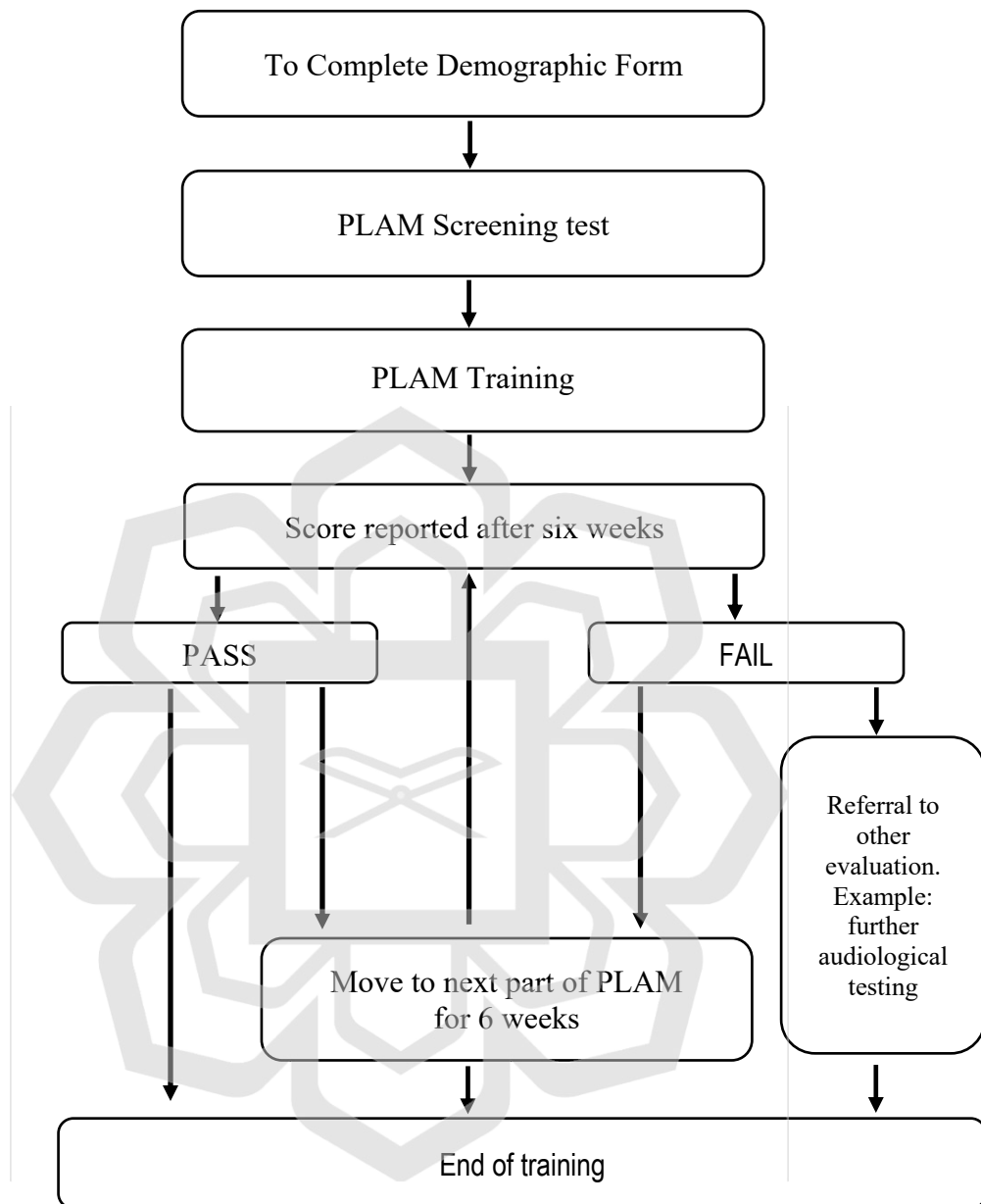


Figure 3.8 PLAM Flowchart

3.5.4.4 Manual for PLAM

The Manual for PLAM was developed to spell out all instructions for the trainer, starting from the philosophy behind PLAM (the framework and general instructions), the

preparation before administering PLAM, delivering procedure, charting score and feedback giving to trainees. The manual for PLAM can be found in Appendix X.

3.5.5 PLAM-Screening (PLAM-S)

The PLAM-Screening, or PLAM-S, was designed to assess the trainee's baseline performance and readiness for PLAM training. It was developed by selecting one representative task from each part of the stimulus in PLAM, including: 1. Environmental sounds identification, 2. Phoneme identification, 3. Words based on Syllabification Identification, 4. Words based on Phonemes Identification, 5. Words Discrimination, 6. Word in sentence discrimination and 7. Sentence Identification and Sentence comprehension

The PLAM-S is administered before PLAM training begins, and the results serve as a guideline for determining the appropriate approach (either bottom-up or top-down) to commence the training. For example, if the trainee fails certain tasks but passes others, the trainer can recommend starting the training at the level where the trainee has demonstrated proficiency, using either a bottom-up or top-down approach.

For instance, if a trainee fails tasks related to identifying words in sentences but passes all other items, the trainer may recommend beginning with environmental sounds identification at the first level and employing a bottom-up approach. Conversely, if a trainee struggles with tasks such as environmental sounds identification and phoneme identification but passes other items, the trainer may suggest starting at the highest level of understanding sentences and working down to phoneme detection using a top-down approach. Starting at a level where the trainee has already demonstrated proficiency helps build confidence before progressing to more challenging tasks.

Additionally, the PLAM-S can be used as an instrument to measure the effectiveness of PLAM by comparing pre-training and post-training results. This allows trainers to assess improvements in auditory skills and comprehension following PLAM intervention.

3.5.6 Focus Group Discussion for PLAM

The focus group discussion is the final part of this development procedure before the PLAM is to be validated as to be explained in Chapter Four. The event was carried out to get the experts' opinion on the preliminary report of PLAM before finalising the first draft. The expert review was also needed for preparing the PLAM content-validation and pre-testing.

3.5.6.1 Focus Group Discussion

The focus group discussion (FGD) was attended by five experts: reviewer 1 (an experienced audiologist), reviewer 2 (an experienced audiologist), reviewer 3 (an experienced audiologist), reviewer 4 (an experienced speech-language pathologist), and reviewer 5 (an experienced clinical linguist). The reviewers' backgrounds are shown in Table 3.13; with working experiences ranging from 13 to 20 years, and all are affiliated with academic institutions. The aim of the FGD was to assess PLAM in regard to its pertinent content.

Before the FGD was conducted, all experts were provided with PLAM documents: (1) PLAM manual, (2) PLAM for trainees, and (3). PLAM for Trainers. At this stage, the experts went through the documents and provided general comments before the FGD. The FGD was conducted in two sessions.

Table 3.13 Reviewers Background

Background	Information
Range of working experiences	13 to 20 years
Institution	All five reviewers are from academic institution
Caseloads for post-lingual hearing impairment	1 expert in linguistic (studied the disordered data) 4 experts have average of 1 to 5 patients per week

3.5.6.1.1 First Experts Review Meeting

The FGD was chaired by the researcher, a speech-language pathologist, and conducted via online discussion, with five reviewers in attendance. The PLAM was thoroughly scrutinized from start to finish, and all comments and suggestions were diligently recorded. A summary of the findings from the discussions and meetings was provided in Appendix V.

Expert recommendations were carefully considered, and modifications were made to the PLAM accordingly to ensure that their suggestions were incorporated. Most of the comments focused on refining the execution of PLAM, improving procedures, and developing meaningful content. Additionally, reviewers examined the integration of the Malay language system with auditory skills.

3.5.6.1.2 Second Focus Group Discussion

After incorporating all modifications based on the first FGD, another online FGD was conducted with three reviewers: Reviewer 1, Reviewer 2, and Reviewer 4, chaired by the researcher. All suggestions to refine the PLAM instructions and terminology were included in the manual. Additionally, discussions were held regarding the calibration of all environmental sounds, as outlined in Section 3.2.2. All necessary adjustments were made to create the first draft of the PLAM.

Most of the comments from the FGD focused on enhancing the scoring system and improving instructions for users to better understand how to use PLAM. This included discussions on conducting cognitive interviews to assess trainees' understanding before initiating training.

3.6 DISCUSSION

The PLAM adheres to a newly developed AT framework aimed at enhancing trainee skills in auditory perception, sound recognition, and speech comprehension under various conditions of complexity. This framework is designed to be adaptable for use with any language, including Malay, which is the focus of this study. Consequently, the PLAM has been extensively developed to meet four key requirements outlined for successful AT programmes by Henshaw and Ferguson (2013) and Kwak et al. (2020).

The first requirement involves identifying individual needs, which is addressed in PLAM through the initial PLAM-S screening process. This screening helps assess the trainee's baseline performance and tailor the training accordingly. The second requirement is setting specific goals, which are established based on the trainee's individual needs identified through PLAM-S. Both the trainer and trainee actively participate in setting these goals, fostering shared decision-making as the third requirement. Lastly, PLAM supports self-management by focusing on the trainee's strengths and weaknesses discovered through training. By understanding these strengths and weaknesses, the training can be tailored to address areas that are most relevant to the trainee's life, thus aiding in self-management of their auditory and communication abilities in real-life situations.

The development of PLAM aims to serve as a comprehensive tool for trainers to deliver effective AT programmes to trainees. The stimuli used in PLAM are designed to be flexible to accommodate the varying needs of trainees. Each stimulus is carefully selected to target specific auditory skills, aligning with the principle outlined by Saidi and Castro (2021) that effective communication begins with the ability to detect, organize, prioritize, and recognize sounds. Trainers should assess the trainee's existing skills to determine the appropriate number and type of sessions needed to support their

progress effectively. Therefore, PLAM emphasizes the importance of planning and tailoring the training approach to the individual needs of each trainee.

Developing PLAM presented several challenges, particularly in selecting appropriate stimuli for each targeted auditory skill. With no specific Malay corpus available for reference, PLAM stimuli were carefully chosen based on the Malay Standard system outlined by Onn (1988), Teoh (1994), and Shaari et al. (2003). Each word was cross-referenced with Kamus Dewan Perdana (Prime Dictionary) (Jabbar et al., 2021) to ensure accuracy. For sound stimuli, publicly accessible sources such as soundBible.com and soundeffectsfactory from YouTube were utilized, and these environmental sounds were meticulously calibrated.

During the second FGD, reviewers suggested introducing cognitive interviewing before beginning PLAM to ensure trainees understand the instructions and recognize the items in training. Naming tasks, particularly auditory naming, can be challenging for adults, especially in the context of ageing, as stated by Hamberger et al. (2022) and Marcell et al. (2000). To address this, PLAM introduces all stimuli with an introduction to their names before training begins, and certain stimuli are accompanied by visual cues (related images) to mitigate bias and aid in recognition.

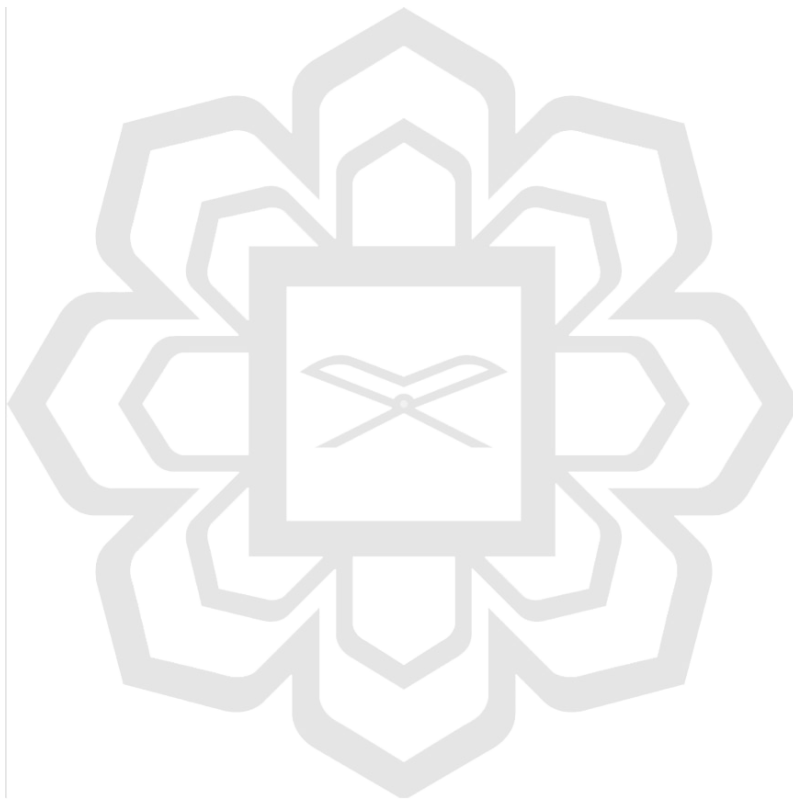
PLAM incorporates its own scoring procedure to objectively measure improvement while also allowing for subjective explanations to maintain individuality in results. The outcomes of PLAM are intended to complement standardised tests, as evidenced by previous studies (Anderson, 2012; Fu & Galvin, 2007; Miller et al., 2015; Preminger & Meeks, 2010; Tyler et al., 2010; Yu et al., 2017). The aim is to provide conclusive findings, addressing concerns raised in the systematic review by Michaud and Duchesne (2017) regarding the inconclusive effects of aural rehabilitation on the quality of life of older adults with hearing loss. PLAM is expected to show significant progress among trainees, with observable improvements within the first week of training, consistent with findings from Stropahl et al. (2020).

Recognizing the need for documentation, a dedicated manual for PLAM has been developed, catering to both trainers and trainees. The trainer's manual provides

instructions for conducting PLAM, while the trainee's manual includes visual cues to assist during training sessions, enhancing practicality and usability.

3.7 CONCLUSION

The PLAM is a holistic Malay AT and ready to be tested for its validity and subsequently to be used in the field.



CHAPTER FOUR

VALIDATION OF *PROGRAM LATIHAN AUDITORI MELAYU* (PLAM)

4.1 INTRODUCTION

The PLAM is a newly developed AT programme for post-lingual hearing-impaired people (trainees). It began with the development of a framework from a scoping review, followed by the PLAM programme content and a PLAM programme manual based on the Malay language system, and concluded with the scoring system for PLAM. The PLAM was thoroughly established with the aim of assisting trainees and trainers in performing a comprehensive AT programme in the Malay language.

The newly developed PLAM comprises three documents: 1. A copy for the trainee containing instructions and visual stimuli for training, 2. A copy for the trainer containing instructions on how to conduct training, a scoring form, and the PLAM screening form (PLAM-S); a screening tool for PLAM, and 3. A manual to guide the trainer before training (Appendix X, XI, XII).

The study recognises the importance of validating PLAM; otherwise, the usefulness of PLAM's elements for the targeted trainees (individuals with post-lingual hearing impairment) and trainers (professionals who conduct AT) could not be confirmed. Validation is also crucial to indicate PLAM functionality in addressing the targeted construct of interest among individuals with post-lingual hearing impairment before it is used in real testing. Therefore, PLAM needs to undergo various validation steps: content validation, picture validation, pretesting, and a pilot study to ensure its effectiveness as a training tool. Subsequently, PLAM will be modified and proofread based on validation findings. The updated version of PLAM should then be ready for field testing.

4.2 LITERATURE REVIEW

In general, the newly developed instruments should be validated. The following items are types of validity that have been established for developing PLAM.

4.2.1 Content-validity

Content validity is a validation process that assesses whether the items in a tool adequately represent the construct being measured across all relevant dimensions. To develop a pool of scale items, DeVon et al. (2007) suggested first defining the construct of interest and its dimensions by conducting a thorough literature review, seeking expert opinions, sampling from the target population, or conducting qualitative research. In the initial stages of instrument development, it is advisable to include the largest possible pool of potential items, which can then be refined based on content reviews.

Content validity is typically assessed using two tests: the content validation ratio (CVR) and the content validity index (CVI). Items that are rated as 1=useful or 2=essential by at least five out of six experts are retained. The CVR for each item is calculated using the formula $CVR = (N_e - N/2) / (N/2)$, where N_e is the number of experts who rated the item as “essential” and N is the total number of experts. The CVI for each item is determined based on the proportion of experts who rated the item as 3=relevant with minor revisions or 4=very relevant. For example, if four out of six experts rated the item as 3 or 4, the CVI would be $4/6 = 0.67$. Items that do not meet the 0.83 level of endorsement required to establish content validity, as determined by six experts at the 0.05 level of significance, are dropped (DeVon et al., 2007).

4.2.2 Picture-Validation

Picture validation is the process of assessing images or illustrations to ensure they meet specific criteria related to quality and usability (Suzuki et al., 2010). This is especially important when images are intended to convey information or aid understanding.

During picture validation, several factors are evaluated, including the clarity and overall visual appeal of the illustrations. This includes assessing the guessability of the illustrations to ensure they are easily understandable and free from ambiguity (Tulloch et al., 2012). Images should effectively convey their intended message without causing confusion or misunderstanding.

Another aspect of picture validation involves evaluating the transparency of the images. In this context, transparency refers to the clarity and honesty of the visuals, ensuring they provide an accurate representation of the subject matter without any hidden agenda or misleading elements. The picture validation process is systematic and typically involves reviewing, analysing, and testing images against predefined criteria (Vilela et al., 2018). Input from experts or users may also be solicited to ensure the visuals effectively fulfil their intended purpose.

In summary, picture validation aims to ensure that images and illustrations meet specific quality and usability standards, effectively conveying the desired message without ambiguity or deception. This process is crucial in various fields, including education, marketing, and communication, where visual content plays a vital role in conveying information and ideas.

4.2.3 Pre-testing

Pre-testing, as commonly defined, involves testing a set of questions or a questionnaire on members of the target population, and can occur in various settings such as the field, office, or laboratory (Czaja, 1998). It is a critical stage in questionnaire development, assessing the potential effectiveness of the questionnaire before its final distribution to the target population (Reynolds et al., 2017).

There are three identified pre-testing processes: testing individual items, reviewing the overall design, and evaluating the logical sequence or flow of the instruments (Reynolds et al., 2017). During pre-testing, researchers aim to observe how respondents interact with each item, identify any words, terms, or concepts that may be

unclear or misinterpreted, and gather suggestions for modifications (Czaja, 1998). The goal of this study is to assess the comprehensibility, feasibility, and suitability of using PLAM for training following the pre-testing phase.

4.2.4 Pilot Study

A pilot study serves as the initial phase of developing the entire research protocol and typically involves a smaller-sized study aimed at assisting in planning and refining the main study (In, 2017). According to Lim et al. (2017) pilot studies have three primary objectives: to assess whether the distinctions among groups of items truly reflect a specific construct, to evaluate the internal consistency of the questions, and to gauge respondents' understanding of the questionnaire.

In the context of this research, the aims of the pilot study are to establish normative data and to determine the time required to complete PLAM training.

4.2.4.1 Pilot Study to Determine Normative Data

In the field of audiology and research related to hearing, obtaining normative data is crucial. The collection of data from individuals with normal hearing serves as a benchmark for comparison when evaluating individuals with hearing impairments (Scollie et al., 2012). Normative data provide insight into the typical range and distribution of responses within the population, which is valuable for both research and clinical purposes. A study conducted by Mattsson et al. (2018) aimed to gather normative data to develop representative and age-appropriate benchmarks.

In the context of this study, the objectives of determining normative data are twofold: first, to establish a reference point for individuals with hearing impairments, and second, to assess their hearing ability relative to that of individuals with normal hearing.

4.2.4.2 Pilot Study to Determine Time Needed to Complete PLAM

Beier et al. (2015), in their systematic review on AT benefits among hearing aid users, found that most of the training programmes reviewed in their study lasted for 7 to 8 weeks. These programmes were typically conducted once or twice a week, with each session lasting between 1 hour and 1 hour and 30 minutes. This duration of AT is considered adequate to assess the effectiveness of the AT programme based on the literature and clinical evidence presented in the study. Table 4.1 displays the AT duration, frequency, and the period required before improvements could be observed.

Fu et al. (2005) introduced a one-hour training session per day, five days a week, for one month or longer before studying the implications of AT among cochlear implant patients. Barcroft et al. (2011) presented one-hour and two-hour sessions per week for a six-week training programme before assessing the effectiveness of AT using multiple talkers and a four-choice discrimination test. Hassan et al. (2013) conducted one-hour weekly sessions over six to 12 months to study the effect of intensive AT on auditory skills and speech intelligibility in prelingual cochlear-implanted adolescents and adults. All three studies observed the effectiveness of AT after the specified training durations as mentioned in Table 4.1 were provided to their patients.

In a study by Olson (2015) reviewing currently available AT options, it was concluded that AT duration should be at least 15 hours before generalisation is observed among patients, enabling them to use the learned AT in their everyday lives.

Based on these studies, PLAM is suggested to be conducted over an 18-hour training period within six-week programmes. These should include one-hour training sessions conducted at a clinic by a professional, and two-hour training sessions carried out at home by the subjects every week. A home-based training programme should be provided to the subjects to complete the 2-hour home training.

Table 4.1 Auditory Training Duration, Frequency and Period

Author	Fu et al. (2005)	Barcroft et al. (2011)	Hassan et al. (2013)
Duration	1 hour per day	1 hour per lesson	1 hour
Frequency	5 days per week	2 lessons per week	Weekly
Period	1 month or longer	6 weeks for a total of 12 training sessions	6 months to 18 months

4.2.5 Problem Statement and Study Rationale

The measurement tools used in the healthcare field are often highly intricate, and the outcomes of their construction cannot be directly observed and measured (Almanasreh et al., 2019). Therefore, validation testing should be conducted to assess the PLAM, and all aspects of the validation process should be addressed before implementing the PLAM in real testing. This process involves four key areas: validating its content, validating its format, conducting pretesting to initially assess what the PLAM is expected to evaluate, and finally conducting a pilot study to establish its normative data. All four areas are essential to demonstrate that the PLAM is suitable for use with real trainees and trainers.

4.2.5.1 PLAM's Content-Validation has not been Tested

Content validation for PLAM is essential to assess whether its content is suitable to fulfil its intended role as a comprehensive AT programme. Sireci (1998) defines content validity as encompassing domain definition, domain relevance, domain representativeness, and appropriate test construction procedures. The methods used in content validation include matching tasks, congruence rating scales, alignment studies, and item similarity ratings (Sireci & Faulkner-Bond, 2014). The content of PLAM includes a manual, training materials (for both trainers and trainees), and the assessment component (PLAM-S). Each of these parts in PLAM must be well-documented to

represent a programme designed to train individuals with post-lingual hearing loss. Sireci (1998) emphasized that content validity accurately describes the desired qualities of a study. Content validation is also necessary to determine the relevance and representativeness of the elements in the instruments (Lynn, 1986).

Furthermore, content validation for PLAM involves seeking consensus from experts on each aspect embodied in PLAM. For instance, Silva et al. (2021) conducted a study to validate an instrument for assessing the degree of implementation of a Hearing Conservation Program and successfully reached consensus among experts, with the exception of two aspects. The study recommended addressing these non-conforming aspects by considering the input of experts to simplify, clarify, and make the statements more precise, ultimately improving presentation and readability. The advantages of following such suggestions, as outlined by Silva et al. (2021), are that it allows for the preservation of PLAM contents carefully developed in Chapter Three. The “failed” parts should be improved rather than removed, to avoid discarding elements that might prove necessary in the future.

Content validity indicates the extent to which the items in an instrument accurately represent the knowledge being tested or the characteristics under investigation (Dawson & Trapp, 2004). The PLAM is aimed to control known sources of error and facilitate the development, implementation, and assessment of required interventions. This can be achieved through high content validation and a careful consideration of expert feedback.

4.2.5.2 PLAM’s Picture-Validation has not been Tested

Houts et al. (2006) explained that using pictures in four areas of research – attention, comprehension, recall, and intention/adherence, can provide significant benefits. However, when using pictures, it can lead to uncertainty regarding how people interpret the meaning, especially in health communication (Houts et al., 2006). In this study, PLAM might face a similar challenge if the pictures within PLAM are not properly validated, as line-drawing pictures may lead to different perceptions among users.

The research for PLAM is targeting multiple racial groups in Malaysia, encompassing various age groups starting from 12 years and above. Therefore, it is crucial that the pictures in PLAM are validated among respondents from different racial backgrounds and age groups to ensure a comprehensive validation process representing the intended targets.

Kassam et al. (2004) conducted a study within the Cantonese-speaking Chinese community, the Punjabi-speaking East Indian community, and the Somali-speaking Somali community to assess whether pictographs used in medication could be correctly interpreted without verbal explanation. Their study revealed that the pictograms used were not well understood, with only four out of 16 pictograms being interpreted correctly by 70% of the participants. Considering the potential variations in interpretation due to differences in age and race among subjects, this study includes standardized verbal explanations to accompany the pictures when presented to a wide range of respondents. This approach is also suggested by Kalsher et al. (1996), who found that elderly respondents significantly prefer pictorial representations on prescription labels alongside verbal explanations.

4.2.5.3 PLAM's Pre-testing has not been Tested

Ruel et al. (2016) emphasized that pre-testing is a crucial method for evaluating an instrument at an early stage. It serves to identify any measurement-related issues, ensure that the instrument's sequence is free from bias, assess the burden placed on respondents, and confirm that respondents correctly interpret the instruments. Conducting pre-testing is particularly important for PLAM because, as suggested by Reynolds et al. (2017), it helps determine the potential effectiveness of the instruments before their final distribution to the target population.

Furthermore, pre-testing should focus on how subjects respond to the instruments, ensuring that they interpret and respond to the instruments in line with the research intentions and possess the required information or skills to complete the tasks (Council of the Inspectors General on Integrity & Efficiency, 2009). Without proper pre-testing of PLAM, any issues that may arise when using this programme may be left

undetected and potentially affect users' investment of their time, effort, and resources in an event that does not deliver the expected benefits or, in some cases, might lead to negative consequences (Ruel et al., 2016).

In the context of PLAM, pre-testing is aimed at scrutinizing the logical sequence of PLAM (Reynolds et al., 2016) and assessing the comprehensibility and acceptability of PLAM content (Kienlin et al., 2020). Pre-testing is essential in preparing PLAM for field testing, aligned with Hilton's (2015) assertion that cognitive pre-testing of item performance and corresponding response options is crucial to ensure that the instruments are understood and interpreted as intended.

4.2.5.4 PLAM's Pilot Study has not been tested and its Normative Score has not been Established

Pilot studies in PLAM are conducted in accordance with the suggestions of Lim et al. (2017). They are aimed at examining whether the distinctions among groups of items truly reflect a particular construct and at gauging respondents' understanding of the questionnaire. Furthermore, PLAM should undergo a pilot study to establish normative scores, as recommended by Xu et al. (2021). Normative data, as explained by Kendal and Sheldrick (2000) provides a means to assess the clinical significance of therapeutic interventions by comparing individual performances against benchmarks established by normative data representing the population. O'Connor (1990) emphasized the importance of having normative data to describe the natural history of clinical conditions in the community and to develop standards of care for interventions.

Obtaining normative scores from this pilot study is critical for evaluating the practicality of PLAM and refining it before conducting more extensive studies. The performance scores obtained from the normal hearing group in the pilot study serve as an initial indication of the program's effectiveness for individuals with hearing impairments. Therefore, the normative data gathered in the pilot study are essential for conducting research on a smaller scale before testing it on a larger scale, involving real populations (In, 2017).

4.2.6 Main Objectives

To validate the PLAM.

4.2.7 Specific Objectives

1. To conduct content-validation on PLAM
2. To conduct picture-validation on PLAM
3. To conduct pre-testing on PLAM
4. To conduct pilot study to get normative score for PLAM and to determine the time needed for a subject to complete PLAM training

4.3 METHODOLOGY

The methodology of this study involved the process of requesting the ethics approval, conducting validation testing, and finalising PLAM.

4.3.1 Study Design

This study is a validation study (Yasir, 2016) and cross sectional study.

4.3.2 Study Population

Subjects for this research were divided into two groups either expert's group or subjects with normal hearing: depending on the validation test.

4.3.2.1 Content validation

Six experts included in the content validation process comprised a linguist, three senior audiologists, and two senior speech-language therapists (SLPs). The selection of experts aimed to encompass a diverse range of expertise from three main academic backgrounds: audiology, speech-language pathology, and linguistics. To ensure the expertise of the participants, the criteria for inclusion in the study required a minimum of five years of experience in their respective fields. Table 4.2 provides details of the selected experts. All experts were chosen based on their qualifications and expertise, and they provided consent to participate in the research.

Table 4.2 Background of Experts

Background	Information
Range of working experiences	15 to 20 years
Institution	3 from hospital 2 from academic institution 1 from private clinic
Caseloads for post-lingual hearing impairment	1 expert in linguistic (studied the disordered data) 5 experts have average of 1 to 15 adult hearing impaired patients per week

The inclusion criteria for expert subjects are:

1. Professional with at least five years of experience in dealing with individual having post-lingual hearing impairment aural rehabilitation management or has experience at least five years in the area of linguistics, audiology and speech-language (e.g., audiologist, speech-language pathologist, linguist, academician),
2. Individual conversant in Malay

The exclusion criteria will be any professional who was unable to give commitment to validate the PLAM. The content validation was done via email and on a voluntary basis.

4.3.2.2 Picture-validation, pre-testing and pilot study

Ten subjects with normal hearing aged 13 to 59 years old were included in picture-validation, pre-testing, and pilot study for PLAM. The subjects were eight Malays, one Chinese and one Indian. The study's subjects were drawn from the three largest racial groups in Malaysia who are conversant in Malay to gather information about PLAM in the population. However, it should be noted that since the sample size is small, the findings may not definitively be representative of the entire population. Table 4.3 shows the subjects' background.

Table 4.3 Background of Normal Hearing Subjects

Background	Information
Age (range)	13 years to 59 years
Gender	3 males 7 females
Race	8 Malay 1 Chinese 1 Indian
Hearing level	$\leq 20\text{dBHL}$

The inclusion criteria are stated below:

1. Aged 12 years and above,
2. Individual conversant in Malay,
3. Does not have hearing loss. All subjects must be tested using a pure-tone audiometry test to confirm their hearing level.
4. Does not have any cognitive problems and abnormal senses through interview with the subjects.

The exclusion criteria are any subjects who cannot commit the time and effort for the validation study.

4.3.3 Sample Size

Two groups of subjects are needed for validation of PLAM. The group are experts and subjects with normal hearing. For content validation, six experts were included. Whereas ten subjects were included in picture validation, pre-testing and pilot study.

4.3.3.1 Content-Validation on PLAM

Consultation on the content-validation of PLAM requires the input of six experts who possess expertise in various areas of aural rehabilitation. The number of experts, as suggested by Lynn (1986), falls within the range of five to ten, providing an adequate level of control to minimise the potential for chance agreement. Additionally, Yusoff (2019) recommended that the number of experts for content validation should be no less than six and no more than ten, further, supported the choice of six experts for this process.

4.3.3.2 Picture-Validation on PLAM

The selection of subjects for this study was determined by calculating a sample size equivalent to a minimum of 30% of the actual subject population, in accordance with the recommendation of Alasuutari et al. (2008). Consequently, the calculated sample size in Chapter Five amounted to 20 subjects but should have been limited to six subjects. However, this study chose to include ten subjects with normal hearing, each representing different age groups and various races, as detailed in Table 4.3.

4.3.3.3 Pre-testing on PLAM

According to Reynolds et al. (2017), pre-test sample sizes discussed in the literature are generally small and can range from as few as 5 to 10 individuals to as many as 50 to 100, depending on the specific research objectives. To align with this guidance, this study opted to include ten subjects with normal hearing for pre-testing.

In preparation for field-testing, the PLAM is expected to involve ten subjects; hence, having ten subjects for pre-testing is considered sufficient. The selection of subjects for pre-testing was made to closely resemble those who will be the actual subjects in the field-testing phase. This selection takes into account individuals who may have varied levels of understanding or may react differently to the questions, those with differing amounts of available information, and those with varying abilities to respond to the questionnaire. This diversity in the sample, encompassing various education levels and experiences, aligns with recommendations from (Council of the Inspectors General on Integrity & Efficiency, 2009).

4.3.3.4 Pilot Study to get Normative Score for PLAM

A pilot study was conducted using the same ten subjects with normal hearing, as previously employed in picture validation and pre-testing, to establish normative scores for PLAM. The size of the pilot study sample is recommended to depend on the eventual size of the actual sample, as suggested by Tools4Dev (2014). As mentioned earlier, the

field study is intended to involve ten subjects; hence, having ten subjects for the pilot study is justifiable. This number is considered sufficient because the goal is to detect clinically meaningful differences based on the researcher's critical experience, as emphasised by In (2017).

4.3.4 Study Location

The content-validation was conducted via online and the documents for validation were sent via email. The picture validation, pre-testing and pilot study was conducted at Hospital Angkatan Tentera Tuanku Mizan (HATTM), Wangsa Maju, Kuala Lumpur.

4.3.5 Study Procedure

Validation of PLAM has been constructed in five stages as shown in Figure 4.1; (1) Content-validation and PLAM modifications 1, (2) Picture-Validation and PLAM modifications 2, (3) Pre-testing and PLAM modifications 3, (4) Pilot study to get normative data and to determine the time needed to complete PLAM and PLAM modifications 4 and (5) PLAM proofread.

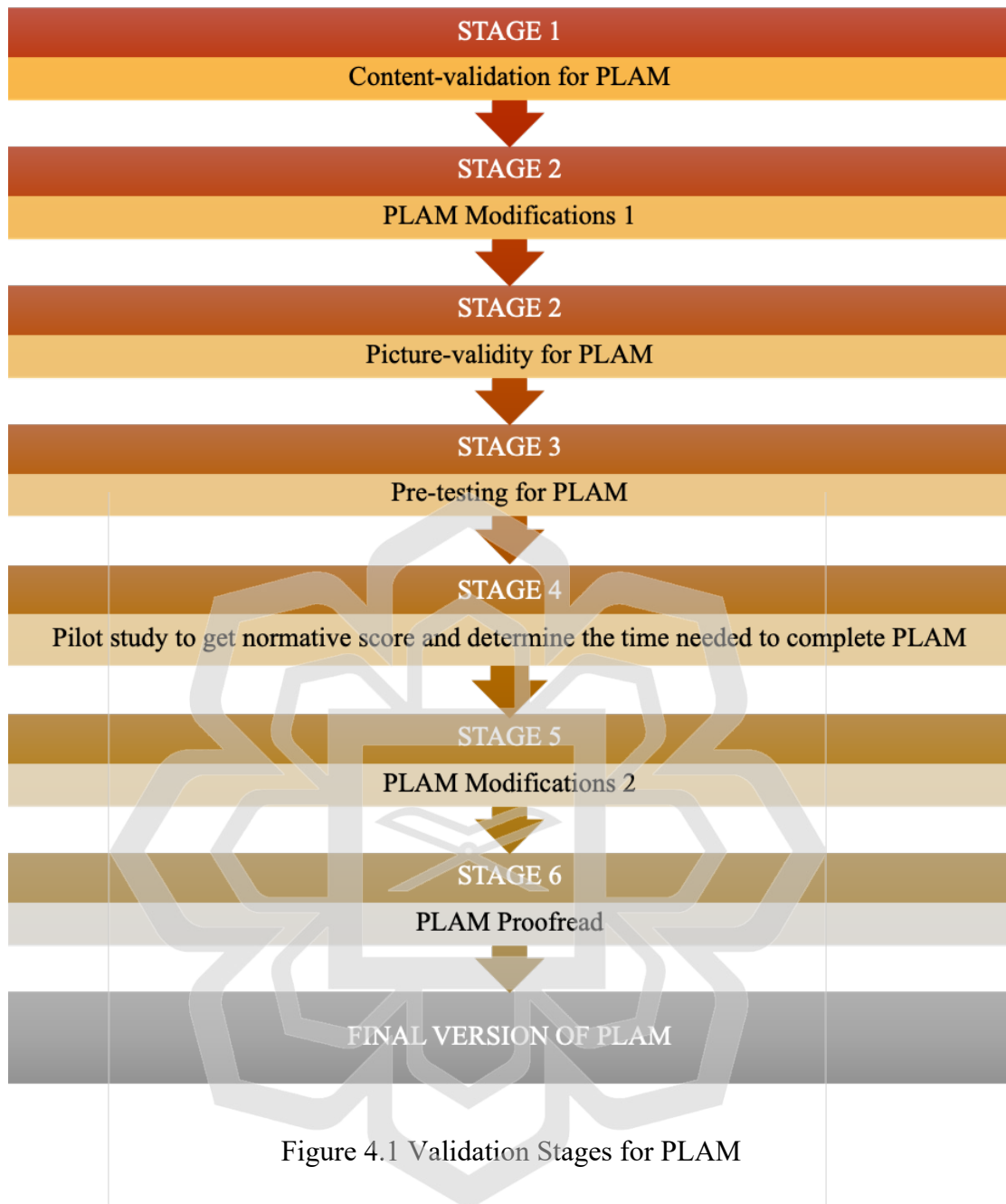


Figure 4.1 Validation Stages for PLAM

4.3.5.1 Content-Validation on PLAM and PLAM Modifications 1

This content validation was conducted asynchronously via email to all experts. Experts were given a set of PLAM and a content validation form to validate all contents within two weeks. The PLAM set given to the experts were the PLAM Manual that contains 43 items and the PLAM Stimulus that contains 164 training items including the instructions. The experts were requested to state their opinions on the relevancy of each item of PLAM based on 4 relevancy scale; 1. Not relevant, 2. Slightly relevant, 3.

Relevant and 4. Very relevant. They were also asked to leave their comments as well as suggestions to further improve each of the items in the comments section and were encouraged to give overall comments and suggestions in general for PLAM.

4.3.5.2 PLAM Modifications 1

Based on content-validation, modifications 1 have been made before carrying out further to the next stage. The modifications undertaken involved addressing and rectifying aspects related to PLAM based on the comments and feedback provided by experts. This included making corrections, adjustments, or improvements to ensure that PLAM is properly aligned with the recommendations or insights offered by knowledgeable individuals in the field.

4.3.5.3 Picture-Validation on PLAM

For picture validation, ten subjects were asked to state their opinion on the guessability and translucency of six pictures appeared in PLAM. The subjects were asked to state their answer in the form of “Yes” / “No”. For each picture two questions were asked:

1. Is the picture the same as what has been explained? (guessability)
(Adakah gambar ini seperti yang diterangkan?)
2. Is the picture clear and recognizable? (translucency)
(Adakah gambar adalah jelas dan boleh dikenali?).

4.3.5.4 Pre-Testing on PLAM

Pre-testing for PLAM was conducted on the same 10 subjects as in the Picture validation stage. A test form was developed to contain three yes or no questions for each item. The three questions are:

1. Can the instructions and training be understood?
(*Adakah arahan dan latihan yang diberi boleh difahami?*)
2. Are you able to do the task according to instruction?
(*Adakah anda boleh melakukan arahan yang diberi?*)
3. The instructions and training suitable to be used?
(*Arahan dan latihan yang diberi sesuai digunakan*)

The questions developed based on Reynolds et al. (2017); to notably pre-test each item and to check the overall design. Overall, questions were asked by personally interviewing the subjects following the recommendation made by Reynolds et al. (2017) and Council of the Inspectors General on Integrity & Efficiency (2009)

4.3.5.5 Pilot Study to Get Normative Score and Determine the Time Needed to Complete PLAM

The pilot study was conducted in a manner identical to the actual testing conditions. Consequently, it encompassed all the requirements for subjects to undergo pre-training assessments using three assessment tools: PLAM-S, MMST-AV (Jamaluddin, 2016), and HHIA-M (Zam et al., 2019). However, since the subjects were normal hearing individuals, the HHIA-M assessment was not administered.

PLAM comprises 81 stimuli that need to be tested from start to finish. Each stimulus has a different maximum score, which is then converted into a percentage. Throughout the pilot study, all scores obtained from subjects were meticulously recorded and calculated as percentages. These percentages serve as normative scores for PLAM.

The time required for each subject to complete PLAM training was also documented. Additionally, the study recorded the results of PLAM-Screening (PLAM-S) and MMST-AV for all subjects.

4.3.5.6 PLAM Modifications 2

The PLAM modifications 2 have been implemented based on processes such as picture validation, pre-testing, and pilot study. This indicates that adjustments or refinements to PLAM were made based on insights gained through picture validation checks, preliminary testing, and a small-scale pilot study. These steps are commonly undertaken to enhance the validity and effectiveness of PLAM. This also includes making corrections, adjustments, or improvements to ensure that PLAM is aligned with the recommendations or insights offered by knowledgeable individuals in the field.

4.3.5.7 PLAM Proofread

After all the modifications have been made, PLAM was sent to individuals for proofreading. The PLAM final version is now ready for the field testing.

4.3.6 Application for Research Ethics Approval

Applications have been submitted to the IIUM Research Ethics Committee (IRECS) for conducting the study at the Audiology Clinic, Department of Audiology and Speech-Language Pathology, Kuliyah of Allied Health Sciences (DASLP, KAHS) and Hospital Angkatan Tentera Tuanku Mizan (HATTM), Wangsa Maju. Additionally, ethical approvals have been sought from both IRECS and HATTM.

HATTM granted approval for the study from 27 September 2021 to 31 December 2021, as indicated in the certificate of ethical approval provided in Appendix V. This approval was forwarded to IRECS for endorsement. Subsequently, on 17 November 2021, IRECS issued approval for the study from 29 October 2021 to 15 November 2022, as stated in the approval letter with ID No. IREC 2021-286, found in Appendix VIII.

4.3.7 Data Analysis

The results for content validation were quantified and justified for their relevance based on the proportions of expert significance, following the method outlined by Lynn (1986). Content validation was calculated using the Content Validity Index for each item (I-CVI), Content Validity Index for Scale (S-CVI), and Average of Content Validity Index for Scale (S-CVI/Average), as outlined in Lynn (1986) and Yusoff (2019) showed below:

- i. $I-CVI = \frac{\text{The number of experts giving rating 3 or 4}}{\text{Total number of experts}}$
- ii. $S-CVI = \frac{\text{The proportion of item given rating 3 or 4}}{\text{Total number of experts}}$
- iii. $S-CVI/Average = \frac{\text{The total of S-CVI for each expert}}{\text{Total number of experts}}$

Data analysis done for picture-validation, pre-testing and pilot study were descriptive analysis. The score obtained from the picture validation will be converted to percentage to see the respondents' agreements. For pre-testing, the score obtained will also be converted to percentage to see if PLAM is suitable, understandable and the training is feasible. For pilot study, the normative score will be described in percentage, mean and standard deviations.

4.4 RESULTS

The validated PLAM has been analysed and the result of each analysis will be explained in this part.

4.4.1 Content-Validation Findings

The content validity analysis yielded an I-CVI value ranging from 0.833 to 1 for each section, indicating strong agreement among the experts. Similarly, the S-CVI value ranged between 0.995 to 1 for each expert, with an overall S-CVI/Average value of 0.998. As the acceptable value for CVI is 0.83 or more (Lynn, 1986), these results indicate that PLAM is considered relevant and justified.

Furthermore, an expert panel provided comments and suggestions to enhance PLAM. Table 4.3 presents a summary of the expert's feedback and the modifications that have been implemented to improve PLAM. Among the modifications made were the removal of items that exhibited dialectical or socioeconomic bias. For instance, sounds associated with vacuum cleaners were eliminated as they may not be universally familiar across all households.

Table 4.4 Expert's Comments and Modifications 1 on PLAM

Expert's Comments	Modifications
To give clear explanation, standardised instructions and add example in manual	i. Clearly explain the flow of PLAM ii. Improve the explanation about procedure and include example iii. Improve explanation and include picture of setting and other necessary diagram iv. Include standardised visual stimulus
To have instructions regarding dialects use in training	Explanations about using dialects has been included
To have picture validation	Picture-validation has been done
To use familiar sounds in environmental sounds section	Sounds stimulus has been reduced from 25 stimulus to 18 stimulus
To rearrange information to have practical flow	i. Rearrange the flow and improve the clarity of explanation ii. Speech stimulus has been rearranged according to auditory skills hierarchy. The intended responses have been recalculated and stated for easy scoring references.

4.4.2 Picture Validation Findings

Picture validity showed 100% responses agreed that the picture used are guessable and 98.33% agreed that the picture is translucent.

4.4.3 Pre-Testing Findings

Pre-testing score showed 100% subjects agreed PLAM instructions and training are understandable, doable and suitable.

4.4.4 Pilot Study to Get Normative Score Findings

From the pilot study, the normal subjects achieved more than 80% score for all sections in PLAM module with a minimum score of 88.7% for individuals. When calculated the total percentage for each stimulus for all ten subjects, the normative scores obtained are ranging from 98.6% to 100% as shown in table 4.4. Mean score obtained for all subjects is 99.8% and standard deviation is 0.036.

Table 4.5 Range and Average Percentage for PLAM stimulus

No.	Range and Average for PLAM Stimulus	Percentage
1.	Range score for PLAM Stimulus (Individual)	88.7 to 100
2.	Average mean score for PLAM Stimulus (all ten subjects)	99.8 with 0.036 SD
	Range mean score for PLAM stimulus (all ten subjects)	98.6 to 100

The findings from the pilot study are summarized in Table 4.5. Among the ten subjects, the average PLAM score obtained was 315.8, with individual scores ranging from 280 to 320 out of a maximum achievable score of 320. Additionally, the MMST-AV results revealed that all participants achieved Speech Recognition Threshold (SRT) results ranging from -1.3 dB HL to -7 dB HL.

The 4.6 table also provides insights into the time required for each subject to complete the PLAM training session, including any breaks needed. Subjects completed the entire PLAM within a timeframe of 50 to 70 minutes, with an average duration of 60.5 minutes. Importantly, none of the subjects required any rest during the PLAM administration.

Table 4.6 Information Obtained from Pilot Study

No.	Information obtained	Score / Percentage/ dB HL/ Minutes
1.	Average score obtained for Ujian Saringan PLAM	315.8 score (320 is maximum score)
	Range score obtained for Ujian Saringan PLAM	280 to 320 score (320 is maximum score)
2.	Average percentage for Ujian Saringan PLAM	99.94%
	Range percentage for Ujian Saringan PLAM	99.4% to 100%
3.	Average SRT for Malay Matrix Sentence test	-4.57dB HL
	Range SRT for Malay Matrix Sentence test	-1.3dB HL to -7dB HL
4.	Average time to complete PLAM	60.5 minutes
	Range time to complete PLAM	50 minutes to 70 minutes
5.	Percentage of subjects that need rest	0%

4.4.5 PLAM Modifications 2

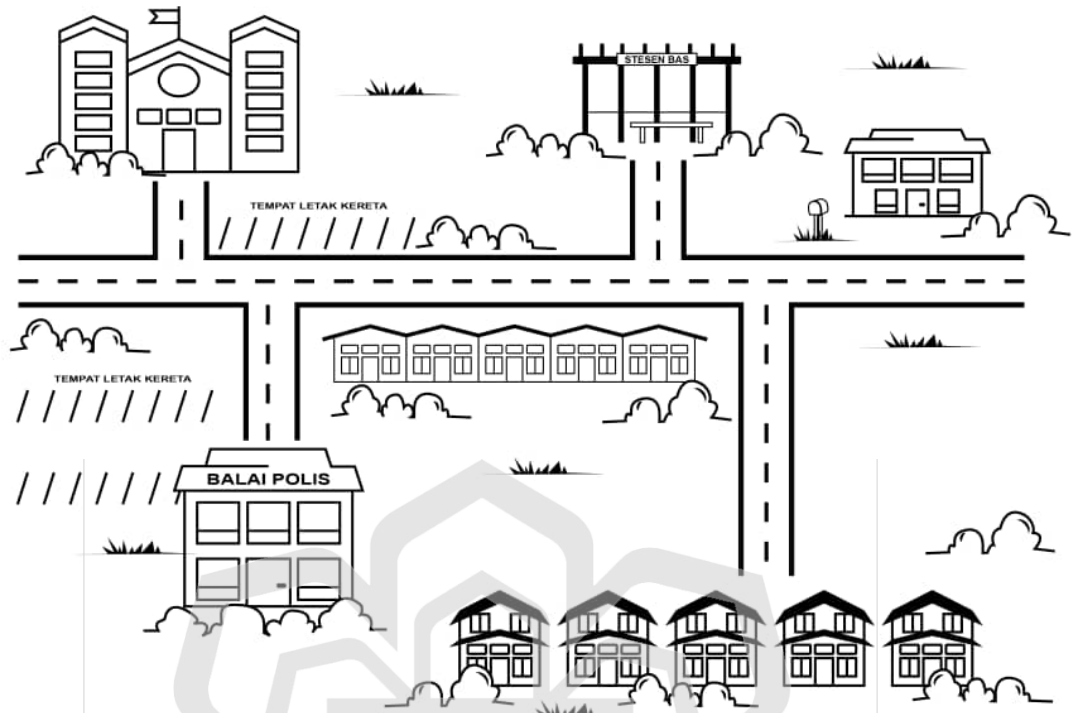
For picture validation, there were no comments or suggestions from seven subjects. Three subjects have given comments as shown in Table 4.6. For pre-testing, eight subjects have no comments and suggestions for PLAM. The two comments were shown in Table 4.6. Based on subjects' responses in the pilot study, there were four comments that have been addressed. All subjects' comments and modifications are shown in Table 4.6.

Table 4.7 Subjects' Comments and Modifications 2 on PLAM

Subjects' Comments	Modifications
1. Modifications Made based on Picture-Validation	
The need to have building's name	The building's name is added.
The picture is able to be recognize with the explanation given	No modifications
The post-box is hard to be recognized	The building's name is added.
2. Modifications Made based on Pre-testing	
The need to have general explanation especially for elderly	The instructions have been improved. Example, related diagram or picture have been added
The need to understands that there will be ambiguous words used in PLAM	The instructions have been improved to explain that there will be ambiguous word used in PLAM such as /welas/
3. Modifications Made based on Pilot-Study	
The sound does not represent "fork and spoon" but "spoon and glass"	To change from ' <i>sudu garfu</i> ' to ' <i>sudu cawan</i> '
Stimulus options given is a bit confusing because it was "too much"	To reduce stimulus options to four to six options per training
Subjects was confused with repetitive word in continuous discourse tracking task.	To highlight only the last word. If the word is repetitive such as ' <i>berdekah-dekah</i> ' the highlighted word will be ' <i>dekah</i> '
Subjects found out the need to explain and introduce the picture before training to avoid bias.	The instructions have been modified to include explanation and introduction to the picture name before testing. This to focus on auditory identification not the cognitive function.

The example of modifications made is as shown in Figure 4.2. The original image was not all labelled before the picture-validation in (A). After modifications, all buildings and objects have been labelled in (B).

(A)



(B)

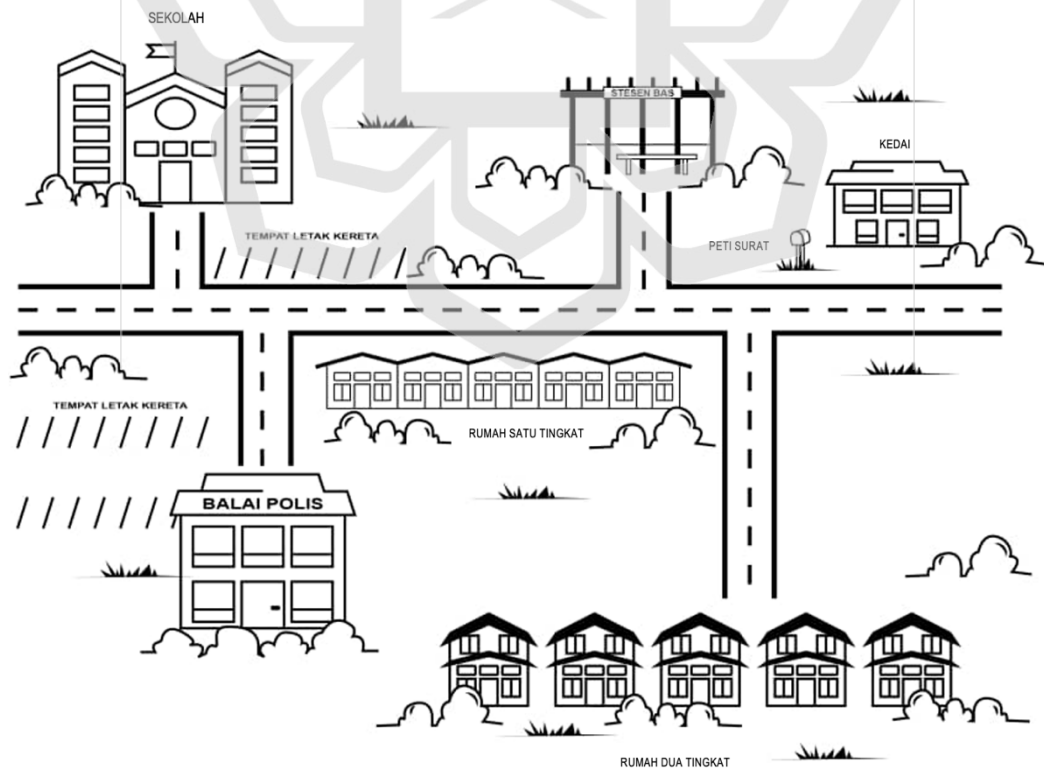


Figure 2.2 (A) Before Modifications Made for Picture-Validation
(B) After Modifications Made for Picture-Validation

4.4.6 PLAM Proofread

The PLAM document was sent for proofread to ProofreadersUnited.com. The certificate for proofread showed in Appendix IX. The final version of PLAM is now ready for field-testing.

4.5 DISCUSSION

The PLAM validation process has been effectively conducted through five stages: (1) Content validation, (2) Picture validation, (3) Pre-testing, (4) A pilot study to obtain normative data, and (5) PLAM proofreading. At each stage, PLAM underwent modifications to ensure its readiness for field testing. Throughout the validation process, adjustments were made to PLAM items, including the removal of unnecessary items and the addition of essential ones, to ensure its clarity and relevance.

The study revealed that PLAM achieved a high level of content validity, with a CVI value of 0.995, surpassing the recommended threshold of 0.83 by Lynn (1986), as assessed by the six experts involved. Feedback from the content validity experts included suggestions for providing clear and standardized instructions tailored to the various dialects found in Malaysia when using PLAM. Dialects in Malaysia vary based on geographical populations, such as the distinct Malay dialects divided by states in Malaysia (Collins, 1989). These dialects may have different linguistic nuances that cannot be assumed to be consistent or formalized in written instructions. Therefore, it was necessary to address these variations by analysing existing dialects and identifying gaps in instruction content (Collins, 1989).

Consequently, the instructions in PLAM have been enhanced to better accommodate all dialects spoken in Malaysia. Specifically, PLAM now includes “suggestions” to explain instructions using the speaker’s dialect when necessary, ensuring suitability for all dialects. However, it’s important to note that the training materials will still be presented in standard Malay, as the AT program is designed to train listening skills rather than test the meaning of items.

Another important consideration raised during the validation process was the need for picture validation, which was successfully conducted in PLAM. Additionally, experts suggested including items that represent various socioeconomic status levels in Malaysia. This recommendation stemmed from feedback indicating that individuals living in rural areas may not be familiar with certain modern gadgets, such as vacuum cleaners, originally included in PLAM. Thus, some items were removed to ensure the inclusivity and relevance of PLAM across different socioeconomic backgrounds.

The picture validity assessment for PLAM revealed that 100% of respondents found the pictures used to be guessable, while 98.33% rated them as clear. No modifications were deemed necessary, as per the criteria outlined by Kassam et al. (2004), which suggests further investigation if a certain threshold of errors is surpassed during picture validation. This indicates that the pictures incorporated in PLAM are highly recognizable and comprehensible.

Moreover, pictograms or pictures have been demonstrated to be effective tools for enhancing understanding, particularly among individuals with limited reading skills (Dowse & Ehlers, 2005). This effectiveness was observed during the validity testing of PLAM, where a subject with no ability to read or write was still able to identify the pictures and follow instructions based on them. By including pictures in the PLAM module, the program becomes accessible to individuals with limited literacy skills and abilities. However, trainers should be mindful that while PLAM sections that do not require reading can be administered to such individuals, sections requiring reading comprehension (e.g., sections S33 to S69) should be handled differently. Trainers should adjust the total marks based on the administered sections and consider individualized approaches to ensure effective training.

An important insight gained during picture validation is the necessity to name each picture before the actual training begins. For instance, trainers will introduce and label each object and action depicted in scenario pictures before instructing the trainee to identify them. This proactive approach addresses potential challenges arising from variations in dialects within the Malay language, which may result in multiple names for certain objects. Consequently, instructions in PLAM have been refined to provide

clearer guidance, and the pictures have been edited to incorporate standardized Malay labels, enhancing clarity.

This adjustment aligns with the recommendation of Tulloch et al. (2012), who emphasized the importance of providing additional information or explanations regarding illustrations used in research. By enhancing the clarity of instructions in PLAM, trainees are better equipped to comprehend the training requirements and ultimately achieve the desired goals of the program. This proactive approach mitigates potential confusion and ensures a more effective learning experience for trainees undergoing PLAM training.

The pre-testing phase for PLAM yielded positive feedback, with all subjects unanimously agreeing that the instructions were suitable, understandable, and the training feasible. Pre-testing plays a crucial role in assessing the overall presentation and appropriateness of the instrument's scale, ensuring its performance adequacy (Hilton, 2015). During pre-testing, subjects were invited to provide comments and suggestions regarding PLAM, reflecting a participatory approach that acknowledges the importance of user feedback (Council of the Inspectors General on Integrity & Efficiency, 2009).

Although only two subjects provided comments on PLAM, their feedback was valued and respected. Research by Reynolds et al. (2017) suggests that individual problems are often isolated in nature rather than indicative of broader design issues. The comments received highlighted the need for clear explanations before training and clarification regarding the use of ambiguous words during the sessions. For instance, the word “/welas/” was identified as ambiguous, as it exists in the Malay dictionary but is not commonly used in everyday language.

In response to this feedback, improvements were made to the instructions for PLAM. A general instruction outlining the overall procedure was included, along with specific guidance regarding the use of ambiguous words. Trainees are now alerted that these unique words are not intended to assess cognitive function but rather to train listening skills. It is clarified that the focus is on auditory word identification, which does not necessitate an understanding of the word's meaning. These enhancements

ensure that PLAM instructions are clear, comprehensive, and conducive to effective training outcomes.

The pilot study conducted in this research, as highlighted by Ruel et al. (2016), serves as a critical phase to identify potential issues throughout the entire instrument's procedure and evaluate the feasibility, realism, and rationality of the project. With ten subjects, representing 50% of the intended sample size for real testing in Chapter Five, the pilot study effectively mirrors the conditions of actual PLAM training.

Results from the pilot study indicate that nine subjects achieved a perfect score of 100% on the PLAM Screening, with one subject attaining a score of 99.4%. Similarly, all normal subjects attained SRT results ranging from -1.3 to -7 in the MMST-AV assessment. The duration for each subject to complete the PLAM training ranged from 50 to 70 minutes, with none requiring rest during the administration.

However, the pilot study also identified several challenges that required attention. Firstly, discrepancies were noted between the descriptions of sounds and their actual perception by subjects, leading to adjustments in sound labelling. Secondly, the visual stimuli provided were deemed excessive, prompting a reduction in the number of stimuli and an increase in font size for clarity. Thirdly, confusion arose regarding the identification of certain words in the continuous discourse tracking task, necessitating clarification and modification of the task instructions. Lastly, subjects highlighted the importance of introducing and explaining pictures before training to mitigate language bias, leading to modifications in the instructions accordingly.

These findings are crucial for both trainers and trainees to effectively plan the duration and content of training sessions. By addressing these issues, PLAM can be refined to ensure optimal effectiveness and usability in subsequent field testing.

The mean score obtained by all subjects is 99.8%, with a standard deviation of 0.036. In this research, the normative score is fixed at 99.8%. Achieving a passing score of 99.8% suggests that the trainee has demonstrated an ability comparable to that of a person with normal hearing. Therefore, the passing score for PLAM is set at 75%, allowing room for the trainee to confidently utilize the acquired skills and progress to

the next level in PLAM. Setting a slightly lower yet reasonable pass score aims to enhance the trainee's intrinsic motivation for training. Research suggests that individuals are more motivated when engaged in activities they find interesting and enjoyable (Legault, 2016). Since the passing score is not determined by existing literature due to the unique scoring technique used in PLAM, an independent determination based on the pilot study and relevant considerations is necessary. As there are no established benchmarks in the literature for this novel approach, careful consideration of the data and the training objectives is paramount in setting an appropriate passing score for PLAM.

4.6 CONCLUSION

In conclusion, the PLAM has undergone rigorous validation processes, including content and picture validity, and has established its normative score. The development of PLAM has paved the way for its utilization as an AT program for individuals with post-lingual hearing impairment in the Malay language. With its robust validation and readiness, PLAM is poised to be tested for its effectiveness and implemented in real-world testing scenarios. This marks an important milestone in providing comprehensive support and training for individuals with hearing impairments, empowering them to enhance their auditory skills and communication abilities effectively.

CHAPTER FIVE

PRELIMINARY STUDY ON THE EFFECTIVENESS OF *PROGRAM LATIHAN AUDITORI MELAYU (PLAM)*

5.1 INTRODUCTION

As previously discussed in Chapter Four, PLAM has undergone a comprehensive validation process, demonstrating good content and picture validation. Additionally, the normative score for the program has been established. With these validations completed, PLAM has been finalized and is now prepared for field-testing. The upcoming field-testing will aim to investigate the effectiveness of PLAM on both professional trainers and trainees with post-lingual hearing impairment. This pivotal phase will provide valuable insights into the practical application and impact of PLAM in real-world settings.

5.2 LITERATURE REVIEW

Literature review discussed here is specific for the preliminary study on the effectiveness of PLAM.

5.2.1 Measuring the Effectiveness of the Programme

The effectiveness of the program can be gauged by assessing notable improvements observed in each task or stimulus, comparing pre-training scores with post-training scores. As highlighted by Dubno (2013), progress can be evident as individuals advance to higher levels, indicating the minimum training required to achieve maximum benefits. Striking a balance in training duration is crucial to ensure optimal performance improvements without overburdening participants.

Moreover, the benefits of training should extend beyond auditory contexts to everyday life and non-auditory situations. Post-training assessments should be

conducted for both trained and untrained groups to demonstrate the program's ability to transfer acquired skills to real-life scenarios and broader applications, such as improvements in attention or multisensory integration.

Assessing patients' compliance with scheduled tasks, individualized computer-based learning, and their engagement with the program's goals can also provide insights into effectiveness, as suggested in prior studies. Fu et al. (2005) proposed a procedure for tracking patient progress in auditory training among cochlear implantees, emphasizing regular baseline testing and subsequent re-tests at defined intervals. Similarly, Hassan et al. (2013) measured the effectiveness of their training program by evaluating patients' auditory perception abilities pre- and post-implantation over various time intervals.

5.2.2 Managing Trainees' Compliance towards PLAM Training

Sweetow and Sabes (2010) stated that the two biggest challenges in AT are getting the audiologist to offer the training and getting the patient to complete the training. They found that patient compliance towards AT was less than 30% for a cohort of home-based auditory therapy. Therefore, this study suggested that the clinician should give clear and understandable information to patients about their condition and progress in a sincere and responsive way. They also proposed using simple instructions to the patients and simplifying the explanation regarding the training.

Sweetow and Sabes (2010) also stated that the clinician should value the patient's concerns and opinions. They also suggested that the clinician incorporate the patient's attitudes and past experiences into the rehabilitation timing and plan. This incorporation will give internal motivation for the patient to continue the training. The clinician and patient will be able to identify auditory and non-auditory factors that may adversely affect the overall audiological rehabilitation process.

According to Olson (2015), each of the components in adult aural rehabilitation requires a comprehensive management plan and will consume a lot of time to achieve its specific goals. Olson recommended the clinician to realistically address the patient's

expectations based on the patient on-going process by giving specific information, targeted goals and carrying home activities gradually. This is to ensure the patient understands the main goal of the auditory and can have an overview of what to expect if they were to commit in a long AT plan.

The new programme developed for AT should integrate counselling to improve the professional and patient compliance. Integration of counselling in the new AT programme should focus on how the clinician delivers information and how to effectively gather information from the patient. This will help both the clinician and patient to consistently comply with the training programme.

5.2.3 Instruments to Study Effectiveness

The effectiveness of PLAM aims to study the significant effects on hearing handicap perception and speech perception. Therefore, this study will utilize three instruments: the Malay Hearing Handicap Inventory for adults (HHIA-M) (Zam et al., 2019), the Malay Auditory-Visual Matrix Sentence Test (MMST-AV) (Jamaluddin, 2016), and the newly developed PLAM-Screening (PLAM-S). The HHIA-M, MMST-AV, and PLAM-S will be administered during both pre-training and post-training assessments.

5.2.3.1 Malay Hearing Handicap Inventory

The HHIA-M (Appendix XIII) is a self-reporting outcome measurement designed to quantify the subject's disability and assess how their function is affected by hearing loss. It is a survey translated and validated for the Malay-speaking population, used to study hearing handicap perception in this research (Zam et al., 2019), making it suitable for assessing PLAM's effectiveness among individuals conversing in Malay. The purpose of the HHIA-M is to determine the psychosocial aspects of adults with hearing loss (Zam et al., 2019). It is capable of measuring the perceived impact of hearing loss on an individual's everyday life; therefore, the use of the HHIA-M is appropriate for assessing hearing handicap perception among trainees in PLAM.

5.2.3.2 Malay Auditory-Visual Matrix Sentence Test

The PLAM effectiveness study also aims to assess speech perception among trainees, for which the MMST-AV test will be utilized. The MMST-AV is designed to evaluate speech perception in noise and has been developed specifically for Malay speakers (Jamaluddin, 2016). In this study, subjects will be presented with a training list of 30 sentences using the auditory-alone method in the MMST-AV test. The sentences will be structured with fixed syntax but semantically unpredictable content, utilizing fifty pre-determined words.

This test is suitable and effective tool for measuring PLAM effectiveness because it is specifically tailored for Malay speakers, aligning with the intended population of this study. Additionally, the MMST-AV test is standardized and structured, providing objective measurements of speech perception abilities. The standardized nature of the MMST-AV test ensures consistency in administration and scoring, enabling comparisons across training group and control group in this study. By utilising objective measurements, the MMST-AV test allows for precise quantification and analysis of the effectiveness of PLAM in improving speech perception in noise among trainees.

5.2.3.3 PLAM-Screening

The PLAM Screening (PLAM-S) serves as a valuable screening tool developed in Chapter 3 to assess auditory performances among trainees using PLAM. It represents speech and listening categories derived directly from PLAM. The speech assessment includes progression from sounds, words, minimal pairs to sentences whereas, listening skills evaluation covers detection, discrimination, identification and comprehension. The PLAM-S is directly derived from PLAM will ensure consistency and alignment with goals and objectives of the study This ensures that the screening tool accurately reflects the skills and competencies targeted by PLAM. This comprehensive approach allows for a thorough evaluation of trainees' auditory performance, capturing a broad spectrum of skills relevant to aural rehabilitation.

5.2.4 Problem Statement and Study Rationale

This study aims to investigate the effectiveness of PLAM among both trainees and trainers. The problem statement and study rationale for this research will be described in the following sections.

5.2.4.1 PLAM Effectiveness has not been Proven

While PLAM has undergone validation, its real-world effectiveness remains unproven. Möller (2011) emphasized the importance of conducting effectiveness studies in real-world scenarios or pragmatic trials for evidence-based practices. Henshaw dan Ferguson (2013), in their systematic review, stressed the need to evaluate the efficacy of auditory training (AT) for adults with hearing loss as an effective intervention.

This study aims to evaluate the effectiveness of PLAM among individuals with post-lingual hearing impairment. In a scoping review conducted for this research, all 24 papers were thoroughly evaluated for an effectiveness study, with 15 of them demonstrating positive findings when comparing subjects' performances before and after AT programme training. However, there is currently no data to confirm whether PLAM can yield similar positive results. Assessing PLAM's effectiveness is essential to draw definite conclusions on its impact on users.

To date, only one study by Bani (2019) has developed a computerized Malay AT programme for the elderly to assess its usability for 30 subjects. The research revealed that the newly developed AT programme was suitable for older adults, but 90% of the subjects required assistance to understand instructions in the initial stages. Moreover, no other AT programme in Malay language is available. The PLAM is distinct from Bani's AT programme in terms of the target population (age 12 years and above) and training objectives. While Bani's programme focuses on speech-in-noise skills, PLAM emphasizes training in various listening complexities. Nevertheless, the effectiveness of PLAM could not be concluded based on past studies, and as such, PLAM needs to establish its own effectiveness study to confirm its suitability.

In general, PLAM encompasses all areas of Malay speech and requires specific settings for administration, but there is no evidence confirming whether PLAM enhances speech perception abilities among Malay users. Therefore, assessing PLAM's effectiveness for Malay speakers is crucial. Such a study will provide valuable insights into how well the program performs in this specific language and cultural context, particularly regarding speech perception and overall communication skills for individuals with hearing impairments who use Malay as their primary language.

A case study by Stacey et al. (2010) evaluated the effectiveness of a computer-based, self-administered training package designed to improve speech perception using British and Irish accents among adults with cochlear implants. While the study demonstrated a significant improvement in consonant discrimination, no significant improvements were observed in sentence or vowel discrimination tests. The study revealed that their training covered various areas of English speech stimuli but yielded mixed and inconclusive results. Similarly, PLAM should investigate its effectiveness across all individuals conversant in Malay to ensure its readiness for mainstream use.

5.2.4.2 PLAM Efficiency has not been Proven in Various area

This study aims to comprehensively research various aspects of auditory skills improvement because individuals with post-lingual hearing impairment face not only the challenge of re-learning to listen but also quality-of-life issues related to hearing (Humes et al., 2019; Öberg, 2016; Saunders et al., 2016; Smith, Saunders, et al., 2016; Yueh et al., 2005; Zam et al., 2019).

Therefore, PLAM should not only establish its effectiveness but also its efficiency in various area. This is based on the study by Saunders et al. (2016), where improvements were observed in two different domains: (1) Speech perception (speech-in-noise performance) and (2) Hearing handicap perception with standard-of-care hearing aid intervention. Their research on the Listening and Communication Enhancement (LACE) programme for the veteran population found that LACE helped subjects in both speech perception and hearing handicap perception (Saunders et al., 2016). This indicates that an AT (AT) programme can evaluate its effectiveness in two

main areas: speech perception and reduction of hearing handicap. Consequently, PLAM needs to demonstrate whether by using it can enhance trainees' performance in both of these areas.

However, contrasting with the results reported by Humes et al. (2019), their findings revealed significant differences from the positive outcomes found in other literature. Humes and colleagues observed that subjects in their study did not show significant improvements in several key areas, including hearing aid satisfaction, hearing handicap, and tolerance of background noise when listening to speech. These results suggest that AT programmes may not be as effective in addressing the broader challenges faced by individuals with hearing impairments. Given these varying findings, it becomes increasingly important to thoroughly assess the effectiveness of PLAM training in various dimensions: (1) Understanding its impact on speech perception and the reduction of hearing handicap is crucial, (2) Demonstrating its validity and efficacy in these areas is essential, as it may offer a more comprehensive approach to auditory rehabilitation for individuals with hearing impairments, particularly within the context of the individual conversant in Malay, and (3) Conducting further research and studies on PLAM training and its effects on different facets of auditory health and satisfaction will help establish its utility and determine its potential as an innovative tool in audiology.

The use of different types of tests is crucial to assess various aspects of subjects' performance. This can be achieved through multiple tests targeting specific areas. Yueh et al. (2005) developed two modules in the Effectiveness of Auditory Rehabilitation (EAR) scale to assess hearing-related function and quality of life in patients with sensorineural hearing loss. A robust psychometric assessment is essential to establish a significant relationship between each module in EAR and measurements of hearing handicap, communication function, and hearing-aid adherence (Yueh et al., 2005). PLAM will utilise the MMST-AV and PLAM-S for speech perception assessment and the HHIA-M to assess its impact on hearing handicap.

5.2.4.3 Perception of Trainers towards PLAM has not been Investigate

From the existing literature, most studies have primarily focused on the outcomes from the trainee's perspective. For instance, in this scoping review of 24 papers, none has examined trainer perception. However, trainers play a crucial role, as emphasised by Valente et al. (2006), who suggest that they should provide 'best practices' for the rehabilitation of adults with hearing impairment, encompassing four key areas: (1) Assessment and Goal Setting, (2) Technical Aspects of Treatment, (3) Orientation, Counselling, and Follow-up, and (4) Assessing Outcomes. Therefore, studying trainers' perceptions of PLAM is highly significant, as trainers are expected to independently conduct PLAM and deliver 'best practices' to trainees.

Trainers can be considered the initial users of an AT programme, but their perspectives are seldom studied. Understanding the viewpoints and experience of trainers is essential because they represent the first point of contact with these programmes and play a pivotal role in facilitating the training process. Despite their critical role, there is a noticeable lack of research focusing on trainers' perspectives in AT. In the context of audiology services in Malaysia, two notable studies by Ali et al. (2017, 2018) showed comprehensive examinations of audiologists' perspectives have been conducted. These studies have made significant efforts to gain insights into how professionals within the field of audiology perceive the delivery of audiological services and the overarching concept of patient-centred hearing care. By exploring the attitudes, beliefs, and practices of audiologists, these studies shed light on the extent to which patient-centric approaches are integrated into the landscape of hearing healthcare in Malaysia. Their findings contribute to a deeper understanding of the dynamics between healthcare providers and patients in the audiology domain and offer valuable guidance for improving the quality of audiological services in the country.

Conducting a study on trainers' perceptions plays an essential role in PLAM's mission to provide high-quality services to trainees by focusing on enhancing trainers' abilities. By gaining insights into how trainers perceive the programme and assess their experience, PLAM can effectively tailor its training approach to better meet the needs of both trainers and trainees.

Another crucial aspect of examining trainers' perspectives is that trainers are the ones who will be using the module. Therefore, trainers' understanding of the module is among the factors determining the success of training delivery. As highlighted by Reis et al. (2019), many audiologists frequently offered home-based and face-to-face methods to deliver AT, recognizing AT as a necessary component in rehabilitation. This multifaceted approach underscores the adaptability of audiologists in customizing AT programmes to meet the unique needs and preferences of their trainees. Furthermore, Reis et al. (2019) underscored the fundamental role of AT within the broader scope of rehabilitation. This recognition emphasizes the pivotal role that AT plays in assisting individuals with hearing impairments in achieving improved auditory skills and overall communication abilities, ultimately enhancing their quality of life.

Recognizing the critical role that trainers play in the effective delivery of AT using PLAM, this study has chosen to investigate trainers' perceptions of PLAM. The objective is to ensure that PLAM meets and exceeds the expectations of trainers when conducting effective AT using PLAM. This effort is aimed at guaranteeing that PLAM not only meets but also surpasses the expectations of trainers in facilitating effective AT. By understanding trainers' viewpoints, preferences, and insights, PLAM seeks to refine its approach and fine-tune its resources, ultimately enhancing the training experience and outcomes for both trainers and trainees. This commitment with regards to gathering and incorporating trainers' feedback underscores PLAM's dedication to optimizing its services and achieving its goal of delivering exceptional AT.

5.2.5 Main Objectives

To determine the effectiveness of PLAM.

5.2.6 Specific Objectives

1. To compare pre and post performances of PLAM for MMST-AV, HHIA-M and PLAM-S in training and control group
2. To compare the performance gain for MMST-AV, HHIAM, PLAM-S between training group and control group
3. To investigate the perception of trainers towards PLAM (PLAM module, PLAM Documents and Knowledge Improvement)

5.3 METHODOLOGY

The methodology of this study involved the process of requesting ethics approval, conducting the effectiveness study on PLAM training, and conducting the trainers' feedback study.

5.3.1 Study Design

This study adopted a quasi-experimental research design to achieve its objectives as stated in 5.2.5. AT using the PLAM module was conducted for the training group as part of the intervention. The performance of MMST-AV, PLAM-S, and HHIA-M scores were measured pre- and post-training for both the control group (no auditory training given) and the training group. The MMST-AV, PLAM-S, and HHIA-M scores between pre- and post-training, and between the control and training groups, were compared. When assigning subjects to the control and training groups, no randomization was involved. However, to ensure the homogeneity of the control and training groups, the PTA and aided thresholds were matched for both groups.

5.3.2 Study Population

This study comprises two populations: (1) The Trainer Group and (2) The Trainee Group. The Trainer Group consists of professionals or professionals in training to conduct PLAM training. Trainers involved in this study include seven audiologists and one audiology student. While the invitation to participate in this study was open to professionals from various fields (including audiologists, speech-language pathologists, or teachers), no professionals from other fields were available to join. Six of the trainers were affiliated with private companies based in Kuala Lumpur, Selangor, and Kedah, while one trainer was from HATTM, and one trainer was an audiology student from the IIUM Hearing and Speech Clinic, Department of Audiology and Speech-Language Pathology, Kuliyah of Allied Health Sciences (DASLP, KAHS), IIUM Kuantan.

The Trainee Group consisted of 20 individuals with post-lingual hearing impairment whereby selection was based on the inclusion and exclusion criteria mentioned in Section 5.4.4. All trainees were located in Kuala Lumpur, Selangor, Kedah, and Pahang. Eleven trainees were from the Ministry of Defence, with four working as army personnel and seven being retirees from the army. Five other trainees were also retirees; with one being a postmaster retiree, one a retiree from a mechanics profession, and three not specifying their previous work. Additionally, two trainees were not currently employed, with one being a housewife and the other a software engineer. The age of the trainees ranged from 31 to 80 years. The details of trainees are shown in Table 5.1.

All trainees were recruited on a voluntary basis where they needed to give consent using a form (Appendix VII) which was provided and explained. The procedure of the training was explained, and they were assigned either to the training or control group randomly. All subjects received the same pre and post-training assessment. However, only the training group received PLAM training within six weeks.

Table 5.1 Background of Trainees

Background	Information
Age (range)	31 to 80 years
Degree of Hearing loss (Right ear)	2 subjects with normal hearing (≤ 20 dB HL) 2 subjects with mild hearing loss (21 to 40 dB HL) 12 subjects with moderate hearing loss (41 to 70 dB HL) 2 subjects with severe hearing loss (71 to 90 dB HL) 2 subjects with profound hearing loss (> 90 dB HL)
Degree of Hearing loss (Left ear)	1 subject with normal hearing (≤ 20 dB HL) 4 subjects with mild hearing loss (21 to 40 dB HL) 11 subjects with moderate hearing loss (41 to 70 dB HL) 2 subjects with severe hearing loss (71 to 90 dB HL) 2 subjects with profound hearing loss (> 90 dB HL)
Unaided Better ear 3fPTA (range)	20 dB HL to 130 dB HL
Aided better ear 3fPTA (range)	17 dB SPL to 52 dB SPL
Hearing devices	All bilateral hearing aids
Hearing Devices usage (range)	2 to 14 hours per day

To ensure the homogeneity of the control and training groups, a Mann-Whitney U test (a nonparametric test suitable for data with abnormal distribution) was conducted to compare the pre-MMST-AV, HHIA-M, Pure-tone audiometry (PTA), and aided threshold between the training and control groups. For the pure-tone threshold, this study employed a three-frequency pure-tone average (3fPTA) as recommended by the Ministry of Health Malaysia (Kementerian Kesihatan Malaysia, 2014) for determining the average hearing loss at 500 Hz, 1000 Hz, and 2000 Hz.

Referring to the results in Table 5.1, there were no significant differences or large effect sizes observed for the pure-tone average for aided and unaided thresholds, pre-MMST-AV scores, and pre-HHIA-M scores between the control and training groups

($p > 0.05$). These results indicate that the performance of the control and training groups at the pre-training stage is similar, and, as such, the study population can be considered homogeneous.

Table 5.2 Mann-Whitney Test result for Pre MMST-AV, HHIA-M, PTA and Aided Threshold between Training and Control Group

Variables	Training Group	Control Group	Z-value	p-value	Effect size (r)
	Median ± IQR	Median ± IQR			
Unaided better ear 3fPTA	62.00 ±40.00	45.00 ±37.25	-1.21	0.23*	-0.27 (medium effect)
Aided better ear 3fPTA	40.00 ±22.50	33.33 ±24.58	-0.57	0.57*	-0.13 (small effect)
Pre MMST-AV	1.30 ±27.15	-2.15 ±5.28	-0.68	0.50*	-0.15 (small effect)
Pre HHIA-M	36.00 ±54.00	20.00 ±31.5	-1.54	0.13*	-0.34 (medium effect)

*P-value shows significant differences

5.3.3 Inclusion criteria

There are two groups of subjects in this research: the trainer group and the trainee group. Below are the inclusion criteria for both groups.

5.3.3.1 Trainer

- Professional or professional-in-training who has experience in dealing with individual with post-lingual hearing loss,
- Conversant in Malay,
- Completing 2-hour PLAM classes,
- Pass PLAM quiz with minimum marks 20 over 30 questions.

5.3.3.2 Trainee

- Aged 12 years and above,
- Conversant in Malay,
- Pre-lingual (has developed speech and language prior to developing hearing loss).
- Has been diagnosed as having hearing loss (exceeding 20 dB HL) either in one or both ears,
- Is currently using hearing aids and/or cochlear implants,
- Does not have any cognitive problems and abnormal senses,
- Has never undergone any AT either in a clinical setting or at home,
- Does not use sign language,
- Does not have progressive hearing loss.

5.3.4 Exclusion Criteria

Any criteria that did not fit in inclusion criteria was not accepted in this study. The subjects were not accepted if not available for six-week training.

5.3.5 Study Location

This study was conducted in seven locations with one-to-one trainer and the researcher as supervisor to monitor the whole session. The researcher monitored all sessions either in physical or online. The seven locations are: (1) IIUM Hearing and Speech Clinic, DASLP, KAHS, Kuantan (2) Hospital Angkatan Tentera Tuanku Mizan (HATTM), Wangsa Maju, (3) Oticon Sdn. Bhd, Kuala Lumpur (4) Global Precision Sales and Services Sdn. Bhd, Wangsa Maju, (5) Eartistic Sdn. Bhd. Alor Setar, (6) Audiolab Enterprise Sdn. Bhd., Ampang, and 7. Hearlife Hearing Care Centre, Bangsar.

5.3.6 Study Procedure

This study was carried out in four stages as shown in Figure 5.1; Stage 1: Training for trainers, Stage 2: Pre-training assessments for individuals with post-lingual hearing impairment using PLAM, Stage 3: Training for individuals with post-lingual hearing impairment using PLAM, Stage 4: Post-training assessments for individuals with post-lingual hearing impairment using PLAM and finally Stage 5: Post-training assessment for trainers.

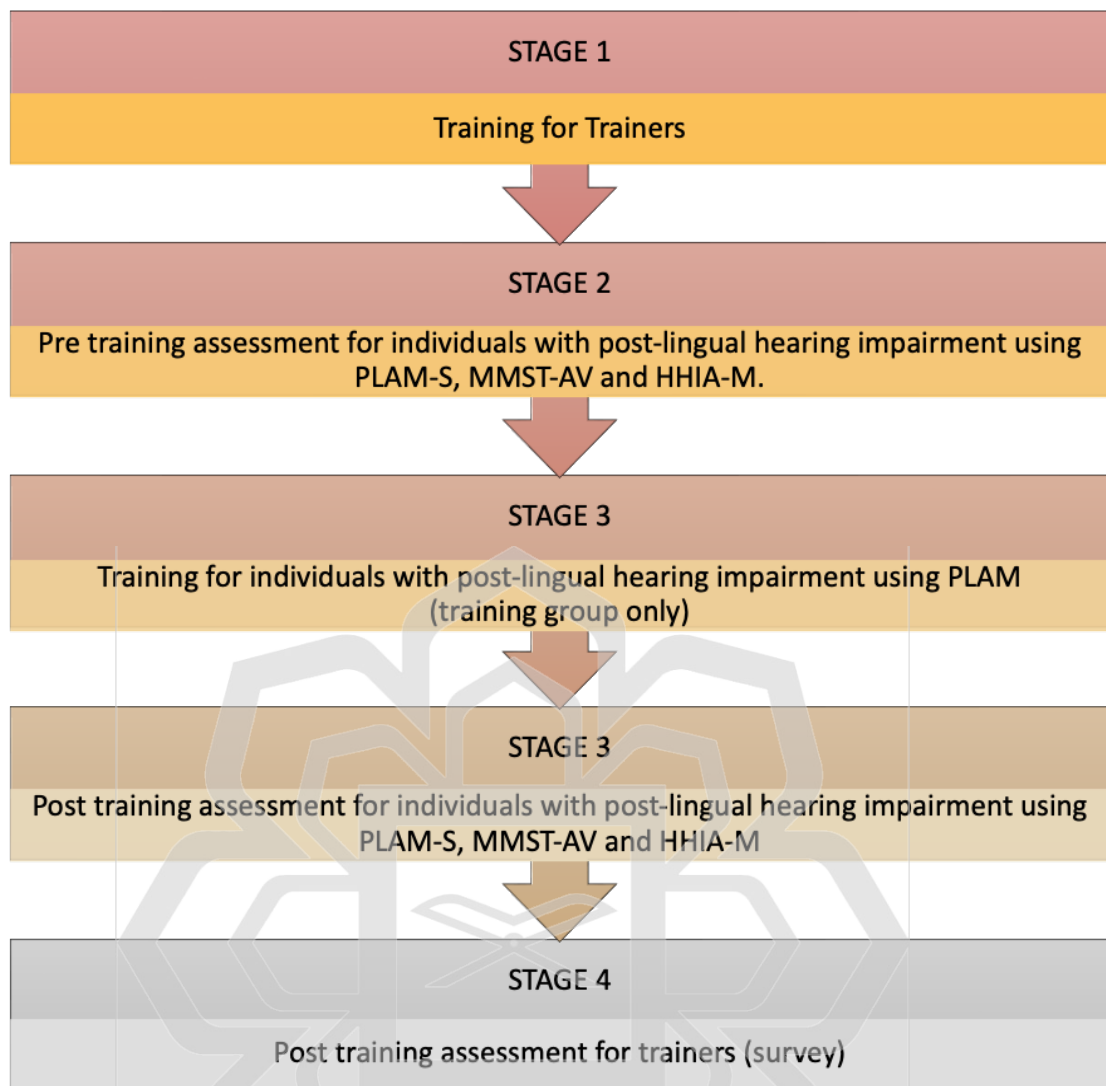


Figure 5.1 The stages of effectiveness study

5.3.6.1 Stage 1: Training for Trainers

The PLAM training for trainers commenced in September 2021 with the recruitment of potential trainers. The training for trainers was delivered through two methods: 1. Classes and 2. Quiz. Classes were conducted in two sessions, each lasting for one hour. The initial one-hour class was held on 1st October 2021, providing an overview of adult AT in general by offering insights into the concept and rationale behind PLAM.

This training class was integrated into a Continuous Audiology Education programme, with participants recruited from all regions in Malaysia, aiming to expand

the training opportunities to a broader audience. The first training class was attended by ten trainers who expressed their willingness to proceed and attend the second one-hour class, conducted on 14th October 2021. This session delved into the specifics of conducting PLAM and provided a comprehensive understanding of PLAM's manual.

After the second class, all ten trainers completed a PLAM quiz, aimed at assessing their baseline knowledge before the PLAM training commenced. The quiz comprised 30 yes/no questions, with a passing score set at 20. Prior to its administration, the quiz underwent scrutiny by a senior audiologist and researcher. The quiz was administered online, utilizing Google Forms. Nine trainers achieved a passing score of 20 marks out of 30, while one trainer scored 16 marks, rendering them ineligible to continue as a trainer. An additional trainer who met the passing score opted not to continue with the training due to personal reasons. Consequently, the programme continued with eight trainers.

5.3.6.2 Stage 2: Pre-Training Assessment for Individuals with Post-Lingual Hearing Impairment Using PLAM

Prior to the commencement of training, a pre-training assessment was conducted on all 20 trainees, including those in both the training and control groups under the supervision of the trainers. The assessment encompassed a thorough history-taking session focusing on the trainees' hearing loss and other health factors to determine their suitability for inclusion in the research. The hearing levels of the trainees were evaluated through both unaided and aided audiograms.

Subsequently, the trainers administered pre-training tests to establish the trainees' baseline performance. The assessment tools used were PLAM-S, MMST-AV by Jamaluddin (2016) for speech perception measurement, and the HHIA-M developed by Zam et al. (2019) to assess hearing handicap.

The initial evaluation involved the trainers conducting PLAM-S, where trainees were instructed to respond in accordance with the screening procedure. The PLAM-S required trainees to detect or identify stimuli in various conditions, such as with or

without background noise, with or without repetition, at normal or slow rates, and from one meter or six inches away from the stimulus, with or without verbal cues. The results of this assessment were recorded on PLAM-S sheets.

Next, MMST-AV, a matrix sentence test in Malay, was administered to all trainees to measure their speech perception in noisy environments. The test was conducted in a closed-set format at a fixed 65 dB SPL background noise level, using specific test noise and 6-talker babble noises. The stimulus was presented at a distance of one meter using a Vinnfier Ecco2 RGB USB-powered speaker connected to a Sony S series Laptop running Windows 10 Pro with an Intel® Core™ i5-2410M CPU @ 2.30GHz processor. During the test, trainees were required to identify sentences containing five words within background noise by selecting the correct sentence displayed on the laptop screen. A trial or familiarization training was provided before the actual test, and the results were recorded on the laptop. All subjects were instructed to wear their hearing aid(s) during testing.

Finally, the HHIA-M assessment involved distributing HHIA-M questionnaire sheets to all trainees who were required to answer all the questions. The results were recorded on the HHIA-M sheet. The HHIA-M is a questionnaire consisting of two subscales: (1) social, with 12 items related to socializing difficulties due to hearing loss, and (2) emotional, with 13 items describing the emotional impact experienced by the hearing-impaired. Subjects were asked to respond to the questions based on their daily life experiences, using a 3-point Likert scale: 'Yes' = 4 points, 'Sometimes' = 2 points, and 'No' = 0 points.

5.3.6.3 Stage 3: Training for Individuals with Post-Lingual Hearing Impairment Using PLAM

Ten trainees, comprising the training group, participated in a six-week training programme conducted by all eight trainers under the researcher's supervision. The training was carried out using two methods: face-to-face supervision and online supervision. Each training session for the ten trainees ranged from 45 to 90 minutes, depending on the trainees' endurance. Over the course of six weeks, the training group

received a minimum of 270 minutes of training from the trainers. This training took place from November 2021 to March 2022. In contrast, the control group received no training during the same six-week period.

The PLAM employs a combination of bottom-up and top-down approaches. Therefore, the training of the trainees was initiated based on the findings from PLAM-S. When a trainee displayed emerging abilities in a specific area, such as the identification of phonemes, the trainer recommended commencing training in that particular area. In this context, 'emerging ability' refers to an ability that has achieved a pass score of 75%. This approach is crucial to boost the trainees' confidence by starting training in areas where they already have some ability. If training were to commence in an area where trainees scored below 75%, there may be concerns that the trainees are yet to possess that ability. Learning a new skill under such circumstances could prove challenging and potentially demotivating if no improvement is observed. Trainees will be considered to have an ability comparable to normal hearing if they achieve a pass score of 99.8%.

5.3.6.4 Stage 4: Post Training Assessment for Individuals with Post-Lingual Hearing Impairment Using PLAM

Post-training assessment for trainees was conducted on all 20 trainees, including those in both the training and control groups, by trainers under the researcher's supervision. The trainers administered the same assessment as in the pre-training tests to evaluate the trainee performance level. The assessment tools used were PLAM-S, MMST-AV, and HHIA-M, following the same procedures outlined in Section 3.5.2.

5.3.6.5 Stage 5: Post Training Assessment for Trainers (Feedback Form)

A feedback form has been developed to assess trainers' responses on conducting PLAM training. This feedback form consists of three sections: (1) PLAM Training for Trainer Module; Classes, Quiz, and Training (sufficiency), (2) PLAM Documents; Manual, Trainer's copy, and Trainee's copy (performance rate), and (3) Knowledge Improvement

(agreement). The feedback form was distributed to trainers within one week after the final training session with trainees.

5.3.7 Ethical Approval

Ethical approval has been obtained from the International Islamic University Malaysia Research Ethics Committee (ID No. IREC 2021-286) and from Hospital Angkatan Tentera Tuanku Mizan (HATTM/EK/21-11). The approval letters and ethics certificate can be found in Appendix V. Permission from all private companies involved in the data collection has also been obtained.

All subjects have been informed that participation in this research is purely voluntary and carries no potential risks. The findings of this research will be kept confidential from the general public. Subjects have also signed an agreement to allow the information from this research to be published; however, any information that could expose the identity of any subject will not be used in the research report. All data obtained will be kept confidential.

5.3.8 Data Analysis

The analysis of data will be based on specific objectives shown in 2.3. All analyses were done using IBM Statistical Package for the Social Science (SPSS) Statistics Version 26.

5.3.8.1 The normality of data

The normality of the data was analysed before conducting the statistical investigations based on two criteria:

1. Visual inspection using normal plots to determine whether the distribution is bell-shaped and to identify any gaps in the data or outliers (outlying values).
2. Normality test, specifically the p-value of the Shapiro-Wilk test, provided by the SPSS software (Ghasemi & Zahediasl, 2012).

The Shapiro-Wilk test is considered more appropriate for this study because it involved a relatively small sample size (<50 samples). If the data are normally distributed, parametric tests will be used; otherwise, if the data are not normally distributed, non-parametric tests will be employed for analysis.

5.3.8.2 Test statistic

In this study, a significance level of $p < 0.05$ is considered significant, indicating a 95% confidence interval. This threshold indicates that there is less than a 5% probability that the observed result is due to chance alone (Chittaranjan, 2019). It signifies that there is a probability exceeding 95% that the observed result is a true finding.

Additionally, apart from the p-value, effect size is also utilized to determine the significance of the results. Effect size, as defined by Cohen (1988) (in Dawson & Trapp, 2004) refers to the degree to which a phenomenon is present in the population.

The effect size is calculated based on the statistical analysis performed. For paired sample T-tests, the effect size is calculated using the “calculator” from <https://www.socscistatistics.com/effectsize/default3.aspx>. The effect size values presented in Table 5.2 are derived from <https://datatab.net/tutorial/paired-t-test>.

For the Mann-Whitney U test, the effect size (r) is calculated using the formula $r = Z/\sqrt{N}$. The effect size values presented in Table 5.2 are obtained from <https://datatab.net/tutorial/mann-whitney-u-test>.

Table 5.3 Effect size for Paired Sample T-Test and Mann-Whitney U Test

Paired Sample T-Test	Mann-Whitney U Test	Effect Size
$d: 0.2$	r less than 0.3	small effect
$d: 0.5$	r between 0.3 and 0.5	medium effect
$d: 0.8$	r greater than 0.5	large effect

5.3.8.3 Comparison between pre and post performances of PLAM for MMST-AV, HHIA-M and PLAM-S in training and control group

The effectiveness study involved comparing the performance between pre and post-test results. Due to the abnormal distribution of the data, a non-parametric test, specifically the Wilcoxon signed-rank test, was conducted to compare the pre and post performances of MMST-AV and PLAM-S. However, data for HHIA-M in the training group was found to be normally distributed. Therefore, a paired sample t-test was employed to compare the pre and post performances of HHIA-M.

In contrast, for the control group, all data for MMST-AV, PLAM-S, and HHIA-M were found to be normally distributed. Consequently, paired samples t-tests were conducted to compare the pre and post performances of MMST-AV, PLAM-S, and HHIA-M in the control group.

5.3.8.4 Comparison of the performance gain for MMST-AV, HHIA-M, PLAM-S between training group and control group

Another analysis was conducted to determine the differences in improvement when comparing the performance gains from MMST-AV, HHIA-M, and PLAM-S between the training group and the control group.

The performance gain was determined using the normalised gain formula as outlined by Hake (1998) for HHIA-M and PLAM-S. This formula, as depicted in Figure 5.2, is applicable because these two tests have a maximum score of 100.

$$\text{Normalized Gain (g)} = \frac{(\text{post training marks} - \text{pre-training marks})}{(100 - \text{pre training marks})}$$

Figure 5.2 Normalized gain formula (Hake, 1998)

This MMST-AV has no maximum marks, so the performances gain was calculated using the formula shown in Figure 5.3.

$$\text{Performances gain} = (\text{post training marks} - \text{pre-training marks})$$

Figure 5.3 Performances gain formula

A normality test was conducted on the gain data for MMST-AV, HHIA-M, and PLAM-S, revealing that all data were not normally distributed. Consequently, the Mann-Whitney U test was employed to compare the gain data between the training and control groups for MMST-AV, HHIA-M, and PLAM-S.

5.3.8.5 Investigating the perception of trainers towards PLAM (PLAM module, PLAM Documents and Knowledge Improvement)

A feedback form, as depicted in Appendix XVII, was distributed physically to all trainers within one week after the conclusion of the training. Trainers were asked to provide feedback on PLAM using a 4-point Likert scale. Descriptive analysis was then conducted to examine the trainers' perceptions of PLAM based on the feedback received.

5.4 RESULTS

Analysis data for this part will be explained based on specific objectives in 2.3.

5.4.1 Comparison of Pre and Post Performances of PLAM for MMST-AV, HHIA-M and PLAM-S in The Training and Control Group

Results for comparing pre and post performances of PLAM for MMST-AV, HHIA-M and PLAM-S will be divided in two parts: training group and control group.

5.4.1.1 Training Group

Referring to the results in Table 5.3, the Wilcoxon signed-ranks test conducted on MMST-AV and PLAM-S data, comparing pre-training (MMST-AV: Median = 1.30, IQR = 26.13; PLAM-S: Median = 93.86, IQR = 15.33) and post-training (MMST-AV: Median = -0.80, IQR = 23.53; PLAM-S: Median = 98.54, IQR = 5.08) performances in the training group, revealed significant differences ($p < 0.05$). The effect size was found to be large (MMST-AV: $r = -0.86$; PLAM-S: $r = -0.89$).

Regarding HHIA-M, the paired sample T-test showed significant differences between pre-training (Mean = 40.20, SD = 24.79) and post-training (Mean = 22.40, SD = 18.45) performances in the training group ($p < 0.05$) with a medium effect size ($r = 0.76$).

Table 5.4 Comparison between Pre and Post Performances for MMST-AV, HHIA-M and PLAM-S in Training Group

Variables	Test used	Pre-training		Post-training		Z-value or t-value	p-value	Effect size (r) or (d)
		Mean ± SD	Median ± IQR	Mean ± SD	Median ± IQR			
MMST-AV	Wilcoxon signed ranks test	NA	1.30 ±26.13	NA	-0.80 ±23.53	Z= -2.70	0.01*	r = -0.86 (large effect)
HHIA-M	Paired sample T-test	40.20 ±24.79	NA	22.40 ±18.45	NA	t= 2.40	0.04*	d= 0.76 (medium effect)
PLAM-S	Wilcoxon signed ranks test	NA	93.86 ±15.33	NA	98.54 ±5.08	Z= -2.81	0.01*	r= -0.89 (large effect)

*P-value shows significant differences

NA: Not Applicable

5.4.1.2 Control Group

Following the results in Table 5.4, when tested using paired sample T-tests, no significant differences were found in HHIA-M and PLAM-S in the control group when comparing the pre-training performances (HHIA-M; Mean = 25.20, SD = 23.54 and PLAM-S; Mean = 97.13, SD = 1.70) with the post-training performances (HHIA-M; Mean = 25.20, SD = 24.79 and PLAM-S; Mean = 97.21, SD = 1.21). However, the effect size for HHIA-M ($d = <0.01$) and PLAM-S ($d = -0.05$) was small.

In contrast, significant differences were found between the pre-training performances (Mean = 0.15, SD = 4.55) and post-training performances (Mean = -2.19, SD = 2.61) in the control group for MMST-AV ($p < 0.05$). The effect size for this comparison was medium ($d = 0.63$). The improvement observed in the control group's MMST-AV performance during the post-training assessment may be attributed to a training effect, as subjects likely had a better understanding of how to respond to the test during the second assessment following the training session.

Table 5.5 Paired Sample T-test Result to Compare between Pre and Post Performances in Control Group For MMST-AV, HHIA-M And PLAM-S

Variables	Pre-training	Post-training	Z-value or t-value	p-value	Effect size (d)
	Mean ± SD	Mean ±SD			
MMST-AV	0.15 ±4.55	-2.19 ±2.61	3.05	0.01*	0.63 (medium effect)
HHIA-M	25.20 ±23.54	25.20 ±24.79	<0.01	1.00*	<0.01 (small effect)
PLAM-S	97.13 ±1.70	97.21 ±1.21	-0.15	0.88*	-0.05 (small effect)

*P-value shows significant differences

5.4.2 Comparisons of Normalised and Performance Gains for MMST-AV, HHIA-M And PLAM-S between Training Group and Control Group

The Mann-Whitney U Test showed no significant differences in the gain performance of MMST-AV between the training group (Median = -0.02, IQR = 0.01) and the control group (Median = -0.02, IQR = 0.02). The effect size was small ($r = -0.05$).

However, the Mann-Whitney U Test indicated significantly improved performances when testing the normalised gain of HHIA-M and PLAM-S in the training group (HHIA-M; Median = -0.19, IQR = 0.45 and PLAM-S; Median = 0.80, IQR = 0.11) compared to the control group (HHIA-M; Median = 0.04, IQR = 0.12 and PLAM-S; Median = -0.11, IQR = 0.43). The effect size for HHIA-M was medium ($r = -0.44$) and for PLAM-S was large ($r = -0.79$). The results are shown in Table 5.5 and Figure 5.3.

Table 5.6 Mann-Whitney U Test Result to Compare the Gain performance between Training and Control Group for MMST-AV, HHIA-M and PLAM-S

Variables	Training Group	Control Group	Z-value or t-value	p-value	Effect size (r)
	Median $\pm$ IQR	Median $\pm$ IQR			
MMST-AV	-0.02 $\pm$ 0.01	-0.02 $\pm$ 0.02	-0.23	0.82*	-0.05 (small effect)
HHIA-M	-0.19 $\pm$ 0.45	0.04 $\pm$ 0.12	-1.97	0.05*	-0.44 (medium effect)
PLAM-S	0.80 $\pm$ 0.11	-0.11 $\pm$ 0.43	-3.55	<0.01*	-0.79 (large effect)

*P-value shows significant differences

5.4.3 To investigate the perception of trainers towards PLAM (PLAM module, PLAM Documents and Knowledge Improvement)

The perception of trainers towards PLAM were investigated based on three different areas: 1. PLAM module, 2. PLAM Documents and 3. Knowledge Improvement.

5.4.3.1 Sufficiency of PLAM Module

Six parts in the feedback form for the PLAM module sufficiency were: 1. Duration of classes, 2. Content of classes, 3. Duration of quiz, 4. Content of quiz, 5. Duration of training, and 6. Content of training. The feedback form used a 4-sufficiency scale: 1 = not sufficient, 2 = slightly sufficient, 3 = sufficient, and 4 = very sufficient. Figure 5.4 shows the percentage of trainers' feedback on each domain, ranging from 84.38% to 96.88%.

Based on feedback from respondents, the lowest percentage in this category is 84.38% for the 'duration of classes'. This indicates that there may be a consensus among respondents that more classes are needed to enhance the effectiveness or comprehensiveness of the PLAM programme. For the 'content of classes', 'content of quiz', and 'duration of training', 93.75% of respondents agreed that they are sufficient. This implies that the content provided in classes and quizzes, as well as the overall training duration, aligned well with the needs or expectations of the respondents. Almost all respondents (96.88%) agreed that the duration of the quiz and training is sufficient. Respondents appear to be agreeable with the time allocated for these activities, suggesting that they find the duration appropriate for effective learning and understanding within the PLAM system. In summary, while there is a perceived need for additional classes based on the lower agreement percentage for the 'duration of classes,' other aspects such as content and duration of quiz and training seemed to meet or exceed the expectations of the majority of respondents.

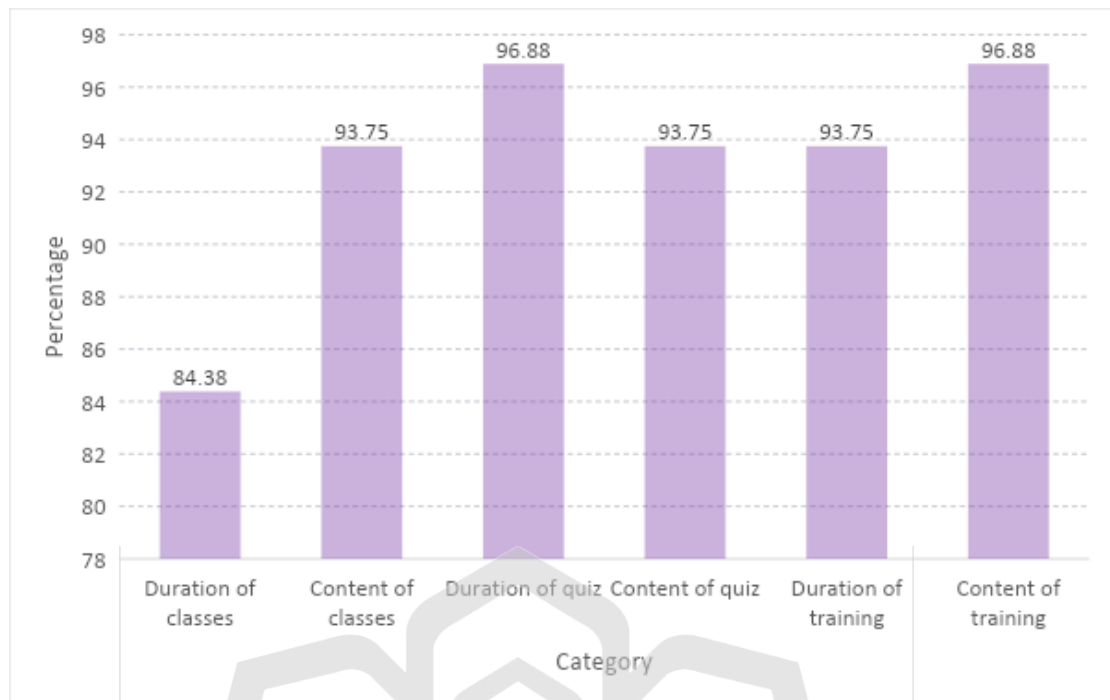


Figure 5.4 Trainers Perception towards Sufficiency of PLAM Module Percentage

5.4.3.2 Performance of PLAM documents

The documentation of the feedback form regarding the performance of PLAM was conducted on trainers, covering nine areas: (1) Organization of manual, (2) Easiness of manual, (3) Manual language, (4) Organization of trainer copy, (5) Easiness of trainer copy, (6) Trainer copy language, (7) Organization of trainee copy, (8) Easiness of trainee copy, and (9) Trainee copy language. The feedback form used a 4-performance scale: 1 = very poor, 2 = poor, 3 = good, and 4 = very good. Figure 5.5 shows the percentage of trainers' feedback regarding the PLAM documents ranging from 90.63% to 100%.

The lowest percentage (90.63%) in the 'easiness of copy' category indicates that PLAM copy needs guidance to be used. For 'manual language' and 'organization of trainer copy,' both scored 93.75%, indicating that respondents were able to understand the PLAM's manual and the PLAM organization in the trainer copy. A result of 96.88% for 'organization of manual' and 'easiness of trainee copy' reveals that both PLAM's manual and trainee copy are easy to comprehend. With all respondents giving 100%

positive feedback for ‘easiness of manual,’ ‘trainer copy language,’ ‘organization of trainee copy,’ and ‘trainee copy language,’ it shows a unanimous positive perception among respondents. This suggests that respondents find the PLAM’s manual easy to employ, appreciate the language used in the trainer copy, and find both the organization and language of the trainee copy clear and accessible. This positive feedback is the highlight of a strong consensus among users regarding the user-friendliness and effectiveness of these components in PLAM.

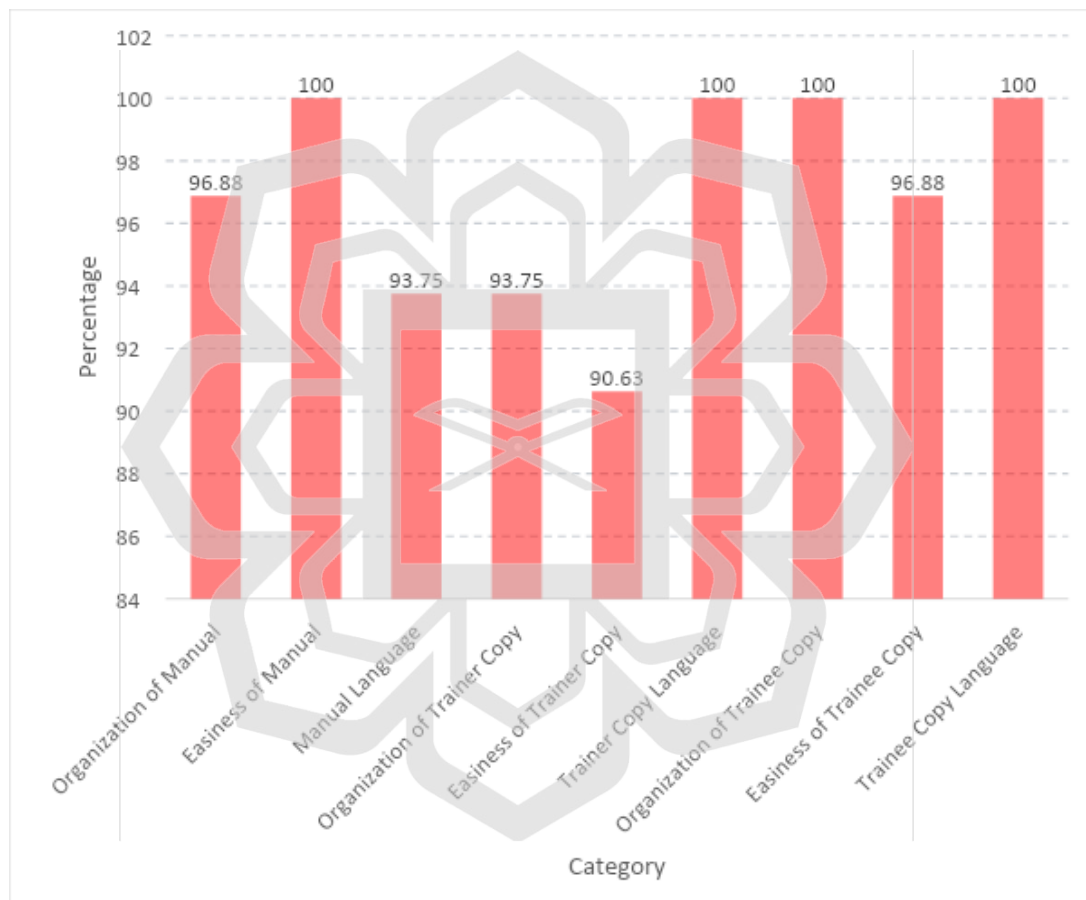


Figure 5.5 Trainers Perception on Performance of PLAM Documents Percentage

5.4.3.3 Knowledge Improvement after PLAM Training

Trainers’ perception of knowledge improvement was gathered using a 4-agreement scale: 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. Figure 5.6 shows five domains: (1) General knowledge, (2) Conducting AT after PLAM training,

(3) Plan for AT independently, (4) Able to record findings independently, and (5) Able to explain results independently. The percentage for each domain ranges from 78.13% to 93.75%. The results showed that all trainers agreed that their knowledge has improved after going through PLAM training.

The percentage of 78.13% obtained for 'plan for AT' suggests that respondents perceived their knowledge improvement as relatively modest when it comes to planning for an AT programme. The figure indicates that a significant portion of respondents might feel that their understanding or skills to plan for an AT programme is limited. This feedback could be indicative and needs adjustments, enhancements, or additional measures to better facilitate knowledge improvement to plan for AT. While the result of 81.25% for 'explain results' suggests that a portion of respondents can interpret results, this finding highlights a potential need for respondents to receive additional training to enhance the overall ability to understand and effectively deliver the results from PLAM's training. The result of 87.5% for 'conducting AT' implies that a substantial majority of respondents expressed confidence or capability in conducting AT. This is evident that a significant number of respondents feel competent to carry out the PLAM training. For both 'record findings' and 'general knowledge,' scores exceeded 90% with 'record findings' at 90.63% and 'general knowledge' at 93.75%, indicating a strong level of proficiency to record findings from PLAM training and a good understanding of general knowledge within the context of PLAM.

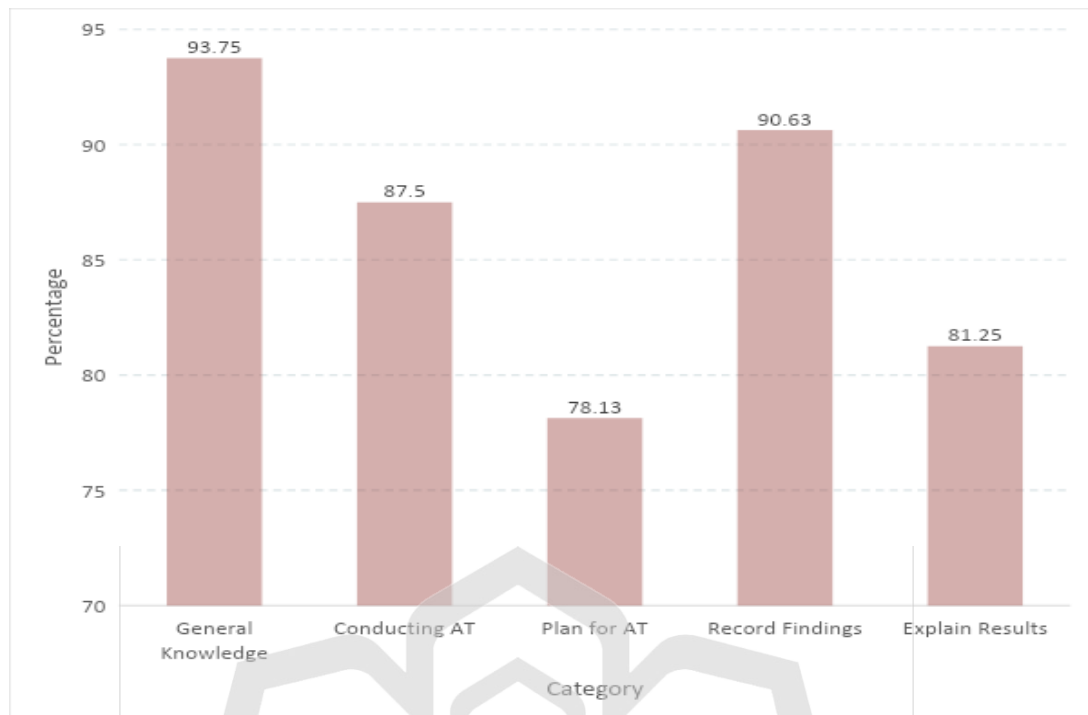


Figure 5.6 Trainers Perception on Agreement on Knowledge Improvement Percentage

5.4.4 Power of study

The power of study was calculated using <https://www.openepi.com> calculator resulted in a 99.73% mark for this sample size. The calculation used 10 sample sizes of training group with mean= 0.7284, SD=0.224 and another 10 sample sizes of control group with mean=-0.1158, SD=0.5159 of normalised gain for PLAM-S.

5.5 DISCUSSION

The effectiveness study for this research utilised four measurement instruments: (1) MMST-AV (Jamaluddin, 2016), (2) HHIA-M (Zam et al., 2019), (3) PLAM-S (newly developed for this research), and (4) A feedback form to assess the trainers' perception of PLAM (also newly developed for this research). These four instruments were employed to investigate the effectiveness of PLAM in three different areas: (1) Speech perception among trainees, (2) Hearing handicap perception among trainees, and (3) Trainers' perception of PLAM.

To date, most effectiveness studies primarily focus on assessing speech perception and hearing handicap perception among trainees (Humes et al., 2019; Öberg, 2016; Saunders & Chisolm, 2015; Yueh et al., 2005). Studies regarding trainers' perception are limited but tend to concentrate on audiological management in general (Ali et al., 2017; Makhoba & Joseph, 2016). However, one study has explored trainers' perceptions of AT programmes, as seen in Scarinci et al. (2022). Therefore, this study also recognizes the value in examining trainers' perceptions of PLAM.

5.5.1 Comparison between Pre and Post Performances in Training and Control Group

The results presented in Table 5.3 indicate significant improvements in the performance of the training group across various assessment measures following PLAM training. Specifically, when comparing pre-training and post-training performances in the MMST-AV and PLAM-S using a Wilcoxon signed rank tests; significant differences were observed ($p < 0.05$). The effect sizes for these improvements were found to be large, indicating substantial changes in performance after the training intervention. This suggests that PLAM training had a considerable impact on improving speech perception abilities (as measured by MMST-AV) and auditory performance (as measured by PLAM-S) among the trainees.

Furthermore, the paired sample T-test results for HHIA-M scores also unveiled a significant difference between pre-training and post-training performances in the training group ($p < 0.05$). While the effect size for this improvement was medium, hinting at a somewhat smaller change compared to MMST-AV and PLAM-S, the findings still underscore a noteworthy enhancement in the trainees' perceived hearing handicap following PLAM training.

Notably, the HHIA-M results showcased a notable decrease from pre-training to post-training, accompanied by a large effect size. This decline in HHIA-M scores indicates a tangible reduction in perceived hearing loss handicap among the participants following the training. These outcomes align with previous studies, which also reported significant reductions in perceived hearing handicap across all subjects when evaluated

using HHIA or HHIE (HHIA/E). For example, Preminger & Ziegler (2008) observed a significant decrease in hearing handicap perception, sustained over a six-month period for 32 subjects in both training and control groups, as evidenced by ANOVA results ($p < 0.0001$) when tested with HHIA/E. The substantial effect size underscores the significant positive impact of the PLAM training program in addressing the challenges associated with perceived hearing loss, indicating an improvement in overall well-being and a reduction in obstacles related to hearing difficulties among the participants.

Therefore, the results revealed that a minimum of 45 minutes of training per week for six weeks in PLAM elicited statistically significant improvements in speech perception abilities, as measured by MMST-AV and PLAM-S, and in hearing handicap perception, as measured by HHIA-M in the training group. Despite the small sample size of 10 participants in both the training and control groups, the study exhibited a very high 99.73% study power for samples of this nature. This robust study power underscores confidence in observing statistically significant improvements, reinforcing the effectiveness of the PLAM training programme, and enhancing speech perception abilities within the given participant pool. This finding aligns with the results of Stacey et al. (2010) in a study involving 24 post-lingually deafened adults with cochlear implants. Stacey et al. (2010) found that progress in speech perception was observed within three weeks of using computer-based AT when assessed using the IEEE (Institute for Electrical and Electronic Engineers) Sentence Test and Consonant test. Similarly, Reis et al. (2021) reported significant on-task improvements for both auditory and visual training among experienced CI users, although these improvements had not been extended to untrained listening and cognition. Yu et al. (2017) also observed improved speech perception in noisy conditions among 22 adults with hearing aids after four weeks of AT.

In summary, the findings suggest that PLAM training yields consistent positive outcomes, aligning with previous research by Stacey et al. (2010), Reis et al. (2021), and Rao et al. (2017). This underscores PLAM's effectiveness and its potential as an effective intervention tool. Overall, the results provide robust evidence supporting the effectiveness of PLAM training in improving speech perception abilities, auditory performance, and perceived hearing handicap among individuals with post-lingual hearing impairment. The large effect sizes observed indicate substantial improvements,

indicating the promise of PLAM as an effective intervention for individuals with hearing impairment.

Moreover, the findings presented in Table 5.4 indicate that there were no significant differences in the HHIA-M and PLAM-S scores between pre-training and post-training assessments in the control group, as determined by the paired sample T-test ($p > 0.05$). Additionally, the effect sizes for both HHIA-M and PLAM-S were small, suggesting no changes in performance following the absence of PLAM training intervention.

Contrasting results were observed in the MMST-AV scores for the control group. A significant difference was found between pre-training and post-training performances ($p < 0.05$), with a medium effect size. This unexpected improvement in MMST-AV scores post-training may be attributed to a training effect, wherein subjects became more familiar with the test and its requirements after undergoing the pre-training assessment. This increased familiarity could have led to improved performance in the MMST-AV test during the post-training assessment, despite the absence of specific PLAM training.

Overall, while there were some improvements observed in the control group's MMST-AV scores, likely due to increased familiarity with the assessment, no significant changes were detected in the HHIA-M and PLAM-S scores. These results underscore the importance of the PLAM training intervention in driving significant improvements in speech perception abilities and perceived hearing handicap among individuals with post-lingual hearing impairment.

5.5.2 Comparison between Improvement Differences (Gain) in Training and Control Group

The Mann-Whitney U Test revealed significantly improved performances in the training group compared to the control group when assessing the normalized gain of HHIA-M and PLAM-S. Specifically, the median gain performance for HHIA-M was higher in the training group (Median = -0.19, IQR = 0.45) than in the control group

(Median = 0.04, IQR = 0.12), with a medium effect size ($r = -0.44$). Similarly, the median gain performance for PLAM-S was higher in the training group (Median = 0.80, IQR = 0.11) than in the control group (Median = -0.11, IQR = 0.43), with a large effect size ($r = -0.79$). These results indicate significant differences in normalized gain when using PLAM-S and HHIA-M in the training group, underscoring the effectiveness of the PLAM training program in addressing the participants' hearing-related challenges.

The improvement shown when tested using PLAM-S indicates a statistically significant increase in normalized gain, a key indicator of improvement, highlighting the effectiveness of the PLAM training program. This finding is consistent with a study by Tye-Murray et al. (2017), which demonstrated significant improvements in speech perception that appeared to be maintained three months after the end of training for 47 adult hearing aid users who received 16 hours of training. However, the effectiveness study of PLAM does not include a retention study, and consequently, no conclusive information can be drawn regarding its long-term impact, as noted in the study by Tye-Murray et al. (2017). This highlights the need for additional research, specifically examining the long-term retention of PLAM effects to provide a more comprehensive understanding of its sustained impact over time.

The study also indicates HHIA-M improvements with a medium effect size, contrasting with the study by Smith et al. (2016), which showed a greater gain when tested using HHIA/E. Smith et al. (2016) indicated that listeners with poorer baseline HHIA/E scores, greater hearing impairment, older age, and new hearing aid users showed more positive change scores on the HHIA/E. The greater gain observed may be due to the lower baseline, providing more room for improvement among trainees, even though Smith et al. (2016) noted that they had homogenous study groups. The PLAM effectiveness study also maintained homogeneous study groups; however, it did not specifically focus on exploring other factors that might contribute to significant improvements. This suggests a potential avenue for future research to investigate additional variables that could enhance the effectiveness of PLAM and lead to even greater improvements, aligning with the program's objectives.

In contrast, the results of the Mann-Whitney U Test revealed no significant differences in the gain performance of MMST-AV between the training group (Median

= -0.02, IQR = 0.01) and the control group (Median = -0.02, IQR = 0.02). The effect size for this comparison was small ($r = -0.05$), indicating minimal differences in performance improvement between the two groups. This suggests that both groups may have demonstrated similar performance gains within the six-week training period, even though the control group did not receive any intervention.

The lack of difference in gains between the training and control groups may be attributed to both groups possibly reaching an asymptote on the test due to the training effect of the MMST-AV test itself (as observed by Stacey et al., 2010). Saunders et al. (2016) also explained that individuals with poorer performance at baseline may exhibit the greatest improvement post-training, irrespective of the intervention they receive. Even though homogeneity tests were conducted on both the training and control groups in this current research, Saunders et al. (2016) explanation could be considered one of the reasons why the performance gains in the training and control groups are similar.

Furthermore, it is worth noting that the MMST-AV test may have induced a learning practice effect, which could have made the participants in the control group more focused and attentive during the test, despite not receiving PLAM's intervention. This observation aligns with the findings of Tye-Murray et al. (2017), who highlighted that general aural rehabilitation, including the use of hearing aids, can lead to significant improvements across all tests, even in the absence of specific auditory training. Thus, it is plausible that the significant improvement observed in the MMST-AV scores in both the training and control groups could be attributed to the participants' effective use of hearing aids.

These findings underscore the significant positive impact of the PLAM training intervention on the gain performances of HHIA-M and PLAM-S in the training group compared to the control group. Moreover, the effect sizes further emphasize the substantial differences in improvement between the two groups, particularly for PLAM-S, where the effect size was large, indicating a pronounced improvement associated with the PLAM training program.

5.5.3 Trainers' Perception towards PLAM

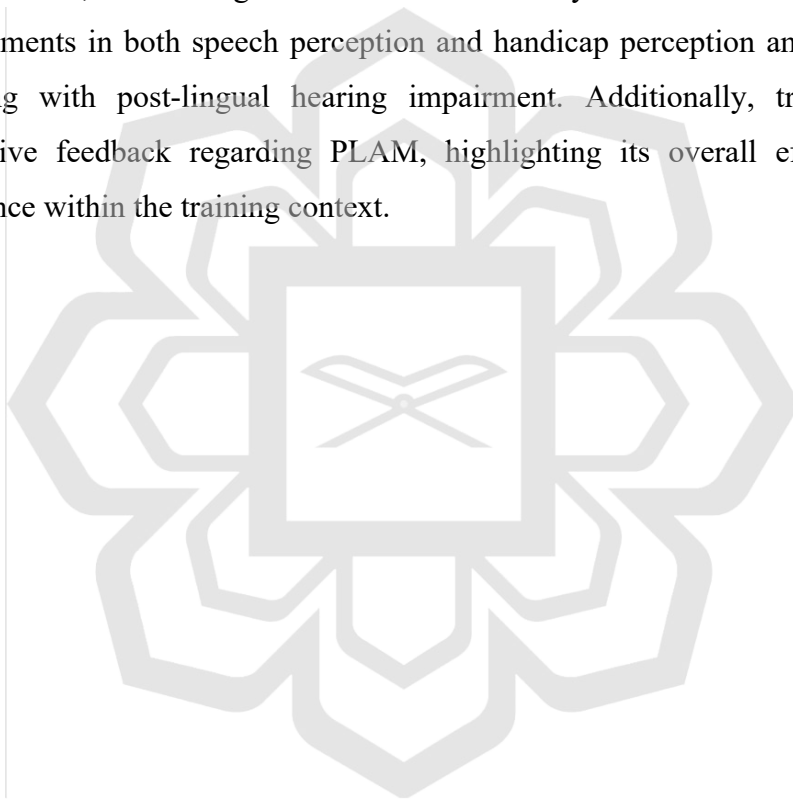
Trainers' perceptions of PLAM were assessed through a feedback form tailored for this study, encompassing three key areas: (1) PLAM module, (2) PLAM Documents, and (3) Knowledge Improvement. The feedback garnered positive responses regarding the training, with trainers indicating satisfaction with the training modules and quizzes (with over 90% positive feedback). However, there was a consensus among trainers for the need for additional classes, with 84.38% feeling that the class duration was insufficient. Additionally, trainers acknowledged the requirement for assistance in planning AT programs, with only 78.13% expressing positive feedback in this aspect. These findings resonate with the observations made by Ali et al. (2018), suggesting gaps in audiological management among adult patients in Malaysia by audiologists. These gaps include inadequate consideration of the psychosocial implications of hearing impairment, limited shared responsibility for treatment decisions between patients and clinicians, and minimal family involvement. The current study's results underscore the notion that the deficiency in audiological management may stem from the expressed need among trainers for more classes and supervision when formulating PLAM plans for trainees.

Moreover, Ali et al. (2017) reported that 83% of audiologists in Malaysia expressed a desire to enhance their skills related to the management of adult patients, particularly in counselling and AT areas. This inclination was similarly observed among the trainers in this study, who exhibited commitment to PLAM training but voiced a desire to augment their knowledge in AT, particularly regarding its implementation and result interpretation. These findings align with those of Ali et al. (2018), emphasizing the urgent need for training and resources to enhance audiologists' services in Malaysia. Currently, services predominantly address patients' biomedical needs, with hearing aids being the sole rehabilitation option offered, as highlighted by Ali et al. (2018).

5.6 CONCLUSION

The training exerted a significant positive impact on speech perception among participants in the training group, as evidenced by improvements in MMST-AV, HHIA-M, and PLAM-S scores. Notably, the control group also exhibited improvement in MMST-AV scores, albeit without the training intervention. While normalized gain analysis revealed progress in the training group for HHIA-M and PLAM-S, no significant difference in gain was observed for MMST-AV.

Overall, the findings underscore the efficacy of PLAM in fostering notable enhancements in both speech perception and handicap perception among individuals grappling with post-lingual hearing impairment. Additionally, trainers provided affirmative feedback regarding PLAM, highlighting its overall effectiveness and acceptance within the training context.



CHAPTER SIX

CONCLUSION

6.1 SUMMARY OF FINDINGS

The study aimed to develop, validate, and assess the effectiveness of the PLAM intervention, successfully fulfilling its primary objectives. Four key goals were pursued throughout the research process which are a scoping review was conducted to gather information on AT designs and parameters available in existing literature, tailored items and content were developed for the PLAM intervention, specifically designed for individuals dealing with post-lingual hearing impairment, the validity of PLAM for individuals facing post-lingual hearing impairment was evaluated and the effectiveness of PLAM for individuals experiencing post-lingual hearing impairment was assessed.

6.1.1 Summary of Chapter Two: Auditory Training Programme for Individuals with Post-Lingual Hearing Impairment: A Scoping Review

The research commenced with a scoping review aimed at gathering valuable insights into the structure and components of AT programs. The results of this review provided descriptions of AT program elements based on an analysis of 15 AT programs drawn from 24 papers. These descriptions represented novel contributions to the literature, offering comprehensive insights into the design and parameters of AT programs not previously documented. The primary objective of these descriptions was to provide clear and detailed explanations of the terminology associated with AT programs.

The study revealed that each AT program exhibited a unique design, although they shared common parameters. While the design outlined the overall structure of the program, the parameters defined the specific content and characteristics of the training. Eleven distinct designs were identified within the programs, encompassing variables such as sample size, hearing status, types of hearing devices, duration and frequency of training, and delivery methods (e.g., computer-based or face-to-face, individual or

group training). The inclusion of findings and retention effects within the designs further enriched the research methodology and direction. The study recommended that future research endeavours in AT programs take into account these diverse designs to ensure comprehensive investigation and analysis.

The parameters identified in the study functioned as profiles outlining the content and focus areas of AT programs, guiding their alignment with intended objectives. Ten parameters were identified, including training activities, themes, communication strategies, methods, approaches, auditory and speech stimuli, and complexity of training. Each AT program incorporated a combination of these parameters to tailor the training content to specific needs and goals.

6.1.2 Summary of Chapter Three: The Development of *Program Latihan Auditori Melayu* (PLAM)

The insights garnered from the scoping review were meticulously examined to construct an optimal framework. This framework was then integrated with the Malay language system to develop PLAM, comprising three documents: the PLAM Manual and PLAM for Trainee and PLAM for Trainer. The framework for PLAM training was designed to encompass five key parameters aimed at achieving the goals of AT: AT approaches, auditory skills, training complexity, speech stimulus, and sound stimulus. PLAM training incorporated various stimuli, including calibrated sound, phonemes, words, sentences, and continuous discourse, to provide a comprehensive training experience.

Additionally, PLAM introduced two additional categories: (1) PLAM scoring, which was devised to standardize and facilitate the quantification of trainees' performance using PLAM, and (2) PLAM-Screening (PLAM-S), developed to screen and objectively measure trainees' progress. PLAM-S was recommended as the designated measurement instrument for assessing the effectiveness of PLAM interventions.

6.1.3 Summary of Chapter Four: Validation of Program Latihan Auditori Melayu (PLAM)

The PLAM documents have undergone a comprehensive validation process, encompassing content validation, picture validation, pre-testing, and a pilot study to establish normative scores: 1. Content validity was assessed by six experts who evaluated the relevance of each section and item of PLAM using a four-point Likert scale. This evaluation yielded Item-Content Validity Index (I-CVI) values ranging from 0.833 to 1 for each section, with an impressive overall Scale-Content Validity Index/Average (S-CVI/Average) value of 0.997, 2. Picture validation involved ten subjects with normal hearing, who rated the guessability and translucency of the pictures used in PLAM. The results showed that 99.19% of respondents found the pictures to be guessable and translucent, 3. Pre-testing was conducted with the same subjects, who unanimously agreed that the instructions in PLAM were suitable, understandable, and that the training was feasible, achieving a perfect score of 100%, 4. A pilot study involving ten subjects with normal hearing provided normative scores for PLAM. The results were highly encouraging, with normal subjects achieving scores exceeding 80% in all sections of the PLAM module, with a minimum score of 88.7%, 5. The PLAM underwent a meticulous proofreading process, confirming its comprehensive development, good content and picture validity, and successful pre-testing results.

6.1.4 Summary of Chapter Five: The Preliminary Study on the Effectiveness of Program Latihan Auditori Melayu (PLAM)

The preliminary effectiveness study of PLAM revealed no significant differences between the training and control groups for pure-tone audiometry (PTA), aided threshold, MMST-AV, and HHIA-M, indicating homogeneity across both groups. However, the training group demonstrated statistically significant improvements in auditory performance after six weeks of minimum 45-minute PLAM training, evidenced by significant post-training enhancements in MMST-AV ($p=0.007$), PLAM-S ($p=0.005$), and HHIA-M ($p<0.005$), comparable to pre-training scores.

In contrast, the control group exhibited a significant post-training improvement in MMST-AV ($p=0.014$). Comparing both groups, the training group showed significantly greater normalized gain than the control group for HHIA-M ($p=0.049$) and PLAM-S ($p<0.001$), with no significant difference in gain observed for MMST-AV ($p=0.821$).

Moreover, all trainers perceived the PLAM module as sufficient, providing positive feedback on the performance of PLAM documents. Additionally, 97.5% of trainers reported an improvement in their knowledge of AT.

The study's power, calculated using the OpenEpi calculator, was found to be 99.73% for this sample size. This calculation was based on ten sample sizes for the training group with a mean of 0.7284 and a standard deviation of 0.224, and ten sample sizes for the control group with a mean of -0.1158 and a standard deviation of 0.5159 for normalized gain in PLAM-S.

6.2 THE IMPLICATIONS AND CONTRIBUTIONS OF PLAM

The implications and contributions of PLAM involve understanding the potential effects and outcomes linked to its implementation. Overall, PLAM has broad effects, from its use as a specialized training program to enhancing auditory skills. This program can impact cognitive development, communication abilities, and overall well-being. Nevertheless, the consequences of PLAM might extend beyond individual participants, including influencing education, accelerating social interactions, and potentially advancing auditory research. Appreciating these implications is vital for evaluating the program's effectiveness, recognizing challenges, and making informed decisions about its integration into educational or therapeutic settings.

6.2.1 Clinical Implications

The PLAM has proven to have several clinical implications, particularly in the field of audiology and related healthcare disciplines. In this study, it has helped individuals with

post-lingual hearing impairment (trainees) adapt to the program and maximize the benefits of their hearing devices by enhancing their ability to understand and process auditory information. The trainees learned to focus on improving listening skills, discerning between different sounds, and enhancing comprehension, leading to improved communication abilities. This enhanced ability has optimized the performance of their devices and facilitated their understanding of speech. These findings suggest that PLAM can leverage neuroplasticity; the brain's ability to reorganize itself throughout the lifespan to enhance auditory processing and comprehension (Irvine, 2018).

The development of PLAM can also facilitate its cross-cultural utilisation among Malaysian community. PLAM has been designed for conversational use in Malay and it has distinct potential for widespread use among Malaysians and Malay speakers worldwide. Its utilisation will provide significant opportunities to serve as a tool for aiding in aural rehabilitation.

6.2.2 Professional Development

In general, PLAM has significantly impacted educational outcomes for trainers by enhancing learning, training abilities, and knowledge improvement. The PLAM training programs have aided trainees in skill enhancement, thereby contributing to workforce development by equipping them with relevant skills and knowledge pertaining to PLAM. This suggests that their professional expertise has been bolstered, instilling confidence in their ability to offer AT programs to their patients.

6.3 RESEARCH NOVELTY

In the context of AT for individuals with post-lingual hearing impairment, research novelty, as explained by Oommen (2023) refers to a distinctive and original perspective that enhances existing knowledge. This study aims to contribute to the field by proposing five innovative ideas.

6.3.1 PLAM Framework is Interchangeable with Any Other Languages

Although this study did not find any recommended framework in existing literature for developing an assistive technology (AT) programme, research by Uhler et al. (2014) sought to determine best practices for Early Hearing Detection and Intervention (EHDI) and suggested the need for a robust framework to identify, monitor, and report the benefits of early intervention. This study underscores the significance of a framework in developing an AT programme, as it serves as the foundation for the PLAM.

Uhler et al. (2014) also emphasized the importance of a framework for future quality care monitoring. The framework generated in this study, depicted in Figure 3.2, encompasses all quantifiable components of an AT programme. This framework is recommended to serve as the core structure for developing AT programmes for individuals with post-lingual hearing impairment in any language. It is versatile and adaptable for use in any language, systematically outlining the methodology of an AT programme. New users can integrate their language system into the framework to develop AT programmes tailored to their language, as demonstrated by the successful development of PLAM using the Malay language system.

6.3.2 Charting Progress using Newly-developed Scoring System

A study employing the face-to-face method is often referred to as the traditional aural rehabilitation programme (Preminger & Meeks, 2010). Traditional training methods frequently rely on subjective sessions and may incorporate external assessment tools such as HHI/E or any speech assessment tools available to gauge progress outcomes (Preminger & Meeks, 2010). Alternatively, they might require the development of additional assessment tools to evaluate the training provided (Petersen et al., 2012; Preminger & Meeks, 2010).

In this study, a scoring system has been developed and is recommended for use in any new AT programmes due to its ease of use. The scoring system is straightforward as it aligns with the trainee's abilities regarding the 'complexity of training,' using '1' to denote 'able' and '0' to represent 'not able.' This approach allows trainers to

quantitatively document trainee performance and objectively assess their abilities. It is anticipated that this scoring method will be comparable to established scoring systems commonly found in computerized AT programmes which should be confirmed in future study.

6.3.3 The Complexity of Training is Useful for Counselling and Home-based Programme

The “complexity of training” is a critical component in an auditory training (AT) programme as it serves as the foundation for tracking trainee progress. Insights gained in understanding this complexity have broadened the scope of AT programmes, providing a more comprehensive training landscape. The results from PLAM also form the core content for counselling sessions, enabling trainers to better focus on explaining and tailoring the training based on specific findings.

The integration of a home-based programme using the “complexity of training” offers a promising avenue for extending PLAM benefits beyond traditional clinical settings. By allowing trainees to practice auditory training exercises at home, this approach provides increased accessibility, flexibility, and convenience. Clear guidelines provided by the complexity of training facilitate this process. However, resource and ongoing support from trainers are essential for the successful implementation of a home-based programme. Through regular follow-up and remote assessments, trainers can monitor progress, address challenges, and customize the training plan to meet individual needs. Ultimately, leveraging a home-based programme has the potential to enhance the effectiveness and sustainability of PLAM, leading to improved auditory skills, communication abilities, and overall well-being for individuals with post-lingual hearing impairment.

6.3.4 PLAM is the First Malay Holistic Doable AT Programme

To date, only one study, conducted by Bani (2019), has developed a Malay computerized AT program for the geriatric population. As such, PLAM stands out as

the first comprehensive AT program that utilizes the Malay language. Specifically tailored for individuals proficient in Malay with post-lingual hearing impairment, aged 12 years and above, PLAM is inclusive of individuals regardless of gender, socioeconomic status, or race. Covering all auditory skills, the program leverages the Malay language system to assist trainees in improving their skills in various areas of focus.

6.4 STUDY LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study has identified several limitations that could be addressed in future research. As such, this study recommends further research to enhance the value of PLAM in the future.

6.4.1 The Use of Objective Test to Find Effectiveness of PLAM

Currently, PLAM's effectiveness has been evaluated using MMST-AV, which assesses speech perception ability (Jamaluddin, 2016). However, PLAM does not provide insights into the auditory processing of subjects undergoing PLAM training.

Carter et al. (2013) suggested employing Cortical Auditory Evoked Potentials (CAEP) in adult listeners. CAEP offers greater accuracy than audibility predictions based solely on threshold and hearing aid response measures, serving as a sensitive tool for directly assessing the audibility of speech sounds (Carter et al., 2013). Additionally, Lee et al. (2020) found that long-term musical training could alter behavioural thresholds for frequency discrimination in musicians when assessed using CAEP tests. Hence, for future research, it is recommended to test PLAM using objective measures such as CAEP to ascertain any changes resulting from PLAM training.

Moreover, PLAM can be utilized to investigate the effects of AT on cognitive abilities. This could be achieved through studies employing electrophysiological techniques to precisely elucidate the processes contributing to robust behavioural gains (Rao, 2016).

6.4.2 To Commercialised PLAM

Most audiologists in Malaysia have reported feeling confident in managing adult patients, but they have also noted inadequacies in infrastructure, resources, and workplace facilities (Ali et al., 2017). Consequently, PLAM was developed to address this need. However, as of now, PLAM has not been commercialized. It is recommended that PLAM be marketed to all professionals who use the Malay language as a medium of communication and should also be made available for future research.

6.4.3 To Prove PLAM in Different Part of Effectiveness

Völter (2021) suggested that a computer-based training might be as effective or even more effective than face-to-face therapy. However, Völter (2021) did not have any data for the long-term effects of the study. Similarly, PLAM has not been studied for its long-term effects and has not been tested on a larger population. The use of PLAM as a newly-developed AT programme is currently limited to the sample size as stipulated in this study. Despite showing promising results as an effective AT programme, PLAM has not been generalized to a broader scope. Therefore, PLAM should be researched in various areas to represent a larger population conversant in Malay. Some of the studies that should be conducted on PLAM include:

1. Investigating the effectiveness of PLAM with a larger population.
2. Exploring the retention effects of PLAM.
3. Comparing PLAM with computerized AT programmes.

6.4.4 To Produce PLAM for Advanced Level

The development of PLAM should be taken further to an advanced level. A study by Rao et al. (2017) demonstrated that their AT programme required additional data concerning the contribution of audio-visual training to audio-visual integration and communication, even though their programme was already well-established. Advancing PLAM is essential to enable it to cater to the heightened communication needs of

trainees. Ideally, PLAM-Advanced should encompass more challenging listening scenarios, including tasks such as comprehending recorded speech and understanding formal but complex language.

6.4.5 To Study Cost-Effectiveness

Reis et al. (2019) emphasised that AT recommendations, including the frequency of sessions, the overall programme duration, and the type of programme (e.g., home-based or clinician-led), should be discussed with trainees due to the potential costs involved. However, PLAM has not conducted any research regarding the cost of training. This gap of information may limit the utilisation of PLAM if cost becomes a primary concern for trainers or trainees. Therefore, it is recommended that future studies should include a cost-effectiveness analysis for PLAM.

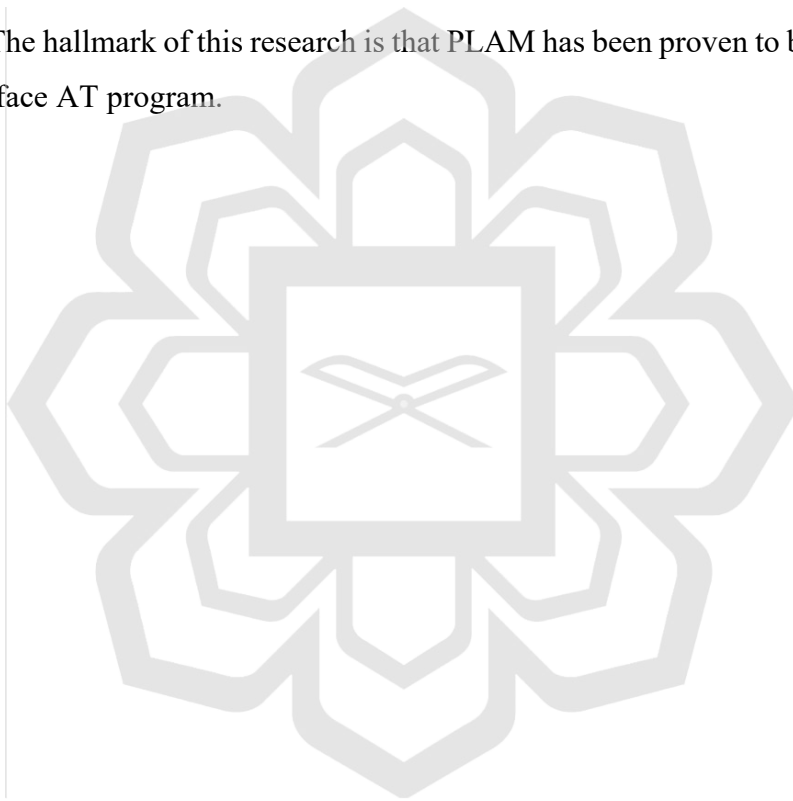
6.4.6 The use of Complexity of Training as Screening Tool

This study recommends utilizing the findings related to the complexity of training in a broader context. It could serve as a screening tool to help select the most suitable mode of communication for individuals with hearing impairments. Typically, the choice of communication mode for individuals with hearing impairments involves considering various variables as discussed among trainers and family members (Welling & Ukstins, 2015). However, Welling & Ukstins (2015) described these 'variables' in rather general terms. Therefore, this study suggests using the complexity of training as a specific set of variables to be discussed before making recommendations for the most appropriate communication mode for the trainee. To employ the complexity of training as a screening tool for selecting a communication mode, further research is necessary to validate its effectiveness.

6.5 CONCLUSIONS

The study has demonstrated that PLAM is a valuable tool for significantly enhancing speech perception and reducing hearing handicap perception among individuals with post-lingual hearing impairment. Furthermore, trainers have recognized the effectiveness of PLAM, providing positive feedback on the program as a whole. Consequently, PLAM is ready to be utilized as a standardized AT program for individuals conversant in Malay, aged 12 and above, regardless of gender, socioeconomic background, or race.

The hallmark of this research is that PLAM has been proven to be a standardized face-to-face AT program.



REFERENCES

- Acquadro, C., Conway, K., Hareendran, A., & Aaronson, N. (2008). Literature review of methods to translate health-related quality of life questionnaires for use in multinational clinical trials. *Value in Health*, 11(3), 509–521. <https://doi.org/10.1111/j.1524-4733.2007.00292.x>
- Agung, K. B., Purdy, S. C., & Kitamura, C. (2005). The Ling sound test revisited. *The Australian and New Zealand Journal of Audiology*, 27(1), 33–41. <https://doi.org/10.1375/audi.2005.27.1.33>
- Alasuutari, P., Bickman, L., & Brannen, J. (2008). *Social research methods handbook: Chapter 8: Quantitative sampling*. SAGE Publication; SAGE Publication Ltd. Retrieved from http://www.csun.edu/~hbsoc126/soc4/chapter_8_outline.pdf
- Ali, A., Hickson, L., & Meyer, C. (2017). Audiological management of adults with hearing impairment in Malaysia. *International Journal of Audiology*, 1–9. <https://doi.org/10.1080/14992027.2017.1305515>
- Ali, A., Meyer, C., & Hickson, L. (2018). Patient-centred hearing care in Malaysia: what do audiologists prefer and to what extent is it implemented in practice? *Speech, Language and Hearing*, 21(3), 172–182. <https://doi.org/10.1080/2050571X.2017.1385167>
- Ali Hanafiah, N. (2016). *Motivation for hearing aid uptake amongst Malay adults in the Klang Valley, Malaysia*. (Doctoral dissertation, University of Canterbury, Canterbury, New Zealand). Retrieved from <https://ir.canterbury.ac.nz/server/api/core/bitstreams/f36af150-c12c-4428-b100-c74757cb729a/content>
- Almanasreh, E., Moles, R., & Chen, T. F. (2019). Evaluation of methods used for estimating content validity. *Research in Social and Administrative Pharmacy*, 15(2), 214–221. <https://doi.org/10.1016/j.sapharm.2018.03.066>
- Amirullah, N. A., Rahmat, S., Dzulkarnain, A. A. A., Maamor, N., & Jamaludin, M. K. (2021). Calibrating different sounds for sound therapy : A general guide. *The Medical Journal of Malaysia*, 1–30.

- Anderson, S. B. (2012). *Neural correlates of auditory function and training in older adults*. (Doctoral dissertation, Northwestern University, Evanston, Illinois, United State of America). Retrieved from <https://www.proquest.com/openview/f643efd65b04ed62fafaf03cac71c43c/1?p-q-origsite=gscholar&cbl=18750>
- Archana, G., Krishna, Y., Rajashekhar, B., & Bhargavi, P. G. (2016). Adult auditory training is it part of aural rehabilitation? Focused group discussion. *Indian Journal of Otology*, 22(1), 24–27. <https://doi.org/10.4103/0971-7749.176514>
- Bamford, J. (1981). Auditory training: What is it, what is it supposed to do, and does it do it? *British Journal of Audiology*, 15(2), 75–78. <https://doi.org/10.3109/03005368109081418>
- Bani, N. H. (2019). *Pembangunan latihan auditori berkomputer untuk dewasa tua: Modul latihan mendengar dalam hingar*. (Unpublished doctoral dissertation). Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia.
- Barcroft, J., Mauzé, E., Schroy, C., Tye-Murray, N., Sommers, M., & Spehar, B. (2011). Improving the quality of auditory training by making tasks meaningful. *Perspectives on Audiology*, 7(1), 15–28. <https://doi.org/10.1044/poa7.1.15>
- Beier, L. O., Pedroso, F., & Costa-Ferreira, M. I. D. (2015). Auditory training benefits to the hearing aids users- A systematic review. *Rev. CEFAC*, 17(4), 1327–1332. <http://www.epistemonikos.org/documents/6a188e82606736b9fbfe07844f0f4914d189d2e9>
- Blamey, P. J., & Alcántara, J. I. (1994). Research in auditory training. *JARA Monogr. Suppl.*, 27, 161–191 Retrieved from <https://rest.neptune-prod.its.unimelb.edu.au/server/api/core/bitstreams/fa6c38b4-5927-5945-93e5-2996a22b044c/content>
- Boothroyd, A. (1968). Developments in speech audiometry. *British Journal of Audiology*, 2, 3–10. <https://doi.org/10.3109/05384916809074343>
- Boothroyd, A. (2007). Adult aural rehabilitation: What is it and does it work? *Trends in Amplification*, 11(2), 63–71. <https://doi.org/10.1177/1084713807301073>

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Cambridge Dictionary. (2021). Retrieved from <https://dictionary.cambridge.org/dictionary/english>
- Cardemil, F., Aguayo, L., & Fuente, A. (2014). Auditory rehabilitation programmes for adults: What do we know about their effectiveness? *Acta Otorrinolaringológica Española*, 65(4), 249–257. <https://doi.org/10.1016/j.otoeng.2013.10.017>
- Carter, L., Dillon, H., Seymour, J., Seeto, M., & Dun, B. Van. (2013). Cortical Auditory-Evoked Potentials (CAEPs) in adults in response to filtered speech stimuli. *Journal of the American Academy of Audiology*, 24(9), 807–822. <https://doi.org/10.3766/jaaa.24.9.5>
- Chisolm, T. H., Saunders, G. H., Frederick, M. T., McArdle, R. A., Smith, S. L., & Wilson, R. H. (2013). Learning to listen again: The role of compliance in auditory training for adults with hearing loss. *American Journal of Audiology*, 22(2), 339–342. [https://doi.org/10.1044/1059-0889\(2013/12-0081\)](https://doi.org/10.1044/1059-0889(2013/12-0081))
- Chittaranjan, A. (2019). The P value and statistical significance: Misunderstanding, explanations, challenges, and alternatives. *Indian Journal Psychological Medicine*, 41(3), 210–215. https://doi.org/DOI:10.4103/IJPSYM.IJPSYM_193_19
- Clark, C., Dowling, M., & Sims, D. (2008). Audiologic rehabilitation and speech-language therapy for prelingually deaf young adults. *Contemporary Issues in Communication Science and Disorders*, 35(Fall), 154–167. https://doi.org/10.1044/cicsd_35_f_154
- Coletta, V. P., & Phillips, J. A. (2005). Interpreting FCI scores: Normalized gain, pre-instruction scores, and scientific reasoning ability. *American Journal of Physics*, 73(12), 1172–1182. <https://doi.org/https://doi.org/10.1119/1.2117109>
- Collins, J. T. (1989). Malay dialect research in Malaysia: The issue of perspective. *Bijdragen Tot de Taal-, Land- En Volkenkunde / Journal of the Humanities and Social Sciences of Southeast Asia*, 145(2/3), 235–264. <https://doi.org/10.1163/22134379-90003253>

- Council of the Inspectors General on Integrity & Efficiency. (2009). *Questionnaire Pretest Procedures: Guide on the inspector general empowerment act's exemption to the paperwork reduction act*. September, 1–4. Retrieved from <https://www.ignet.gov/manuals-guides/igea-pra>
- Cruzes, D. S., & Dybå, T. (2011). Recommended steps for thematic synthesis in software engineering. *International Symposium on Empirical Software Engineering and Measurement, October*, 275–284. <https://doi.org/10.1109/esem.2011.36>
- Czaja, R. (1998). Questionnaire pretesting comes of age. *Marketing Bulletin*, 9(Article 5), 52–66. Retrieved from <http://marketing-bulletin.massey.ac.nz>
- Dawson, B., & Trapp, R. G. (2004). *Basic & clinical biostatistics* (4th ed.). Singapore, Mc Graw Hill.
- De Filippo, C. L., & Scott, B. L. (1978). A method for training and evaluating the reception of ongoing speech. *Journal of the Acoustical Society of America*, 63(4), 1186–1192. <https://doi.org/10.1121/1.381827>
- DeVon, H. A., Block, M. E., Moyle-Wright, P., Ernst, D. M., Hayden, S. J., Lazzara, D. J., Savoy, S. M., & Kostas-Polston, E. (2007). A Psychometric toolbox for testing validity and reliability. *Journal of Nursing Scholarship*, 39(2), 155–164. <https://doi.org/10.1111/j.1547-5069.2007.00161.x>
- Dowse, R., & Ehlers, M. (2005). Medicine labels incorporating pictograms: Do they influence understanding and adherence? *Patient Education and Counseling*, 58(1), 63–70. <https://doi.org/10.1016/j.pec.2004.06.012>
- Driscoll, V. D., Oleson, J., Jiang, D., & Gfeller, K. (2009). Effects of training on recognition of musical instruments presented through cochlear implant simulations. *Journal of the American Academy of Audiology*, 20(1), 71–82. <https://doi.org/10.3766/jaaa.20.1.7>
- Dubno, J. R. (2013). Benefits of auditory training for aided listening by older adults. *American Journal of Audiology*, 22(2), 335–338. [https://doi.org/10.1044/1059-0889\(2013/12-0080\)](https://doi.org/10.1044/1059-0889(2013/12-0080))

- Erber, N. P. (1980). Auditory evaluation and training of hearing-impaired children. *Journal of the National Student Speech Language Hearing Association*, 1–18. <https://www.researchgate.net/publication/335569722>
- Estabrooks, W., & Marlowe, J. (2000). *The baby Is listening: An educational tool for professionals who work with children who are deaf or hard of hearing* (1st ed.). Washington, USA: Plural Publishing Inc.
- Ferguson, M. A., Kitterick, P. T., Chong, L. Y., Edmondson-Jones, M., Barker, F., & Hoare, D. J. (2017). Hearing aids for mild to moderate hearing loss in adults. *Cochrane Database of Systematic Reviews*, 2015(9), 1–39. <https://doi.org/10.1002/14651858.CD012023>
- Ferguson, M., & Henshaw, H. (2015). How does auditory training work? Joined-up thinking and listening. *Seminars in Hearing*, 36(4), 237–249. <https://doi.org/10.1055/s-0035-1564456>
- Fu, Q. J., & Galvin, J. J. I. (2007). Perceptual learning and auditory training in cochlear implant recipients. *Trends in Amplification*, 11(3), 193–205. <https://doi.org/10.1177/1084713807301379>
- Fu, Q. J., Nogaki, G., & Galvin, J. J. I. (2005). Auditory training with spectrally shifted speech: Implications for cochlear implant patient auditory rehabilitation. *Journal of the Association for Research in Otolaryngology*, 6, 180–189. <https://doi.org/10.1007/s10162-005-5061-6>
- Fu, Q. J., Galvin, J., Wang, X., & Nogaki, G. (2005). Moderate auditory training can improve speech performance of adult cochlear implant patients. *Acoustic Research Letters Online*, 6(3), 106–111. <https://doi.org/10.1121/1.1898345>
- Gaver, W. W. (1993). What in the world do we hear?: An ecological approach to auditory event perception. *Ecological Psychology*, 5(1), 1–29.
- Gfeller, K., Guthe, E., Driscoll, V., & Brown, C. J. (2015). A preliminary report of music-based training for adult cochlear implant users: Rationales and development. *Cochlear Implants International*, 16(S3), S22–S31. <https://doi.org/10.1179/1467010015Z.0000000000269>

- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, 10(2), 486–489. <https://doi.org/10.5812/ijem.3505>
- Ghazali, K. (2012). *National identity and minority languages*. UN Chronicle. Retrieved from <https://unchronicle.un.org/article/national-identity-and-minority-languages>
- Gil, D., & Iorio, M. C. M. (2010). Formal auditory training in adult hearing aid users. *Clinics*, 65(2), 165–174. <https://doi.org/10.1590/S1807-59322010000200008>
- Glasgow, R. E., Lichtenstein, E., & Marcus, A. C. (2003). Why don't we see more translation of health promotion research to practice? Rethinking the efficacy-to-effectiveness transition. *American Journal of Public Health*, 93(8), 1261–1267. Retrieved from: <http://www.re-aim.org>
- Habanec, O. L. (2013). *Outcomes of group audiologic rehabilitation for adults with unaided hearing impairment and their significant others*. (Unpublished master's thesis). University of Canterbury, Canterbury, New Zealand.
- Haile, L. M., Orji, A. U., Reavis, K. M., Briant, P. S., Lucas, K. M., Alahdab, F., Bärnighausen, T. W., Bell, A. W., Cao, C., Dai, X., Hay, S. I., Heidari, G., Karaye, I. M., Miller, T. R., Mokdad, A. H., Mostafavi, E., Natto, Z. S., Yang, L., Ong, K. L., & Steinmetz, J. D. (2021). Hearing loss prevalence and years lived with disability, 1990-2019: Findings from the Global Burden of Disease Study 2019. *GBD 2019 Hearing Collaborators*, 397, 996–1009. [https://doi.org/10.1016/S0140-6736\(21\)00516-X](https://doi.org/10.1016/S0140-6736(21)00516-X)
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74. <https://doi.org/10.1119/1.18809>
- Hamberger, M. J., Heydari, N., Caccappolo, E., & Seidel, W. T. (2022). Naming in older adults: Complementary auditory and visual assessment. *Journal of the International Neuropsychological Society*, 28(6), 574–587. <https://doi.org/10.1017/S1355617721000552>

- Hassan, S. B. M., Hegazy, M., & al-Kassaby, R. (2013). The effect of intensive auditory training on auditory skills and on speech intelligibility of prelingual cochlear implanted adolescents and adults. *Egyptian Journal of Ear, Nose, Throat and Allied Sciences*, 14, 201–206. <https://doi.org/10.1016/j.ejenta.2013.06.003>
- Hellermann, J., & Lee, Y. (2021). Changing practices for connected discourse: Starting and developing topics in conversation. *Journal of Pragmatics*, 172, 89–104. <https://doi.org/10.1016/j.pragma.2020.11.007>
- Helmholtz, H. L. F., & Ellis, A. J. (1895). *The sensations of tone* (Eberdeen U). New York, USA: Dover.
- Henshaw, H., & Ferguson, M. A. (2013). Efficacy of individual computer-based auditory training for people with hearing loss: A systematic review of the evidence. *PLOS ONE*, 8(5), e62836–e62836. <https://doi.org/10.1371/journal.pone.0062836>
- Hilton, C. E. (2015). The importance of pretesting questionnaires: A field research example of cognitive pretesting the Exercise referral Quality of Life Scale (ER-QLS). *International Journal of Social Research Methodology*, 1–14. <https://doi.org/10.1080/13645579.2015.1091640>
- Hirsch, K. de. (1970). A review of early language development. *Developmental Medicine & Child Neurology*, 12(1), 87–97. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1469-8749.1970.tb01865.x>
- Hochberg, I., Rosen, S., & Ball, V. (1989). Effect of text complexity on connected discourse tracking rate. *Ear and Hearing*, 10(3), 192–199.
- Holt, R. F., & Carney, A. E. (2005). Multiple looks in speech sound discrimination in adults. *Journal of Speech, Language, and Hearing Research*, 48(4), 922–943. [https://doi.org/10.1044/1092-4388\(2005/064\)](https://doi.org/10.1044/1092-4388(2005/064))
- Houser, J., & Oman, K. S. (2011). *Evidence-based practice: An implementation guide for healthcare organizations*. Sudbury, Canada: Jones and Bartlett Learning.

- Houts, P. S., Doak, C. C., Doak, L. G., & Loscalzo, M. J. (2006). The role of pictures in improving health communication: A review of research on attention, comprehension, recall, and adherence. *Patient Education and Counseling*, 61, 173–190. <https://doi.org/10.1016/j.pec.2005.05.004>
- Hughes, M. E., Nkyekyer, J., Innes-Brown, H., Rossell, S. L., Sly, D., Bhar, S., Pipingas, A., Hennessy, A., & Meyer, D. (2018). Hearing aid use in older adults with postlingual sensorineural hearing loss: Protocol for a prospective cohort study. *JMIR Research Protocols*, 7(10), 1–20. <https://doi.org/10.2196/resprot.9916>
- Hull, R. H. (2014). *Introduction to Aural Rehabilitation* (2nd ed.). San Diego, USA: Plural Publishing Inc.
- Humes, L. E., Burk, M. H., Strauser, L. E., & Kinney, D. L. (2009). Development and efficacy of a frequent-word auditory training protocol for older adults with impaired hearing. *Ear and Hearing*, 30(5), 613–627. <https://doi.org/10.1097/AUD.0b013e3181b00d90>
- Humes, L. E., Skinner, K. G., Kinney, D. L., Rogers, S. E., Main, A. K., & Quigley, T. M. (2019). Clinical effectiveness of an at-home auditory training program: A randomized controlled trial. *Ear and Hearing*, 40(5), 1043–1060. <https://doi.org/10.1097/AUD.0000000000000688>
- In, J. (2017). Introduction of a pilot study. *Korean Journal of Anesthesiology*, 70(6), 601–605. <https://doi.org/10.4097/kjae.2017.70.6.601>
- Irvine, D. R. F. (2018). Plasticity in the auditory system. *Hearing Research*, 362, 61–73. <https://doi.org/10.1016/j.heares.2017.10.011>
- Ismail, M. Y. (1997). *Gajah Sejati*. Kuala Lumpur, Malaysia: Dewan Bahasa dan Pustaka.
- Jabbar, S., Abu Bakar, N. A., Baharom, N., & Jasmani, F. (Eds.). (2021). *Kamus dewan perdana*. Kuala Lumpur, Malaysia: Dewan Bahasa dan Pustaka.

- Jamaluddin, S. A. (2016). *Development and evaluation of the Digit Triplet and Auditory-Visual Matrix Sentence Tests in Malay*. (Doctoral dissertation, University of Canterbury, Canterbury, New Zealand). <https://doi.org/10.3813/AAA.918988>
- Kalsher, M. J., Wogalter, M. S., & Racicot, B. M. (1996). Pharmaceutical container labels: Enhancing preference perceptions with alternative designs and pictorials. *International Journal of Industrial Ergonomics*, 18(1), 83–90. [https://doi.org/10.1016/0169-8141\(95\)00033-X](https://doi.org/10.1016/0169-8141(95)00033-X)
- Kassam, R., Vaillancourt, R., & Collins, J. B. (2004). Pictographic instructions for medications: Do different cultures interpret them accurately? *International Journal of Pharmacy Practice*, 12, 199–209. <https://doi.org/10.1211/0022357044698>
- Katz, J., Chasin, M., English, K., & Hood, L. J. (2015). *Handbook of Clinical Audiology* (7th ed.). Philadelphia, USA: Wolters Kluwer Health.
- Kendal, P. C., & Sheldrick, R. C. (2000). Normative data for normative comparisons. *Journal of Consulting and Clinical Psychology*, 68(5), 767–773.
- Kienlin, S., Nytrøen, K., Stacey, D., & Kasper, J. (2020). Ready for shared decision making: Pretesting a training module for health professionals on sharing decisions with their patients. *Journal of Evaluation in Clinical Practice*, 1–2. <https://doi.org/10.1111/jep.13380>
- Kilcullen, C., Nagle, S., Evitts, P., Pallett, S., & DeLany, J. (2015). *The Ling six-sound test as a hearing screening measure*. (Doctoral dissertation, Towson University, Towson, Maryland, USA)
- Krull, V., Luo, X., & Kirk, K. I. (2012). Talker-identification training using simulations of binaurally combined electric and acoustic hearing: Generalization to speech and emotion recognition. *The Journal of the Acoustical Society of America*, 131(4), 3069–3078. <https://doi.org/10.1121/1.3688533>
- Kwak, C., Kim, S., You, S., & Han, W. (2020). Development of the Hearing Rehabilitation for Older Adults (HeRO) healthcare mobile application and its likely utility for elderly users. *International Journal of Environmental Research and Public Health*, 17(3998), 1–13. <https://doi.org/10.3390/ijerph17113998>

- Kynette, D., Kemper, S., Norman, S., & Cheung, H. (1990). Adults' word recall and word repetition. *Experimental Aging Research*, 16(3), 117–121. <https://doi.org/10.1080/07340669008251538>
- Lawrence, B. J., Jayakody, D. M. P., Henshaw, H., Ferguson, M. A., Eikelboom, R. H., Loftus, A. M., & Friedland, P. L. (2018). Auditory and cognitive training for cognition in adults with hearing loss: A systematic review and meta-analysis. In *Trends in Hearing* (Vol. 22, pp. 1–20). SAGE Publications Inc. <https://doi.org/10.1177/2331216518792096>
- Lazard, D. S., Innes-Brown, H., & Barone, P. (2014). Adaptation of the communicative brain to post-lingual deafness. Evidence from functional imaging. *Hearing Research*, 307, 136–143. <https://doi.org/10.1016/j.heares.2013.08.006>
- Legault, L. (2016). Intrinsic and extrinsic motivation. In *Encyclopedia of Personality and Individual Differences* (pp. 1–4). https://doi.org/10.1007/978-3-319-28099-8_1139-1
- Lim, T. S., Mail, R., Karim, M. R. A., Ulum, Z. K. A. B., Mifli, M., & Lajuni, N. (2017). Pre-testing and piloting the research instrument to examine the central roles of risk perception and attitude towards financial investment behavioral intention among Malaysians. *Journal of the Asian Academy of Applied Business*, 4, 97–108.
- Lin, F. R., Yaffe, K., Xia, J., Xue, Q. L., Harris, T. B., Purchase-Helzner, E., Satterfield, S., Ayonayon, H. N., Ferrucci, L., & Simonsick, E. M. (2013). Hearing Loss and cognitive decline in older adults. *JAMA Internal Medicine*, 173(4), 293–299. <https://doi.org/10.1001/jamainternmed.2013.1868>
- Ling, D. (1989). *Foundations of spoken language for hearing-impaired children*. Washington, USA: Alexander Graham Bell Association for the Deaf.
- Loebach, J. L., Pisoni, D. B., & Svirsky, M. A. (2009). Transfer of auditory perceptual learning with spectrally reduced speech to speech and nonspeech tasks: Implications for cochlear implants. *Ear & Hearing*, 30(6), 662–674. <https://doi.org/10.1097/AUD.0b013e3181b9c92d>

- Loebach, J. L., Pisoni, D. B., & Svirsky, M. A. (2010). Effects of semantic context and feedback on perceptual learning of speech processed through an acoustic simulation of a cochlear implant. *Journal of Experimental Psychology: Human Perception and Performance*, 36(1), 224–234. <https://doi.org/10.1037/a0017609>
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 35(6), 382–386.
- Maguire, M., & Delahunt, B. (2017). Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. *AISHE-J*, 8(3), 3351–33514. <https://doi.org/10.1109/TIA.2014.2306979>
- Makhoba, M., & Joseph, N. (2016). Practices and views of audiologists regarding aural rehabilitation services for adults with acquired hearing loss. *The South African Journal of Communication Disorders*, 63(1), 1–10. <https://doi.org/10.4102/sajcd.v63i1.155>
- Mansor, N. R., Syed Azmy, S. N. M., & Yusoff, S. Z. (2018). Malay as the language of advanced knowledge: Scientific review in National Academia Scholarship. *International Journal of Asian Social Science*, 8(9), 694–705. <https://doi.org/10.18488/journal.1.2018.89.694.705>
- Marcell, M. M., Borella, D., Greene, M., Kerr, E., & Rogers, S. (2000). Confrontation naming of environmental sounds. *Journal of Clinical and Experimental Neuropsychology*, 22(6), 830–864. <https://doi.org/10.1076/jcen.22.6.830.949>
- Mattsson, T. S., Follestad, T., Andersson, S., Lind, O., Øygarden, J., & Nordgård, S. (2018). Normative data for diagnosing auditory processing disorder in Norwegian children aged 7–12 years. *International Journal of Audiology*, 57(1), 10–20. <https://doi.org/10.1080/14992027.2017.1366670>
- Mendel, L. L., Danhauer, J. L., & Singh, S. (1999). *Singular's Illustrated Dictionary of Audiology*. San Diego, USA: Singular's Publishing Group.
- Michaud, H. N., & Duchesne, L. (2017). Aural rehabilitation for older adults with hearing loss: Impacts on quality of life- A systematic review of randomized controlled trials. *Journal of the American Academy of Audiology*, 28(7), 596–609. <https://doi.org/10.3766/jaaa.15090>

- Miller, J. D., Watson, C. S., Dubno, J. R., & Leek, M. R. (2015). Evaluation of speech-perception training for hearing aid users: A multisite study in progress. *Seminars in Hearing*, 36(4), 273–283. <https://doi.org/10.1055/s-0035-1564453>
- Miller, J. D., Watson, C. S., Kewley-Port, D., Sillings, R., Mills, W. B., & Burleson, D. F. (2007). SPATS: Speech perception assessment and training system. *The Journal of the Acoustical Society of America*, 122(5), 3063. <https://doi.org/10.1121/1.2942927>
- Möller, H.-J. (2011). Effectiveness studies: Advantages and disadvantages. *Dialogues in Clinical Neuroscience*, 13(2), 199–207. <https://doi.org/10.31887/DCNS.2011.13.2/hmoeller>
- Moore, D. R., & Amitay, S. (2007). Auditory training: Rules and applications. *Seminars in Hearing*, 28(2), 99–109. <https://doi.org/10.1055/s-2007-973436>
- Mukari, S. Z.M. S., Maamor, N., Ishak, W. S., & Wan Hashim, W. F. (2016). Hearing loss and risk factors among community dwelling older adults in Selangor. *Sains Malaysiana*, 45(9), 1405–1411.
- Mukari, S. Z.M., & Said, H. (1991). The development of Malay speech audiometry. *The Medical Journal of Malaysia*, 46(3), 262–268.
- Munson, B. (2001). Phonological pattern frequency and speech production in adults and children. *Journal of Speech, Language, and Hearing Research*, 44, 778–792. [https://doi.org/10.1044/1092-4388\(2001/061\)](https://doi.org/10.1044/1092-4388(2001/061))
- Nilsson, M., Soli, S., & Sullivan, J. A. (1994). Development of the Hearing In Noise Test (HINT) for the measurement of speech reception thresholds in quiet and in noise. *The Journal of the Acoustical Society of America*, 95(2), 1085–1099.
- Northern, J. L., & Downs, M. P. (2002). *Hearing in children* (5th ed.). Baltimore, USA: Lippincott Williams & Wilkins.
- O'Connor, P. J. (1990). Normative data: Their definition, interpretation, and importance for primary care physicians. *Family Medicine*, 22(4), 307–311. <https://pubmed.ncbi.nlm.nih.gov/2200734/>

- Öberg, M. (2016). Validation of the Swedish hearing handicap inventory for the elderly (Screening Version) and evaluation of its effect in hearing aid rehabilitation. *Trends in Hearing*, 20, 1–7. <https://doi.org/10.1177/2331216516639234>
- Olsen, W. O. (1998). Average speech levels and spectra in various speaking/ listening conditions: A summary of the Pearson, Bennett, & Fidell (1977) Report. *American Journal of Audiology*, 7, 1059–0889.
- Olson, A. D. (2015). Options for auditory training for adults with hearing loss. *Seminars in Hearing*, 36(4), 284–295. <https://doi.org/10.1055/s-0035-1564461>
- Olson, A. D., & Canada, T. B. (2010, July). *Using computerized auditory training clinically for adults with cochlear implants*. American Speech-Language-Hearing Association. Retrieved from <https://www.asha.org/articles/using-computerized-auditory-training-clinically-for-adults-with-cochlear-implants/>
- Olson, A. D., Stewart, S., & Effgen, S. (2010). *Auditory training at home for adult hearing aid users*. (Doctoral dissertation, University of Kentucky, Lexington, USA). Retrieved from http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1010&context=gradschool_diss
- Onn, F. M. (1988). *Bunga rampai fonologi Bahasa Melayu*. Kuala Lumpur, Malaysia: Fajar Bakti Sdn Bhd.
- Oommen, M. (2023). Novelty in research: What it is and how to know your work is original. Researcher.Life. Retrieved from <https://researcher.life/blog/article/novelty-in-research-what-it-is-and-how-to-know-your-work-is-original/#:~:text=Novelty in research refers to,a new and innovative way.>
- Pedley, K., Lind, C., & Hunt, P. (2005). *Adult aural rehabilitation: A guide for CI professionals*. New South Wale, Australia: Cochlear Limited.
- Petersen, B., Mortensen, M. V., Hansen, M., & Vuust, P. (2012). Singing in the key of life: A study on effects of musical ear training after cochlear implantation. *Psychomusicology: Music, Mind, and Brain*, 22(2), 134–151. <https://doi.org/10.1037/a0031140>

- Preminger, J. E., & Meeks, S. (2010). Evaluation of an audiological rehabilitation program for spouses of people with hearing loss. *Journal of the American Academy of Audiology*, 21(5), 315–328. <https://doi.org/10.3766/jaaa.21.5.4>
- Preminger, J. E., & Ziegler, C. H. (2008). Can auditory and visual speech perception be trained within a group setting? *American Journal of Audiology*, 17(1), 80–97. [https://doi.org/10.1044/1059-0889\(2008/009\)](https://doi.org/10.1044/1059-0889(2008/009))
- Prendergast, S. G., & Kelley, L. A. (2002). Aural rehab services: Survey reports who offers which ones and how often, and by whom. *Hearing Journal*, 55(9), 30–35. <https://doi.org/10.1097/01.HJ.0000293926.87482.df>
- Rao, A., Rishiq, D., Yu, L., Zhang, Y., & Abrams, H. (2017). Neural correlates of selective attention with hearing aid use followed by ReadMyQuips auditory training program. *Ear & Hearing*, 38(1), 28–41. <https://doi.org/10.1097/AUD.0000000000000348>
- Reis, M., Boisvert, I., Beedell, E., & Mumford, V. (2019). Auditory Training for Adult Cochlear Implant Users: A Survey and Cost Analysis Study. *Ear and Hearing*, 40(6), 1445–1456. <https://doi.org/10.1097/AUD.0000000000000724>
- Reis, M., McMahon, C. M., Távora-Vieira, D., Humburg, P., & Boisvert, I. (2021). Effectiveness of computer-based auditory training for adult cochlear implant users: A randomized crossover study. *Trends in Hearing*, 25, 1–20. <https://doi.org/10.1177/23312165211025938>
- Reynolds, N., Diamantopoulos, A., & Schlegelmilch, B. (2017). Pre-testing in questionnaire design: A review of the literature and suggestions for further research. *International Journal of Market Research*, 1–11.
- Richie, C., & Kewley-Port, D. (2008). The effects of auditory–visual vowel identification training on speech recognition under difficult listening conditions. *Journal of Speech, Language, and Hearing Research*, 51, 1607–1619. [https://doi.org/10.1044/1092-4388\(2008/07-0069\)](https://doi.org/10.1044/1092-4388(2008/07-0069))
- Rishiq, D., Rao, A., Koerner, T., & Abrams, H. (2016). Can a commercially available auditory training program improve audiovisual speech performance? *American Journal of Speech-Language Pathology*, 25, 1–15. <https://doi.org/10.1044/2016>

- Romli, M., Timmer, B. H. B., & Dawes, P. (2023). Hearing care services for adults with hearing loss in Malaysia: A scoping review. *International Journal of Audiology*, 1–9. <https://doi.org/10.1080/14992027.2023.2270594>
- Ruel, E., Wagner III, W. E., & Gillespie, B. J. (2016). Pretesting and pilot testing. *SAGE Research Method*, 101–119.
- Saidi, P., & Castro, N. O. (2021). Auditory training for post linguallly deafened adults cochlear implant users. *Scholarly Journal of Otolaryngology*, 5(5), 561–568. <https://doi.org/10.32474/SJO.2021.05.000225>
- Samsudin, J., Umat, C., Mukari, S. Z.-M. S., & Quar, T. K. (2017). Pencapaian auditori kanak-kanak pengguna implan koklea di bawah program implan koklea kebangsaan. *Jurnal Sains Kesihatan Malaysia*, 15(2), 59–72. <https://doi.org/http://dx.doi.org/10.17576/JSKM-2017-1502-08>
- Saunders, G. H., & Chisolm, T. H. (2015). Connected audiological rehabilitation: 21st century innovations. *Journal of the American Academy of Audiology*, 26(9), 768–776. <https://doi.org/10.3766/jaaa.14062>
- Saunders, G. H., Smith, S. L., Chisolm, T. H., Frederick, M. T., McArdle, R. A., & Wilson, R. H. (2016). A randomized control trial: Supplementing hearing aid use with Listening and Communication Enhancement (LACE) auditory training. *Ear and Hearing*, 37(4), 381–396. <https://doi.org/10.1097/AUD.0000000000000283>
- Scarinci, N., Tulloch, K., Meyer, C., Ekberg, K., & Lind, C. (2022). Using an online tool to apply a person-centred approach in audiological rehabilitation: A pilot study. *Audiology Research*, 12, 620–634. <https://doi.org/10.3390/audiolres12060060>
- Schow, R. L., & Nerbonne, M. A. (2013). *Introduction to Audiologic rehabilitation* (7th ed.). Boston, USA: Pearson Education.
- Schwartz, D. A., Howe, C. Q., & Purves, D. (2003). The statistical structure of human speech sounds predicts musical universals. *Journal of Neuroscience*, 23(18), 7160–7168. <https://doi.org/10.1523/jneurosci.23-18-07160.2003>

- Scollie, S., Glista, D., Tenhaaf, J., Dunn, A., Malandrino, A., Keene, K., & Folkeard, P. (2012). Stimuli and normative data for detection of Ling-6 sounds in hearing level. *American Journal of Audiology*, 21, 232–241. [https://doi.org/10.1044/1059-0889\(2012/12-0020\)](https://doi.org/10.1044/1059-0889(2012/12-0020))
- Shaari, A. S., Yusoff, N., & Awang, M. I. (2003). *Bahasa Melayu Komunikasi* (Edisi Pertama). Kuala Lumpur, Malaysia: PTS Publications & Distributor Sdn. Bhd.
- Shafiro, V. (2008). Development of a large-item environmental sound test and the effects of short-term training with spectrally-degraded stimuli. *Ear & Hearing*, 29(5), 775–790. <https://doi.org/10.1097/AUD.0b013e31817e08ea>
- Shafiro, V., Sheft, S., Kuvadia, S., & Gygi, B. (2015). Environmental sound training in cochlear implant users. *Journal of Speech, Language, and Hearing Research*, 58, 509–519. <https://doi.org/10.1044/2015>
- Silva, V. M. da, Teixeira, C. F., Pimenta, A. da S., Lopes, A. V. C., Mota, M. M. de L., Muniz, L. F., Nascimento, C. M. B. do, & Lima, M. L. L. T. de. (2021). Content and layout validation of indicators to assess the degree of implementation of the Hearing Conservation Program. *Revista CEFAC*, 23(3), 1–22. <https://doi.org/10.1590/1982-0216/20212333220>
- Singh, S., & Kent, R. D. (2000). *Singular's Pocket Dictionary of Speech-Language Pathology*. San Diego, USA: Singular's Publishing Group.
- Sireci, S., & Faulkner-Bond, M. (2014). Validity evidence based on test content. *Psicothema*, 26(1), 100–107. <https://doi.org/10.7334/psicothema2013.256>
- Sireci, S. G. (1998). The construct of content validity. *Social Indicator Research*, 45(1), 83–117. <https://doi.org/10.1023/A:1006985528729>
- Skagerstrand, Å., Köbler, S., & Stenfelt, S. (2017). Loudness and annoyance of disturbing sounds- Perception by normal hearing subjects. *International Journal of Audiology*, 56(10), 775–783. <https://doi.org/10.1080/14992027.2017.1321790>

- Smith, S. L., Pichora-Fuller, M. K., & Alexander, G. (2016). Development of the word auditory recognition and recall measure: A working memory test for use in rehabilitative audiology. *Ear & Hearing, 37*(6), e360–e376. <https://doi.org/10.1097/AUD.0000000000000329>
- Smith, S. L., Saunders, G. H., Chisolm, T. H., Frederick, M., & Bailey, B. A. (2016). Examination of individual differences in outcomes from a randomized controlled clinical trial comparing formal and informal individual auditory training programs. *Journal of Speech, Language, and Hearing Research, 59*, 876–886. <https://doi.org/10.1044/2016>
- Sommers, M. (2016). New directions for auditory training: Introduction. *Journal of Speech, Language, and Hearing Research, 59*, 860–861. https://doi.org/10.1044/2016_JSLHR-H-16-0299
- Sommers, M. S., Tye-Murray, N., Barcroft, J., & Spehar, B. P. (2015). The effects of meaning-based auditory training on behavioral measures of perceptual effort in individuals with impaired hearing. *Seminars in Hearing, 36*(4), 263–272. <https://doi.org/10.1055/s-0035-1564454>
- Soon, C. T., & Loi, C. K. (2019). the Implementation of Malay language education policy and the linguistic landscape in Malaysia. *International Journal of Humanities, Philosophy and Language, 2*(8), 266–277. <https://doi.org/10.35631/ijhpl.280020>
- Speaks, C., Parker, B., Harris, C., & Kuhl, P. (1972). Intelligibility of connected discourse. *Journal of Speech and Hearing Research, 15*, 590–602. <https://doi.org/10.1044/jshr.1503.590>
- Stacey, P. C., Raine, C. H., O'Donoghue, G. M., Tapper, L., Twomey, T., & Summerfield, A. Q. (2010). Effectiveness of computer-based auditory training for adult users of cochlear implants. *International Journal of Audiology, 49*(5), 347–356. <https://doi.org/10.3109/14992020903397838>
- Strawbridge, W. J., Wallhagen, M. I., Shema, S. J., & Kaplan, G. A. (2000). Negative consequences of hearing impairment in old age: A longitudinal analysis. *The Gerontologist, 40*(3), 320–326. <https://doi.org/https://doi.org/10.1093/geront/40.3.320>

- Stropahl, M., Besser, J., & Launer, S. (2020). Auditory training supports auditory rehabilitation: A state-of-the-art review. *Ear & Hearing*, 41(4), 697–704. <https://doi.org/10.1097/AUD.0000000000000806>
- Suzuki, M., Kurimoto, S., Shinohara, T., Tatabe, M., Imaeda, T., & Hirata, H. (2010). Development and validation of an illustrated questionnaire to evaluate disabilities of the upper limb. *The Journal of Bone & Joint Surgery*, 92-B(7), 963–969. <https://doi.org/10.1302/0301-620X.92B7.23410>
- Sweetow, R., & Palmer, C. V. (2005). Efficacy of individual auditory training in adults: A systematic review of the evidence. *Journal of the American Academy of Audiology*, 16(7), 494–504. <https://doi.org/10.3766/jaaa.16.7.9>
- Sweetow, R. W., Corti, D., Praise, A., & Henderson Sabes, J. (2007). Warning: Do not add on aural rehabilitation or auditory training to your fitting procedures. *The Hearing Review (Online)*, 1–6. Retrieved from <http://210.48.222.80/proxy.pac/docview/1644746595?accountid=44024>
- Sweetow, R. W., & Sabes, J. H. (2007a). Listening and Communication Enhancement (LACE). *Seminars in Hearing*, 28(2), 133–141. <https://doi.org/10.1055/s-2007-973439>
- Sweetow, R. W., & Sabes, J. H. (2007b). Technologic advances in aural rehabilitation: Applications and innovative methods of service delivery. *Trends in Amplification*, 11(2), 101–111. <https://doi.org/10.1177/1084713807301321>
- Sweetow, R. W., & Sabes, J. H. (2010). Auditory training and challenges associated with participation and compliance. *Journal of the American Academy of Audiology*, 21(9), 586–593. <https://doi.org/10.3766/jaaa.21.9.4>
- Teoh, B. S. (1994). *The sound system of Malay revisited* (1st Ed). Ampang, Malaysia: Dewan Bahasa dan Pustaka.
- Tools4Dev. (2014). *How to pretest and pilot a survey questionnaire*. Retrieved from <http://www.tools4dev.org/resources/how-to-pretest-and-pilot-a-survey-questionnaire/>

- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., ... Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, 169(7), 467–473. <https://doi.org/10.7326/M18-0850>
- Tulloch, J., Vaillancourt, R., Irwin, D., & Pascuet, E. (2012). Evaluation, modification and validation of a set of asthma illustrations in children with chronic asthma in the emergency department. *Canadian Respiratory Journal*, 19(1), 26–31.
- Turunen-Taheri, S. K., Edén, M., Hellström, S., & Carlsson, P.-I. (2019). Rehabilitation of adult patients with severe-to-profound hearing impairment- Why not cochlear implants? *Acta Oto-Laryngologica*, 139(7), 604–611. <https://doi.org/10.1080/00016489.2019.1607976>
- Tye-Murray, N. (2016). Gaming technology for customized aural rehabilitation and hearing healthcare. *The Hearing Review*, 1–7.
- Tye-Murray, N., Barcroft, J., & Sommers, M. (2011). I hear what you mean: The state of the science in auditory training. In *ENT and Audiology News* 20(4), 84–86.
- Tye-Murray, N., Spehar, B., Barcroft, J., & Sommers, M. (2017). Auditory training for adults who have hearing loss: A comparison of spaced versus massed practice schedules. *Journal of Speech, Language, and Hearing Research*, 60(8), 2337–2345. https://doi.org/10.1044/2017_JSLHR-H-16-0154
- Tyler, R. S., Witt, S. A., Dunn, C. C., & Wang, W. (2010). Initial development of a spatially separated speech-in-noise and localization training program. *Journal of American Academy of Audiology*, 21(6), 390–403. <https://doi.org/10.3766/jaaa.21.6.4>
- Uhler, K., Thomson, V., Cyr, N., Gabbard, S. A., & Yoshinaga-Itano, C. (2014). State and territory EHDI databases: What we do and don't know about the hearing or audiological data from identified children. *American Journal of Audiology*, 23(1), 34–43. [https://doi.org/10.1044/1059-0889\(2013/13-0015](https://doi.org/10.1044/1059-0889(2013/13-0015)
- Ukstins, C. A., & Welling, D. R. (2015). *Fundamentals of Audiology for the Speech-Language Pathologist*. Burlington, USA: Jones & Bartlett Learning.

- Valente, M., Abrams, H., Benson, D., Chisolm, T., Citron, D., Hampton, D., Loavenbruck, A., Ricketts, T., Solodar, H., & Sweetow, R. (2006). *Guidelines for the audiologic management of adult hearing impairment*. American Academy of Audiology. <https://doi.org/Asha>, 36 (Suppl. 12)
- Valente, M., Barninger, K. H., Oeding, K., Smith, S., Snapp, H., Sydlowski, S., Cunningham, R., Bennet, M., McCaslin, D. L., Cire, G., & Sockalingam, R. (2015). *American academy of audiology clinical practice guidelines adult patients with severe-to-profound unilateral Sensorineural hearing loss*. American Academy of Audiology. Retrieved from <https://www.audiology.org/wp-content/uploads/2022/09/PractGuidelineAdultsPatientsWithSNHL.pdf>
- Vandergrift, L. (2004). Listening to learn or learning to listen? *Annual Review of Applied Linguistics*, 24, 3–25. <https://doi.org/10.1017/s0267190504000017>
- Vilela, S., Lopes, C., Guiomar, S., Severo, M., Rangelova, L., Petrova, S., Horváth, Z., Cseh, J., Schweter, A., Lindtner, O., Ambrus, Á., & Torres, D. (2018). Validation of a picture book to be used in a pan-European dietary survey. *Public Health Nutrition*, 21(9), 1654–1663. <https://doi.org/10.1017/S1368980017004153>
- Völter, C. (2021). ‘Greater Benefits’ from computer-based auditory training for CI users. *The Hearing Journal*, 74(7), 30. <https://doi.org/10.1097/01.HJ.0000766264.56942.22>
- Wayne, R. V., & Johnsrude, I. S. (2012). The role of visual speech information in supporting perceptual learning of degraded speech. *Journal of Experimental Psychology: Applied*, 18(4), 419–435. <https://doi.org/10.1037/a0031042>
- Wilderode, M. Van, Vermaete, E., Francart, T., Wouters, J., & Wieringen, A. Van. (2023). Effectiveness of auditory training in experienced hearing-aid users, and an exploration of their health-related quality of life and coping strategies. *Trends in Hearing*, 27, 1–14. <https://doi.org/10.1177/23312165231198380>
- World Health Organization. (2021). *World report on hearing*. Retrieved from <https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/highlighting-priorities-for-ear-and-hearing-care>

- Xu, T., Zhong, Y., Wang, H., & Chen, X. (2021). A normative study of auditory perception in Mandarin-speaking children with categories of auditory performance-II. *International Journal of Pediatric Otorhinolaryngology*, 145(110705), 1–7. <https://doi.org/10.1016/j.ijporl.2021.110705>
- Yasir, S. M. A. (2016). Validation study can be a separate study design. *International Journal of Medical Science and Public Health*, 5(11), 2421-2422.
- Yu, L., Rao, A., Zhang, Y., Burton, P. C., Rishiq, D., & Abrams, H. (2017). Neuromodulatory effects of auditory training and hearing aid use on audiovisual speech perception in elderly individuals. *Frontiers in Aging Neuroscience*, 9(30), 1–8. <https://doi.org/10.3389/fnagi.2017.00030>
- Yueh, B., McDowell, J. A., Collins, M., Souza, P. E., Loovis, C. F., & Deyo, R. A. (2005). Development and validation of the effectiveness of the auditory rehabilitation scale. *Archives of Otolaryngology - Head and Neck Surgery*, 131(10), 851–856. <https://doi.org/10.1001/archotol.131.10.851>
- Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Education in Medicine Journal*, 11(2), 49–54. <https://doi.org/10.21315/eimj2019.11.2.6>
- Zam, T. Z. H. T. Z., Dzulkarnain, A. A. A., Rahmat, S., & Jusoh, M. (2019). Translation, adaptation and cross-cultural validation of hearing handicap inventory for adult in Malay language. *Journal of Audiology and Otology*, 23(3), 129–134. <https://doi.org/10.7874/jao.2018.00395>
- Zhang, M., Miller, A., & Campbell, M. M. N. (2014). Overview of nine computerized, home-based auditory-training programs for adult cochlear implant recipients. *Journal of the American Academy of Audiology*, 25(4), 405–413. <https://doi.org/10.3766/jaaa.25.4.11>

APPENDIX I

IREC AGREEMENT LETTER FOR AUDIOLAB ENT. SDN. BHD



KULLIYAH OF ALLIED HEALTH SCIENCES

No. rujukan: IIUM/310/14/10/1

9 Ogos 2021.

Mr. Mohd. Nor bin Che Ta
Audiolab Enterprise Sdn. Bhd.,
No 2652-G,
Persiaran Tengku Ampuan Rahimah,
41200 Klang,
Selangor

Sir,

INVITATION TO COLLABORATE IN TRAINING FOR RESEARCH PROJECT
Re: Mdm. Fazlin binti Suratman

Referring to the above matter, I would like to invite your audiologist, Mdm. Fazlin binti Suratman to participate in our training for research project to use the newly-developed *Program Latihan Auditori Melayu (PLAM)*. This training aims to help the audiologist to perform auditory training for adult patients with hearing loss. The training will be done via online classes and the participants will be required to use the training item on real patients (maximum two patients per participants). This training will be done in 1-hour per week in six weeks beginning September 2021.

2. For your information, this training is part of Ms. Juliana Aminah binti Marhaban Ph.D study titled, "The Development of Malay Auditory Training for Adults with Hearing Loss" supervised by me and co-supervised by Asst. Prof. Dr. Nor Azrita Mohamed Zain and Asst. Prof. Dr. Ahmad Aidil Arafat Bin Dzulkarnain. Therefore, the information and training program are confidential and shall not be disseminated without our permission. Attached is the agreement form to collaborate in this training.

3. We hope that your good office will accept our invitation. Please do not hesitate to contact us if you need further information through these email: sarahrahmat@iium.edu.my or Julia_am@iium.edu.my or hand phone number: 012-2452160. Thank you for your time and consideration.

Regards,

Asst. Prof. Dr. Sarah binti Rahmat
Department of Audiology and Speech-Language Pathology
Kulliyah of Allied Health Sciences
International Islamic University Malaysia
Bandar Indera Mahkota Campus
25200 Kuantan
Pahang

Garden of Knowledge and Virtue

Office Address: Kulliyah of Allied Health Sciences, International Islamic University Malaysia Kuantan Campus,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang Darul Makmur.
Tel: +609 571 6400 Fax: +609 571 6776 Website: www.iium.edu.my/kahs



AGREEMENT FORM

I hereby agree to proceed with training collaboration for research between **Audiolab Enterprise Sdn. Bhd.** and **Asst. Prof. Dr. Sarah binti Rahmat** on project The Development of Malay Auditory Training for Adults with Hearing Loss.

I would like to name the following Audiologist for training from Audiolab Enterprise Sdn. Bhd for this project. The names and details of Audiologist are as follows:

1. Name : Mdm. Fazlin binti Suratman
Address : Audiolab Enterprise Sdn. Bhd,
36AAB Menara C,
Persiaran MPAJ,
Jalan Pandan Utama,
55100 Kuala Lumpur.
No handphone : 013-6429713
I/C Number : 930210-01-5528
Email : fazlin@hearingcare.com.my

Best regards,

Mr. Mohd. Nor bin Che Ta
Audiolab Enterprise Sdn. Bhd.,
No 2652-G,
Persiaran Tengku Ampuan Rahimah,
41200 Klang,
Selangor

Date: 9th September 2021

Garden of Knowledge and Virtue

Office Address: Kuliyah of Allied Health Sciences, International Islamic University Malaysia Kuantan Campus,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang Darul Makmur.
Tel: +609 571 6400 Fax: +609 571 6776 Website: www.iiu.edu.my/kahs

APPENDIX II

IREC AGREEMENT LETTER FOR EARTISTIC SDN. BHD



No. rujukan: IIUM/310/14/10/1

9 Ogos 2021.

Dr. Nur Shasa Ain binti Abdul Aziz
Eartistic Sdn. Bhd.
23A, Jalan Wan Kadir 2,
Taman Tun Dr. Ismail,
60000 Kuala Lumpur.

Sir,

INVITATION TO COLLABORATE IN TRAINING FOR RESEARCH PROJECT
Re: Mr. Muhammad Khalis bin Osman and Mdm. Zirwatu Hanani binti Mohd. Hashim

Referring to the above matter, I would like to invite your audiologists, Mr. Muhammad Khalis bin Osman and Mdm. Zirwatu Hanani binti Mohd. Hashim to participate in our training for research project to use the newly-developed *Program Latihan Auditori Melayu (PLAM)*. This training aims to help the audiologist to perform auditory training for adult patients with hearing loss. The training will be done via online classes and the participants will be required to use the training item on real patients (maximum two patients per participants). This training will be done in 1-hour per week in six weeks beginning September 2021.

2. For your information, this training is part of Ms. Juliana Aminah binti Marhaban Ph.D study titled, "The Development of Malay Auditory Training for Adults with Hearing Loss" supervised by me and co-supervised by Asst. Prof. Dr. Nor Azrita Mohamed Zain and Asst. Prof. Dr. Ahmad Aidil Arafat Bin Dzulkarnain. Therefore, the information and training program are confidential and shall not be disseminated without our permission. Attached is the agreement form to collaborate in this training.

3. We hope that your good office will accept our invitation. Please do not hesitate to contact us if you need further information through these email: sarahrahmat@ium.edu.my or Julia_am@ium.edu.my or hand phone number: 012-2452160. Thank you for your time and consideration.

Regards,

Asst. Prof. Dr. Sarah binti Rahmat
Department of Audiology and Speech-Language Pathology
Kulliyah of Allied Health Sciences
International Islamic University Malaysia
Bandar Indera Mahkota Campus
25200 Kuantan
Pahang



AGREEMENT FORM

I hereby agree to proceed with training collaboration for research between **Eartistic Sdn. Bhd.** and **Asst. Prof. Dr. Sarah binti Rahmat** on project The Development of Malay Auditory Training for Adults with Hearing Loss. The training program name is *Program Latihan Auditori Melayu (PLAM)*.

I would like to name the following Audiologist for training from Eartistic Sdn. Bhd. for this project. The names and details of Audiologist are as follows:

1. Name : Mr. Muhammad Khalis bin Osman
Address : Eartistic Sdn. Bhd
No. 31, Susuran Juwara,
Taman Juwara,
Jalan Langgar,
06500 Alor Setar, Kedah
I/C Number : 940816-08-5837
No. Handphone : 012-4394536
Email : khalis@eartistic.com.my

2. Name : Mdm. Zirwatu Hanani binti Mohd
Address : Eartistic Sdn. Bhd
No. 31, Susuran Juwara,
Taman Juwara,
Jalan Langgar,
06500 Alor Setar, Kedah
No. Handphone : 011-19731656
I/C Number : 940209-10-5218
Email : zirwahashim@eartistic.com.my

Best regards,



Dr. Nur Shasa Ain binti Abdul Aziz
Eartistic Sdn. Bhd.
23A, Jalan Wan Kadir 2,
Taman Tun Dr. Ismail,
60000 Kuala Lumpur.

Date: 02.09.2021



Garden of Knowledge and Virtue

Office Address: Kulliyah of Allied Health Sciences, International Islamic University Malaysia Kuantan Campus,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang Darul Makmur
Tel: +609 571 6400 Fax: +609 571 6776 Website: www.iiu.edu.my/kahs

APPENDIX III

IREC AGREEMENT LETTER FOR GLOBAL PRECISION SALES AND SERVICES SDN. BHD



KULLIYAH OF ALLIED HEALTH SCIENCES

No. rujukan: IIUM/310/14/10/1

9 Ogos 2021.

Mr. Mohd. Ramizu Ibrahim
Global Precision Sales and Services Sdn. Bhd.,
A-03-05 & A-03-06 Glomac Galari,
Jalan 26A/70A Desa Sri Hartamas,
50480 Kuala Lumpur

Sir,

INVITATION TO COLLABORATE IN TRAINING FOR RESEARCH PROJECT
Re: Mdm. 'Ainu Mardhiah binti Mohd. Razally

Referring to the above matter, I would like to invite your audiologist, Mdm. 'Ainu Mardhiah binti Mohd. Razally to participate in our training for research project to use the newly-developed *Program Latihan Auditori Melayu (PLAM)*. This training aims to help the audiologist to perform auditory training for adult patients with hearing loss. The training will be done via online classes and the participants will be required to use the training item on real patients (maximum two patients per participants). This training will be done in 1-hour per week in six weeks beginning September 2021.

2. For your information, this training is part of Ms. Juliana Aminah binti Marhaban Ph.D study titled, "The Development of Malay Auditory Training for Adults with Hearing Loss" supervised by me and co-supervised by Asst. Prof. Dr. Nor Azrita Mohamed Zain and Asst. Prof. Dr. Ahmad Ajil Arafat Bin Dzulkamain. Therefore, the information and training program are confidential and shall not be disseminated without our permission. Attached is the agreement form to collaborate in this training.

3. We hope that your good office will accept our invitation. Please do not hesitate to contact us if you need further information through these email: sarahrahmat@iium.edu.my or Julia_am@iium.edu.my or hand phone number: 012-2452160. Thank you for your time and consideration.

Regards,

Asst. Prof. Dr. Sarah binti Rahmat
Department of Audiology and Speech-Language Pathology
Kulliyah of Allied Health Sciences
International Islamic University Malaysia
Bandar Indera Mahkota Campus
25200 Kuantan
Pahang



Garden of Knowledge and Virtue

Office Address: Kulliyah of Allied Health Sciences, International Islamic University Malaysia Kuantan Campus,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang Darul Makmur.
Tel: +609 571 6400 Fax: +609 571 6776 Website: www.iium.edu.my/kahs

AGREEMENT FORM

I hereby agree to proceed with training collaboration for research between Global Precision Sales and Services Sdn. Bhd. and Asst. Prof. Dr. Sarah binti Rahmat on project The Development of Malay Auditory Training for Adults with Hearing Loss. The training program name is *Program Latihan Auditori Melayu (PLAM)*.

I would like to name the following Audiologist for training from Global Precision Sales and Services Sdn. Bhd. for this project. The names and details of Audiologist are as follows:

1. Name : Mdm. 'Ainu Mardiah binti Mohd. Razally
Address : Global Hearing Care Centre Wangsa Maju,
Jalan Wangsa Delima 2A, Seksyen 5,
53300, Wangsa Maju, Kuala Lumpur
I/C Number : 910919-03-5302
No. Handphone : 013-9335076
Email : ainu@surewise.com.my

Best regards,

Mr. Mohd. Ramizul Ibrahim
Global Precision Sales and Services Sdn. Bhd.,
A-03-05 & A-03-06 Glomac Galeria,
Jalan 26A/70A Desa Sri Hartamas,
50480 Kuala Lumpur

Date:

23/8/2021

Global Precision Sales & Services Sdn Bhd
(Company No: 987367-U)
A-03-05 & A-03-06, Glomac Galeria;
Jalan 26A/70A, Desa Sri Hartamas
50480 Kuala Lumpur
TEL: +603-6205 2268 FAX: +603-6205 2282

Garden of Knowledge und Virtue

Office Address: Kuliyah of Allied Health Sciences, International Islamic University Malaysia Kuantan Campus,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang Darul Makmur.
Tel: +609 571 6400 Fax: +609 571 6776 Website: www.iiu.edu.my/kohs



APPENDIX IV

IREC AGREEMENT LETTER FOR OTICON SDN. BHD



No. rujukan: IIUM/310/14/10/1

9 Ogos 2021.

Mr. Patrick Tan
Oticon Sdn. Bhd. Kuala Lumpur
K-02-06 Solaris Mont Kiara
No. 2, Jalan Solaris
50480 Kuala Lumpur

Sir,

INVITATION TO COLLABORATE IN TRAINING FOR RESEARCH PROJECT Re: Ms. Nor Azri binti Azrin

Referring to the above matter, I would like to invite your audiologist, Ms. Nor Azri Azrin to participate in our training for research project to use the newly-developed *Program Latihan Auditori Melayu (PLAM)*. This training aims to help the audiologist to perform auditory training for adult patients with hearing loss. The training will be done via online classes and the participants will be required to use the training item on real patients (maximum two patients per participants). This training will be done in 1-hour per week in six weeks beginning September 2021.

2. For your information, this training is part of Ms. Juliana Aminah binti Marhaban Ph.D study titled, "The Development of Malay Auditory Training for Adults with Hearing Loss" supervised by me and co-supervised by Asst. Prof. Dr. Nor Azrita Mohamed Zain and Asst. Prof. Dr. Ahmad Aidil Arafat Bin Dzulkarnain. Therefore, the information and training program are confidential and shall not be disseminated without our permission. Attached is the agreement form to collaborate in this training.

3. We hope that your good office will accept our invitation. Please do not hesitate to contact us if you need further information through these email: sarahrahmat@iium.edu.my or Julia_am@iium.edu.my or hand phone number: 012-2452160. Thank you for your time and consideration.

Regards,

Asst. Prof. Dr. Sarah binti Rahmat
Department of Audiology and Speech-Language Pathology
Kulliyah of Allied Health Sciences
International Islamic University Malaysia
Bandar Indera Mahkota Campus
25200 Kuantan
Pahang



AGREEMENT FORM

I hereby agree to proceed with training collaboration for research between **Oticon Sdn. Bhd.** and **Asst. Prof. Dr. Sarah binti Rahmat** on project The Development of Malay Auditory Training for Adults with Hearing Loss. The training program name is *Program Latihan Auditori Melayu (PLAM)*.

I would like to name the following Audiologist for training from Oticon Sdn. Bhd. for this project. The names and details of Audiologist are as follows:

1. Name : Ms. Nor Azri Azrin
Address : Oticon Sdn. Bhd. Kuala Lumpur
K-02-06 Solaris Mont Kiara
No. 2, Jalan Solaris
50480 Kuala Lumpur
No. Handphone : 013-6704674
I/C Number : 900927145138
Email : noaz@oticonmedical.com

Best regards,



Mr. Patrick Tan
Oticon Sdn. Bhd. Kuala Lumpur
K-02-06 Solaris Mont Kiara
No. 2, Jalan Solaris
50480 Kuala Lumpur

Date: 06/09/2021

Garden of Knowledge and Virtue

Office Address: Kulliyah of Allied Health Sciences, International Islamic University Malaysia
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota, 25200 Kuantan, Pahang Darul Makmur
Tel: +609 571 6400 Fax: +609 571 6776 Website: www.iiu.edu.my/kahs



APPENDIX V

CERTIFICATION OF ETHICAL APPROVAL HATTM



Hospital Angkatan Tentera
Tuanku Mizan

NO RUJ : HATTM/EK/21-11

TARIKH : 03 SEPTEMBER 2021

Sijil Kelulusan Etika

(CERTIFICATE OF ETHICAL APPROVAL)

Dengan ini disahkan bahawa Jawatankuasa Etika Penyelidikan Hospital Angkatan Tentera Tuanku Mizan telah meluluskan protocol yang dibentangkan oleh penyelidik pada 02 September 2021

(This is to certify that the Research Ethics Committee, Hospital Angkatan Tentera Tuanku Mizan approves the study protocol as presented by the investigator (s) on

Protokol/Tajuk Kajian (Protocol/Research Title)	: Pembentukan Program Latihan Auditori Bahasa Melayu untuk Dewasa yang Mempunyai Masalah Pendengaran.
Penyelidik (Investigator)	: Cik Juliana Aminah binti Marhaban (790621-02-5366)
Penyelidik Bersama (Co – Investigator)	: -
Tempat Kajian (Study Centre)	: Klinik Otorinolaringologi Hospital Angkatan Tentera Tuanku Mizan
Tempoh Kajian (Study Duration)	: 27 September 2021 Hingga 31 Disember 2021
Pelajar Sarjana (PhD Student)	: -
Nota (Unit/Universiti) (Notes)	: UIA

Brig Jen Dato' (DR) Rosman Ab Rahman
Pegawai Memerintah
Hospital Angkatan Tentera Tuanku Mizan

Brig Jen Datin (DR) Roza Anon Binti Mohamad Ramlee
Pengerusi Jawatankuasa Etika Komiti
Hospital Angkatan Tentera Tuanku Mizan

APPENDIX VI

IREC IIUM INFORMATION SHEET AND CONSENT FORM

Version: 1

Date: 29th October 2021

RESEARCH INFORMATION AND CONSENT FORM

DEPARTMENT OF AUDIOLOGY AND SPEECH-LANGUAGE PATHOLOGY
KULLIYAH OF ALLIED HEALTH SCIENCES
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Research Title : The Development of the Malay Auditory Training Program (MATP) for Adults with Hearing Loss

You have been invited to take part in this research. This document consists of two parts, which are **Part 1: Research Information** and **Part 2: Consent Form**. Part 1 contains information regarding this research. If you have any questions, you can address them to the researcher. Once you have understood the research and have agreed to take part in it, you need to sign the consent form in part (2) of this document.

PART 1: RESEARCH INFORMATION

A. Introduction

This research aims to validate the Program Latihan Auditori Melayu or PLAM for adult patients with hearing loss who wear hearing aids or have cochlea implants.

Auditory Training is one of the interventions available in aural rehabilitation that helps improve the listening ability of patients after they have been fitted with hearing aids and/or cochlea implants (Boothroyd, 2007). Even though auditory training has been shown to help patients with hearing loss, a very small percentage of audiologists worldwide (less than 10%) offers this training to their patients (Sweetow & Sabes, 2010). This situation also applies in Malaysia, where, according to Ali, Hickson & Meyer (2010), most audiologists only offers intervention in the form of prescribing hearing aids while ignoring auditory training in their services. This could be due to a lack of tools to carry out auditory interventions (Ali, Hickson & Meyer, 2010). Additionally, there is also a lack of auditory training programs that have been validated or been proven to be effective in the current market (Olsen, 2015). Therefore, it is hoped that the outcome of the current research will be developed into a program that could help audiologists in Malaysia to carry out a holistic auditory rehabilitation to adult patients with hearing loss.

B. Inclusion Criteria for the Current Research

You are invited to take part in this research if you fulfil the inclusion criteria of **one of the groups** below:

1. Group A

- Aged 12 years and above
- Uses Bahasa Melayu as the first language
- Does not have hearing loss
- Does not have any cognitive problems and abnormal senses

2. Group B

- Aged 12 years and above
- Uses Bahasa Melayu as the first language
- Pre-lingual (has developed speech and language prior to developing hearing loss)
- Has been diagnosed as having hearing loss (exceeding 20 dB HL) either in one or both ears
- Is currently using hearing aids and/or cochlea implants
- Does not have any cognitive problems and abnormal senses
- Has never undergone any auditory training either in a clinical setting or at home
- Does not use sign language
- Does not have progressive hearing loss

C. Test Procedures

1. Groups A and B

The researcher will perform a history-taking session in regards to your hearing loss as well as other health factors in order to determine if you are suitable to be included into this research. Afterwards, the researcher will perform pre-training tests in order to obtain your baseline level of your listening skills prior to joining the auditory training sessions using MATP. You will be randomly assigned into one of the categories below:

a. Those who will undergo intensive training for six weeks

This group will undergo Pre- and Post-Training Evaluation sessions 1 and 2 and will undergo the MATP training for six weeks. Every training session will be conducted for one (1) hour in a clinical setting with a research team and two (2) hours at home individually.

b. Those who will not undergo intensive training for six weeks

This group will undergo Pre- and Post-Training Evaluation sessions 1 and 2 but will NOT be undergoing the MATP training for six weeks

2. Pre- and Post-Evaluation sessions 1 and 2.

This evaluation is a combination of the tests detailed below, which will be conducted to all of the research participants. The following tests aim to evaluate the progress of the participants before and after the research is conducted on them.

- a. **History-taking session:** The researcher will ask about the history of your hearing loss as well as your general health and wellbeing.
- b. **Pre-training evaluation:** This evaluation consists of four evaluation tests, which are (1) Client Oriented Scale of Improvement (COSI), (2) Malay Hearing Handicap Inventory, (3) Malay Auditory-Visual Matrix Sentence Test and (4) Malay Auditory Training Program-Screening. This evaluation will be conducted through interview sessions and screening tests that require the participants to answer some questions through a computer software.

- c. **Training using the Malay Auditory Training Program:** This training will be conducted for six weeks (3 hours each week; 1 hour in a clinical setting and 2 hours at home)
- d. **Post-Training Evaluation 1:** This evaluation consists of four evaluation tests, which are (1) Client Oriented Scale of Improvement (COSI), (2) Malay Hearing Handicap Inventory, (3) Malay Auditory-Visual Matrix Sentence Test and (4) Malay Auditory Training Program-Screening. This evaluation will be conducted through interview sessions and screening tests that require the participants to answer some questions through a computer software.
- e. **Post-Training Evaluation 2:** This evaluation consists of four evaluation tests, which are (1) Client Oriented Scale of Improvement (COSI), (2) Malay Hearing Handicap Inventory, (3) Malay Auditory-Visual Matrix Sentence Test and (4) Malay Auditory Training Program-Screening. This evaluation will be conducted through interview sessions and screening tests that require the participants to answer some questions through a computer software. This second post-training evaluation will be performed five to ten days after the MATP training has ended.

D. Research benefits for Group A and B

You will know the level at which your listening skills are developing.

If you are a hearing aid user or if you have cochlea implants, you will benefit from the auditory training given to you in this current research in order to improve your listening skills using your hearing device.

E. Potential risks

This research has no potential risks.

F. Your participation in this research

Your participation in this research is **purely voluntary**. If you do not wish to take part in this research, you can refuse the researcher's offer without having to provide any reasons. Your decision to not take part in this research will not affect your relationship with the audiologist, staff, and the students of the Department of Audiology and Speech Language Pathology.

G. Your privacy

The findings of this research will be kept confidential from the general public. If you have signed the consent form in part II, it means that you have given the research team the permission to publish the data obtained from this research. Any information that could expose your identity will not be used in the research report. All data obtained will be kept confidential.

Research results

If you are interested to know more about the results of the current research, you can contact our research team:

Researcher

Juliana Aminah Marhaban
Telephone: 012-2452160
Email: juliamarhaban@gmail.com

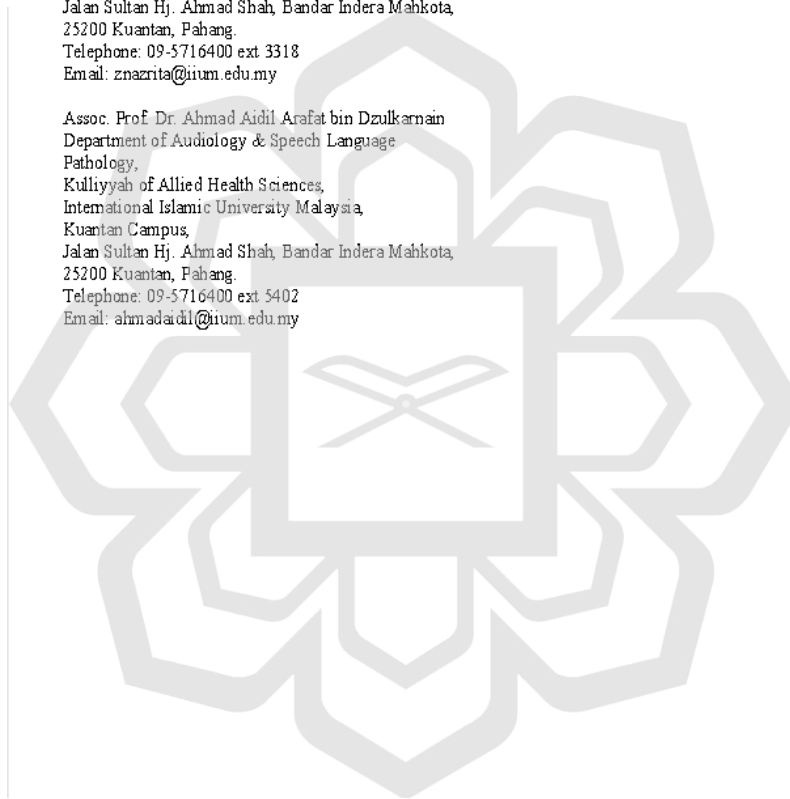
Additional Researchers

Assitant Professor Dr. Nor Azrita Mohamed Zain
Department of Audiology & Speech Language
Pathology,
Kulliyyah of Allied Health Sciences,
International Islamic University Malaysia,
Kuantan Campus,
Jalan Sultan Hj. Ahmad Shah, Bandar Indera Mahkota,
25200 Kuantan, Pahang.
Telephone: 09-5716400 ext 3318
Email: znazrita@iiuim.edu.my

Assoc. Prof. Dr. Ahmad Aidil Arafat bin Dzulkarnain
Department of Audiology & Speech Language
Pathology,
Kulliyyah of Allied Health Sciences,
International Islamic University Malaysia,
Kuantan Campus,
Jalan Sultan Hj. Ahmad Shah, Bandar Indera Mahkota,
25200 Kuantan, Pahang.
Telephone: 09-5716400 ext. 5402
Email: ahmadaidil@iiuim.edu.my

Principal Researcher

Assistant Professor Dr. Sarah binti Rahmat
Department of Audiology & Speech Language
Pathology,
Kulliyyah of Allied Health Sciences,
International Islamic University Malaysia,
Kuantan Campus,
Jalan Sultan Hj. Ahmad Shah, Bandar Indera
Mahkota,
25200 Kuantan, Pahang.
Telephone: 09-5716400 ext 3305
Email: sarahrahmat@iiuim.edu.my



Part II: Consent Form

Research Title : The Development of the Malay Auditory Training Program (MATP) for Adults with Hearing Loss
Supervisor : Assistant Professor Dr. Sarah binti Rahmat
Co-Supervisor : Assistant Professor Dr. Nor Azrita Mohamed Zain
Associate Professor Dr. Ahmad Aidil Arafat bin Dzulkarnain
Researcher : Juliana Aminah Marhaban

In order to participate in this research, you need to sign this form. By signing this form, I acknowledge that:

- ✓ I have read and understood the procedures of this research and I have been given ample time to think about it
- ✓ I have been informed that my private information will be kept confidential and will not be given to anyone
- ✓ I agree to participate in this research voluntarily and I will follow the procedures that have been set, and I have also agreed to provide any relevant information for the purpose of this research
- ✓ I understand that I can withdraw from this research at any time
- ✓ I agree to be contacted so that I can participate in future researches
- ✓ I have obtained a copy of the research information and the consent form for my own safekeeping

Participant

Signature: _____ Date (day/month/year) _____
Full Name: _____
IC No.: _____

Witness

Signature: _____ Date (day/month/year) _____
Full Name: _____
IC No.: _____

* **NOTE:** The subjects involved in this research WILL NOT be covered under any insurance.

APPENDIX VII

MAKLUMAT PENYELIDIKAN DAN BORANG PERSETUJUAN

MAKLUMAT PENYELIDIKAN DAN BORANG PERSETUJUAN

DEPARTMENT OF AUDIOLOGY AND SPEECH-LANGUAGE PATHOLOGY
KULLIYAH OF ALLIED HEALTH SCIENCES
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

Tajuk : **Pembentukan Program Latihan Auditori Melayu (*Malay Auditory Training Program; MATP*) untuk Dewasa yang Mempunyai Masalah Pendengaran**

Anda dijemput untuk mengambil bahagian di dalam penyelidikan ini. Borang ini terdiri daripada dua bahagian, iaitu **Bahagian 1: Bahagian Maklumat Penyelidikan** dan **Bahagian 2: Borang Persetujuan**. Bahagian pertama mengandungi maklumat tentang penyelidikan ini. Jika anda mempunyai sebarang pertanyaan, anda boleh ajukan soalan anda kepada penyelidik. Setelah anda memahami kandungan penyelidikan ini dan bersetuju untuk mengambil bahagian, anda perlu menandatangani borang persetujuan di bahagian (2) borang ini.

BAHAGIAN 1: MAKLUMAT PENYELIDIKAN

A. Pengenalan

Penyelidikan ini bertujuan untuk menghasilkan dan mengesahkan Program Latihan Auditori Melayu (*Malay Auditory Training Program*) atau MATP untuk pesakit dewasa yang mempunyai masalah pendengaran dan memakai alat bantu dengar dan/atau implan koklea.

Latihan Auditori merupakan salah satu intervensi di dalam rehabilitasi aural untuk meningkatkan keupayaan pendengaran selepas pesakit dipakaikan alat bantu pendengaran dan/atau implan koklea (Boothoyd, 2007). Walaupun telah dibuktikan bahawa latihan ini mampu membantu pesakit yang mempunyai masalah pendengaran, namun sangat sedikit audiologis (kurang daripada 10%) di seluruh dunia yang menawarkan latihan auditori ini (Sweetow & Sabes, 2010). Perkara yang sama turut berlaku di Malaysia di mana menurut Ali, Hickson & Meyer (2017), kebanyakan audiologis hanya menawarkan perkhidmatan untuk intervensi alat bantu pendengaran dan mengabaikan latihan auditori di dalam servis mereka. Ini mungkin disebabkan kurangnya peralatan untuk penilaian dan rehabilitasi (Ali, Hickson & Meyer, 2017). Tambahan pula, didapati tidak banyak latihan auditori yang berada di pasaran telah divalidasi atau dibuktikan berkesan (Olsen, 2015). Oleh itu, diharapkan supaya hasil penyelidikan ini akan menjadi satu program yang boleh membantu audiologis di Malaysia untuk menawarkan rehabilitasi yang menyeluruh kepada pesakit dewasa yang mempunyai masalah pendengaran.

B. Syarat-syarat untuk Menyertai Penyelidikan ini

Anda dijemput untuk menyertai penyelidikan ini jika anda mempunyai kriteria yang diperlukan seperti di dalam **salah satu** kumpulan di bawah:

1. Kumpulan A

- ✓ Berumur 18 hingga 60 tahun
- ✓ Menggunakan Bahasa Melayu sebagai bahasa utama
- ✓ Tidak mempunyai masalah pendengaran
- ✓ Tidak mempunyai sebarang masalah kognitif dan ketidaknormalan deria

2. Kumpulan B

- ✓ Berumur 18 hingga 60 tahun
- ✓ Menggunakan Bahasa Melayu sebagai bahasa utama
- ✓ Pasca-bahasa (telah menggunakan pertuturan-bahasa sebelum mempunyai masalah pendengaran)
- ✓ Telah dikenalpasti mempunyai masalah pendengaran (melebihi 20 dB HL) sama ada pada salah satu telinga atau kedua-dua telinga
- ✓ Menggunakan alat bantu pendengaran atau/dan implan koklea
- ✓ Tidak mempunyai sebarang masalah kognitif dan ketidaknormalan deria
- ✓ Tidak pernah menjalani sebarang latihan auditori sama ada di klinik atau di rumah
- ✓ Tidak menggunakan bahasa isyarat
- ✓ Tidak mempunyai masalah pendengaran progresif

3. Kumpulan C

- ✓ Kumpulan profesional (sama ada audiologis, patologis pertuturan-bahasa dan lain-lain) yang mempunyai pengalaman sekurang-kurangnya tiga (3) tahun di dalam menjalankan latihan auditori kepada pesakit dewasa yang mempunyai masalah pendengaran.
- ✓ Menggunakan Bahasa Melayu di dalam perkhidmatan **atau** mampu menggunakan Bahasa Melayu dengan fasih

C. Prosedur Ujian

1. Kumpulan A dan B

Penyelidik akan melakukan sesi pengambilan sejarah masalah pendengaran dan beberapa maklumat kesihatan anda untuk menentukan sama ada anda sesuai dimasukkan ke dalam penyelidikan ini. Selepas itu penyelidik akan menjalankan ujian pra-latihan untuk menilai tanda aras kebolehan pendengaran anda sebelum menyertai latihan menggunakan MATP. Anda akan dikelaskan di dalam salah satu kategori di bawah secara rawak:

1. Kumpulan yang akan menjalani latihan intensif selama enam minggu

Kumpulan ini akan menjalani sesi Penilaian Pra dan Pasca-Latihan 1 dan 2 tetapi TIDAK akan menjalani latihan MATP selama enam minggu.

2. Kumpulan yang tidak akan menjalani latihan intensif selama enam minggu

Kumpulan ini akan menjalani sesi Penilaian Pra dan Pasca-Latihan 1 dan 2 dan akan menjalani latihan MATP selama enam minggu. Setiap latihan akan dijalankan selama satu (1) jam di premis klinikal bersama pasukan penyelidik dan dua (2) jam di rumah secara sendiri.

Penilaian Pra dan Pasca-Latihan 1 dan 2.

Penilaian ini adalah gabungan ujian di bawah yang akan dijalankan kepada kesemua peserta kajian. Ujian-ujian berikut bertujuan menilai perkembangan peserta sebelum dan selepas penyelidikan ini dijalankan ke atas anda.

- a. **Sesi pengambilan maklumat:** Penyelidik akan bertanya tentang sejarah masalah pendengaran dan beberapa maklumat kesihatan anda.
- b. **Penilaian Pra-latihan:** Penilaian ini terdiri daripada empat ujian penilaian iaitu (1) Client Oriented Scale of Improvement (COSI), (2) Malay Hearing Handicap Inventory, (3) Malay Auditory-Visual Matrix Sentence Test dan (4) Malay Auditory Training Program-Screening. Penilaian ini akan dijalankan melalui sesi temubual dan ujian saringan yang memerlukan peserta menjawab soalan melalui perisian komputer.
- c. **Latihan menggunakan Program Latihan Auditori Melayu:** Latihan ini akan dijalankan selama enam minggu (3 jam untuk setiap minggu; 1 jam di premis klinikal dan 2 jam latihan di rumah)
- d. **Penilaian Pasca-Latihan 1:** Penilaian ini terdiri daripada empat ujian penilaian iaitu (1) Client Oriented Scale of Improvement (COSI), (2) Malay Hearing Handicap Inventory, (3) Malay Auditory-Visual Matrix Sentence Test dan (4) Malay Auditory Training Program-Screening. Penilaian ini akan dijalankan melalui sesi temubual dan ujian saringan yang memerlukan peserta menjawab soalan melalui perisian komputer.
- e. **Penilaian Pasca-latihan 2:** Penilaian ini terdiri daripada empat ujian penilaian iaitu (1) Client Oriented Scale of Improvement (COSI), (2) Malay Hearing Handicap Inventory, (3) Malay Auditory-Visual Matrix Sentence Test dan (4) Malay Auditory Training Program-Screening. Penilaian ini akan dijalankan melalui sesi temubual dan ujian saringan yang memerlukan peserta menjawab soalan melalui perisian komputer. Penilaian pasca kedua ini akan dilakukan selepas lima hingga sepuluh hari latihan MATP selesai.

2. Kumpulan C

Peserta di dalam kumpulan ini akan dilatih oleh pasukan penyelidik untuk menggunakan penilaian pra dan pasca-latihan (seperti di atas) yang digunakan di dalam penyelidikan ini. Seterusnya, peserta turut dilatih untuk menggunakan MATP.

Setelah itu, peserta akan dibantu dan diselia untuk memberikan latihan MATP kepada tiga (3) orang peserta dari kumpulan A dan B selama enam (6) minggu (1 jam di premis klinikal).

D. Manfaat penyelidikan ini

1. Kumpulan A dan B

Anda akan mengetahui tahap perkembangan keupayaan pendengaran.

Jika anda adalah pengguna alat bantu dengar dan/atau implan koklea, anda akan mendapat latihan auditori untuk meningkatkan keupayaan pendengaran anda menggunakan alat tersebut.

2. Kumpulan C

Anda mendapat latihan dan seliaan untuk menjalankan sesi penilaian latihan pendengaran dan menggunakan MATP.

E. Risiko penyelidikan ini

Penyelidikan ini tidak mempunyai sebarang risiko.

F. Penglibatan anda dalam penyelidikan ini

Penglibatan anda dalam penyelidikan ini adalah secara **sukarela sahaja**. Jika anda tidak mahu mengambil bahagian dalam penyelidikan ini, anda boleh menolak tawaran penyelidik tanpa perlu memberi apa-apa alasan. Keputusan anda untuk tidak mengambil bahagian dalam penyelidikan ini tidak akan menjejaskan hubungan anda dengan para audiologis, para pekerja, dan para pelajar di Jabatan Audiologi dan Patologis Pertuturan-Bahasa kami.

G. Privasi anda

Keputusan penyelidikan ini akan dirahsiakan daripada masyarakat umum. Jika anda menandatangani borang persetujuan di bahagian II, ini bermakna anda memberi kebenaran kepada pasukan penyelidikan untuk menerbitkan data yang diperolehi daripada penyelidikan ini. Sebarang maklumat yang boleh mendedahkan identiti anda tidak akan digunakan dalam laporan penyelidikan ini. Semua data yang diperolehi akan dirahsiakan.

Keputusan penyelidikan

Jika anda berminat untuk mengetahui keputusan penyelidikan ini, anda boleh menghubungi pasukan penyelidikan kami:

Penyelidik

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Emel: juliamarhaban@gmail.com

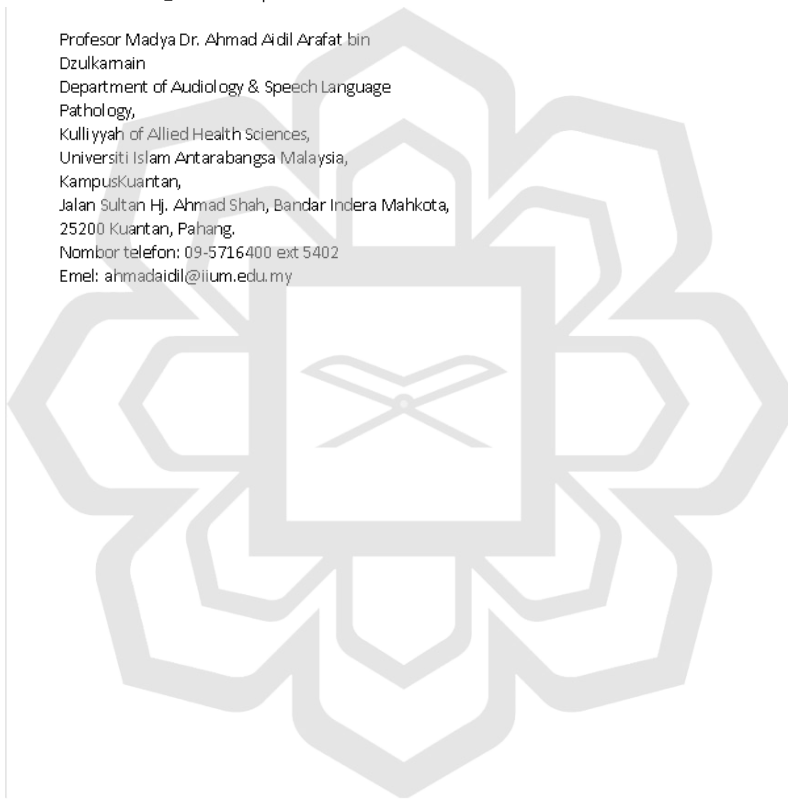
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Kulliyah of Allied Health Sciences,
Universiti Islam Antarabangsa Malaysia,
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Bahagian II: Borang Persetujuan

Tajuk : Penghasilan Program Latihan Auditori Melayu (*Malay Auditory Training Program; MATP*) untuk Dewasa yang Mempunyai Masalah Pendengaran
Penyelidikan :
Penyelia : Pembantu Profesor Dr. Sarah binti Rahmat
Penyelia : Pembantu Profesor Dr. Nor Azrita Mohamed Zain
Bersama : Profesor Madya Dr. Ahmad Aidil Arafat bin Dzulkamain
Penyelidik : Juliana Aminah Marhaban

Untuk menyertai penyelidikan ini, anda perlu menandatangani borang ini. Dengan menandatangani borang ini, saya mengaku bahawa:

- ✓ Saya telah membaca dan memahami prosedur penyelidikan ini dan saya telah diberi masa yang cukup untuk memikirkannya
- ✓ Saya telah dimaklumkan bahawa maklumat peribadi saya akan dirahsiakan dan tidak akan diberikan kepada sesiapa
- ✓ Saya bersetuju untuk menyertai penyelidikan ini secara sukarela dan saya akan mengikut prosedur-prosedur yang ditentukan, dan saya juga bersetuju untuk memberi maklumat-maklumat yang berkaitan dengan penyelidikan ini
- ✓ Saya faham bahawa saya boleh menarik diri daripada penyelidikan ini pada bila-bila masa sahaja
- ✓ Saya bersetuju untuk dihubungi supaya saya boleh mengambil bahagian dalam penyelidikan-penyelidikan yang berkaitan pada masa akan datang
- ✓ Saya sudah perolehi salinan peribadi borang maklumat penyelidikan dan borang persetujuan untuk disimpan.

_____ Nama Penuh Anda	_____ Tarikh (hari/bulan/tahun)
_____ Nama Saksi	_____ Tarikh (hari/bulan/tahun)
_____ Tandatangan Saksi	_____ Tarikh (hari/bulan/tahun)

***NOTA:** Subjek yang terlibat dalam penyelidikan ini TIDAK AKAN dilindungi sebarang insuran.

APPENDIX VIII

IREC APPROVAL LETTER



الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
Garden of Knowledge and Virtue

LEADING THE WAY
KHALIFAH · AMANAH · IGBA · RAHMATAN UL-ILAMIN

SUSTAINABILITY INSTITUTION OF THE YEAR

RESEARCH MANAGEMENT CENTRE

Our Ref. : IIUM/504/14/11/2/ IREC/ 2021-286
Date : 17 November 2021

Asst. Prof. Dr. Sarah binti Rahmat (Principal Investigator)
Kulliyah of Allied Health Sciences
IIUM Kuantan Campus
25200 Kuantan Pahang

Dear Asst. Prof. Dr.

The IIUM Research Ethics Committee (IREC) has reviewed your study protocol as mentioned below:

ID NO.	: IREC 2021-286
TITLE	: Development Of Malay Auditory Training Programme For Adults With Hearing Loss
REGISTRATION DATE	: 29 October 2021
CO-INVESTIGATOR	: 1. Asst. Prof. Dr. Nor Azrita Mohamad Zain 2. Assoc. Prof. Dr. Ahmad Aidil Arafat Bin Dzulkarnain
STUDENT	: Juliana Aminah Binti Marhaban (Postgraduate Student)
STUDY SITE	: 1. Hospital Angkatan Tentera Tunku Mizan, Wangsa Maju 2. Hearing Aids Companies
SAMPLE SIZE	: 52
ETHICAL EXPIRY DATE	: 15 November 2022

The IIUM Research Ethics Committee (IREC) operates in accordance to the Declaration of Helsinki, International Conference of Harmonization Good Clinical Practice Guidelines (ICH-GCP), Malaysia Good Clinical Practice Guidelines and Council for International Organizations of Medical Sciences (CIOMS) International Ethical Guidelines

The following documents have been received and reviewed to the above study:

1.	Study Proposal/Protocol Version 1, dated 19 Jul 2021
2.	Informed Consent Form (ICF) i. Information Sheet (English) – Version 1, dated 19 Jul 2021 ii. Consent Form (English) – Version 1, dated 19 Jul 2021
3.	Questionnaire – Version 1, dated 19 Jul 2021
4.	Approval Letter from Kulliyah of Allied Health Sciences, IIUM
5.	Principal Investigator's CV



RESEARCH MANAGEMENT CENTRE (RMC)
 International Islamic University Malaysia, Jalan Combak, 53100 Kuala Lumpur
 Mailing Address: Research Management Centre, P. O. Box 10, 50728, Kuala Lumpur, Malaysia
 (Company No: 101067-P)
 Tel: +603 6421 5002 (Ext: 5010) Fax: +603 6421 4862 Email: rescentre@iiu.edu.my
 www.iiu.edu.my/centre/rmc



Decision by IIUM Research Ethics Committee (IREC):

(☒) Approved
(☐) Disapproved

Date of Approval: 15 November 2021

The Investigator(s) are required to:

- a) submit the 'Continuing Review Form' 30 days before **EXPIRY DATE** to renew Ethical Approval.
- b) notify IREC of any change in protocol and obtaining further ethical approval as appropriate.
- c) report any adverse incident during the course of a study to IREC even if the incident is not directly related to the study.
- d) report to the IREC within 72 hours for all internal SAEs (occurring in IIUM PI site).
- e) report in a prompt manner if the information impacts the continued ethical acceptability of the trial for external SAEs (occurring in participants at other sites).
- f) provide information of minor protocol deviation in Progress Report or End Report whichever necessary.
- g) report any major protocol deviation occurs within 5 working days.
- h) submit Progress Report Form before the end of six (6) month given by IREC.
- i) complete and submit the End of Project Report Form to the IREC Secretariat's Office.
- j) All records and data subjects are **CONFIDENTIAL** and used only for the purposes of this study and all issues and procedures on data confidentiality must be observed.

Thank you.

Yours sincerely,



PROF. DR. NASSER MUHAMMAD AMJAD
Chairman,
IIUM Research Ethics Committee (IREC)

Copy : File-IREC 2021-286

DISCLAIMER: The approval letter only covers the ethical aspect of your study only. Any other permission/approval to use any facilities, data or human resource should fall under applicant's responsibility.

APPENDIX IX

PROOFREADERS CERTIFICATE

Our reference: CERT-261121-03Juliana



Certificate of Acknowledgement

(Proofreading)

We certify that the following Training Module

Program Latihan Auditori Melayu (PLAM) Untuk Individu Bermasalah Pendengaran Pasca-Lingual

Juliana Aminah binti Marhaban

has been proofread by a proofreader from Proofreaders United. The text has been checked for grammar, spelling, and punctuation. Full details of the proofreading service can be found at <http://bit.ly/PRunited>.

05 December 2021

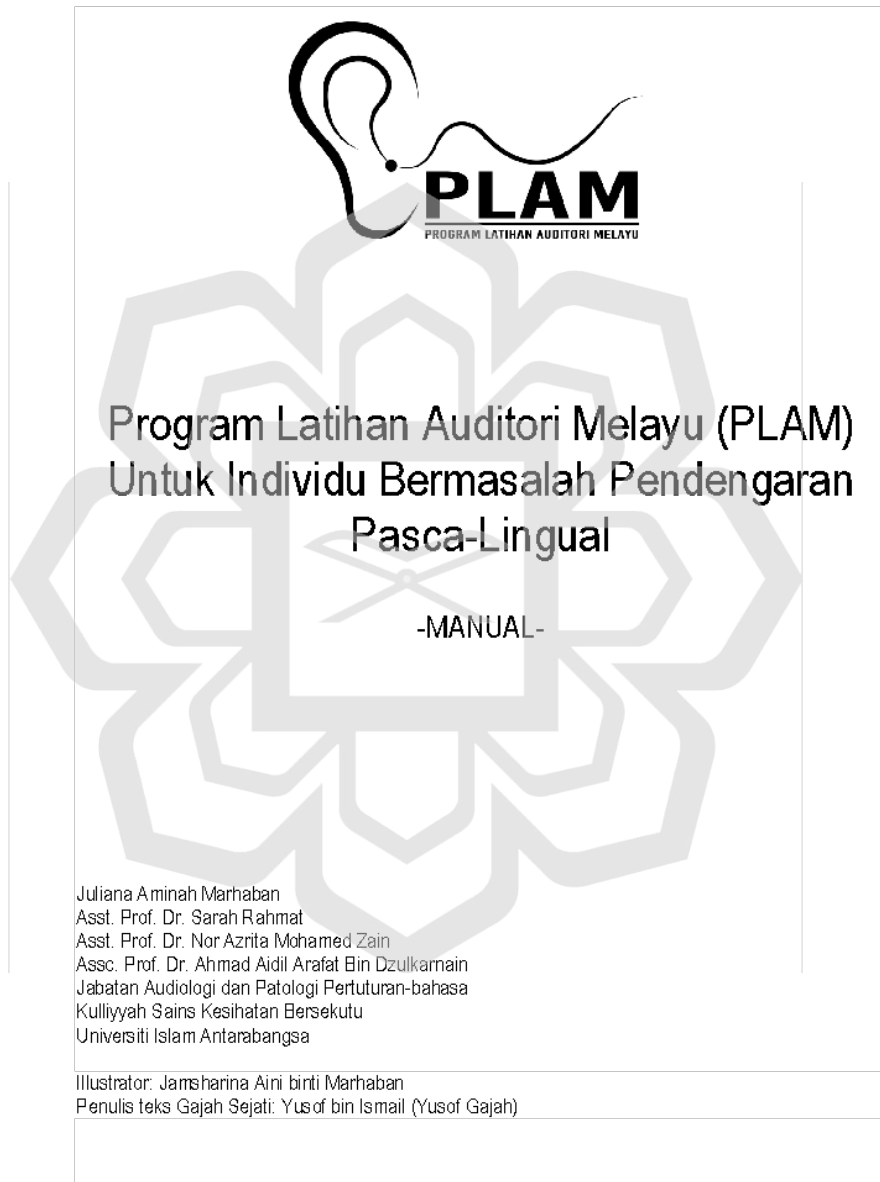
Acknowledgement by:



MOHAMMAD ZAKI RAMLI
FOUNDER OF PROOFREADERS UNITED

APPENDIX X

PLAM MANUAL



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Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 2

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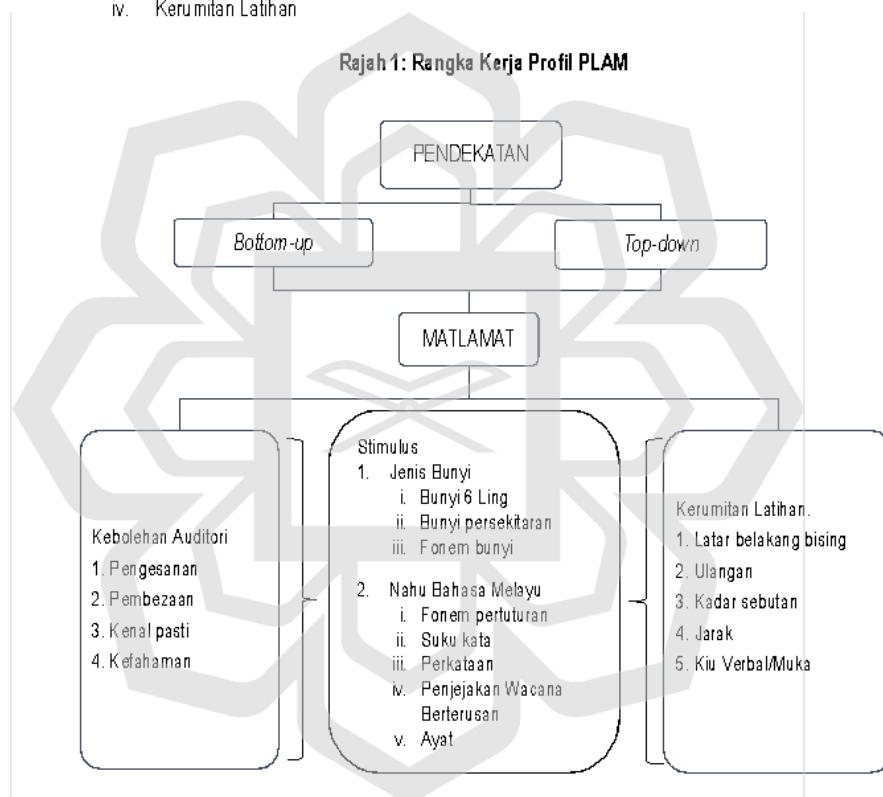
1. PENGENALAN

Program Latihan Auditori-Melayu (PLAM) adalah satu program latihan auditori secara komprehensif dan holistik untuk individu yang mempunyai masalah pendengaran pasca-lingual (*post-lingual*) yang menggunakan bahasa Melayu sebagai bahasa pertuturan. PLAM boleh dijalankan oleh audiologis, patologis pertuturan-bahasa dan profesional yang telah menjalani latihan PLAM. Terdapat dua rangka kerja yang membentuk PLAM iaitu rangka kerja Profil PLAM (rajah1) dan rangka kerja isi kandungan PLAM (rajah2).

1.1 Rangka Kerja Profil PLAM

Rajah 1 menunjukkan rangka kerja Profil PLAM secara keseluruhan. Profil PLAM menerangkan cara matlamat latihan dicapai dengan menggunakan empat jenis profil:

- i. Pendekatan (*approach*) *bottom-up* dan *top-down*¹⁻⁴
- ii. Kebolehan Auditori
- iii. Stimulus
- iv. Kerumitan Latihan



1.1.1 Pendekatan

Pendekatan ialah proses kognitif untuk belajar mendengar sama ada menggunakan pendekatan **bottom-up** atau **top-down** mengikut definisi di bawah:

- i. Proses **Bottom-up**
Merupakan proses apabila pendengar membina makna secara beransur-ansur daripada unit asas iaitu peringkat fonem kepada memahami peringkat wacana⁵.
- ii. Proses **Top-down**
Merupakan proses apabila pendengar menggunakan konteks dan pengetahuan yang ada untuk memahami sesuatu yang didengar⁵ seperti peringkat perbualan beransur-ansur kepada memahami unit asas seperti fonem.

Kedua-dua proses digunakan oleh pendengar mengikut keperluan mendengar⁵. Maka, setiap pendengar mempunyai kebolehan dan keupayaan mendengar yang berbeza. Oleh itu, latihan PLAM membenarkan pelatih dan jurulatih memilih mana-mana pendekatan untuk digunakan. Latihan boleh dimulakan di mana-mana bahagian stimulus mengikut keputusan ujian saringan yang telah dilakukan pada 'Bahagian B: Borang Ujian Saringan PLAM'. Jurupulih boleh memulakan latihan pada bahagian yang **paling banyak jumlah skor** untuk membina keyakinan pelatih. Pilih jumlah skor tertinggi dan mulakan latihan di bahagian yang dipilih:

- i. Jika skor di bahagian bunyi dan pengesanan lebih tinggi, mulakan latihan dengan teknik *bottom-up* menghala ke bahagian ayat dan kefahaman.
- ii. Jika skor di bahagian ayat dan kefahaman lebih tinggi, gunakan teknik *top-down* menghala ke bahagian bunyi dan pengesanan.
- iii. Jika skor hampir sama atau sama di setiap peringkat, jurupulih boleh memulakan latihan di mana-mana bahagian mengikut kemahiran yang ingin dicapai bersama pelatih.

Kedua-dua pendekatan tersebut digunakan untuk mencapai matlamat bagi membolehkan peserta mengesan, membezakan, mengenal pasti dan memahami dua jenis stimulus iaitu jenis bunyi dan nahu Bahasa Melayu pada lima jenis kerumitan latihan iaitu; 1. Latar belakang bising, 2. Ulangan, 3. Kadar sebutan, 4. Jarak dan 5. Kiu Verbal/Muka

1.1.2 Kebolehan Auditori

Kebolehan auditori (*auditory skills*) ialah kebolehan untuk mendengar yang mengandungi empat peringkat iaitu:

- i. **Pengesanan (*detection*)**; kebolehan mengetahui yang stimulus itu ada atau tiada
Respons yang diterima di dalam PLAM: Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.
- ii. **Pembezaan (*discrimination*)**; kebolehan membezakan dua stimulus adalah berbeza atau sama
Respons yang diterima di dalam PLAM: Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.
- iii. **Kenal pasti (*identification*)**; kebolehan menamakan atau melabel bunyi yang didengari.
Respons yang diterima di dalam PLAM: Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

iv. **Kefahaman** (*comprehension*); kebolehan memahami makna bunyi yang didengar⁶⁻⁸. PLAM mempunyai latihan yang menyasarkan kesemua empat peringkat tersebut.

Respons yang diterima di dalam PLAM Memberi respons kepada stimulus dengan cara menunjukkan gambar yang betul atau menjawab soalan dengan tepat. Jawapan 'tepat' bermakna pelatih boleh memberi jawapan sebenar atau menyatakan 'tidak tahu' kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap.

Contoh: Soalan: Apakah berita terkini hari ini?

Contoh jawapan yang diterima:

- a. Berita kemalangan ngeri
- b. Saya belum dengar sebarang berita
- c. Saya tidak tahu (kerana, contoh: tidak minat atau belum dengar sebarang berita)
- d. Berita berkaitan sukan atau semasa?

1.1.3 Stimulus

Stimulus ialah 'bahan' yang digunakan untuk latihan di mana setiap stimulus mempunyai fungsi untuk meningkatkan kebolehan secara spesifik. Stimulus PLAM dihasilkan dengan merujuk **jenis bunyi** dan **nahu bahasa Melayu**. Kedua-dua jenis stimulus ini merujuk kepada cara pengguna harus mendengar dan menggunakan Bahasa Melayu dengan efektif.

i. Jenis Bunyi

Stimulus yang dipilih di dalam PLAM mewakili kesemua bunyi yang mewakili bunyi-bunyi persekitaran dan pertuturan. Stimulus jenis bunyi di dalam PLAM terdiri daripada tiga bahagian iaitu:

- a. Bunyi enam ling (*ling six sounds*)^{9,10}
- b. Bunyi persekitaran²
- telah melalui proses kalibrasi untuk digunakan di dalam PLAM
- c. Fonem bunyi
- fonem pada frekuensi <500hz, 500 – 2000hz dan >2000hz¹¹⁻¹³

ii. Nahu Bahasa Melayu

Pemilihan stimulus ini mewakili pembentukan nahu Bahasa Melayu yang menjadikan penutur adalah penutur yang mampu berkomunikasi secara mantap. Setiap pemilihan perkataan telah disemak ejaan dan sebutan berdasarkan Kamus Dewan Bahasa Edisi¹⁴ terbaru. Nahu atau tatabahasa Bahasa Melayu di dalam PLAM mengandungi tiga peringkat iaitu:

- a. Fonem pertuturan
- b. Perkataan;
 - ✓ Suku kata (satu, dua, tiga, empat dan lebih suku kata)^{15,16}.
 - ✓ Gabungan Konsonan dan enam vokal²
 - ✓ Pasangan perkataan¹⁵.
- c. Ayat
 - ✓ Penjejakan Wacana Berterusan (*continuous discourse tracking*)¹⁷
 - ✓ Kata kunci di dalam ayat²
 - ✓ Jenis-jenis ayat^{18,19}
 - ✓ Isi tempat kosong²
 - ✓ Menjawab soalan pendek²

1.1.4 Kerumitan Latihan

Kerumitan latihan (*complexity of the stimulus*) yang juga dikenali sebagai *acoustic highlighting* ialah strategi yang digunakan untuk mendengar dengan lebih efektif dalam situasi yang berbeza²⁰. Kerumitan latihan mempengaruhi kebolehan mendengar stimulus dengan menyampaikan stimulus dalam keadaan yang mudah didengari kepada yang sukar didengari²⁰.

Kerumitan latihan yang disediakan di dalam PLAM ialah kerumitan yang boleh dikawal dalam penyampaian bermakna dan respons diberi boleh dikira (*countable response*). Terdapat enam jenis kerumitan latihan² yang digunakan di dalam penyampaian latihan PLAM iaitu:

No.	Jenis kerumitan latihan	Mudah didengari (asas)	Sukar didengari (matlamat)
i.	Latar belakang bising	Stimulus diberikan tanpa bunyi bising	Stimulus diberikan dengan bunyi bising. Bunyi bising yang digunakan dalam PLAM telah disediakan iaitu bunyi 'air terjun' ¹
ii.	Ulangan	Stimulus diulang sebanyak dua kali atau lebih	Stimulus hanya diberi sekali
iii.	Kadar sebutan/bunyi	Stimulus diberikan dalam kadar lambat dan panjang	Stimulus diberikan dalam kadar pertuturan biasa
iv.	Jarak (kekuatan bunyi)	Stimulus diberikan pada jarak dekat (6 inci dari jarak pendengaran)	Stimulus diberikan dalam lingkungan 1 meter dari jarak pendengaran
v.	Kiu verbal/kiu muka	Stimulus diberikan beserta kiu verbal (seperti gerak bibir) atau kiu muka (seperti pergerakan muka dan badan)	Stimulus diberikan tanpa sebarang kiu

¹Air terjun dipilih kerana air terjun merupakan bunyi persekitaran yang didapati efektif untuk menggalakkan sistem auditori eferen (sistem yang berfungsi untuk membantu memilih perhatian dan pendengaran di dalam bunyi bising)²¹

Kerumitan latihan yang lain seperti 'kepanjangan ayat' (*length of utterances*), kerumitan ujaran (*complexity of utterances*), posisi target (*target position; end/middle/initial*), set terbuka/set tertutup (*closed-set/open-set*), jujukan stimulus (*in-sequence/random*), konteks stimulus (*in-context/out of context*) adalah berkaitan dengan stimulus bahasa. Jadi kerumitan ini dikawal di bawah stimulus bahasa di dalam PLAM dan tidak disenaraikan di dalam bahagian kerumitan latihan.

Manakala kerumitan latihan seperti keaslian bunyi (*degraded/ undegraded*) tidak disediakan kerana PLAM adalah latihan yang menggunakan suara penutur (*live voice*).

Kerumitan latihan penutur dikenali (*familiar/ unfamiliar*) *learning style (active/ passive)*, dan *learning effect (adapted/new)* tidak disediakan kerana kerumitan ini merupakan refleksi kepada hasil dapatan latihan. Setiap penutur digalakkan untuk menguasai kebolehan mendengar dalam setiap keadaan kerumitan latihan kerana kerumitan latihan ini menggambarkan situasi sebenar dalam komunikasi harian.

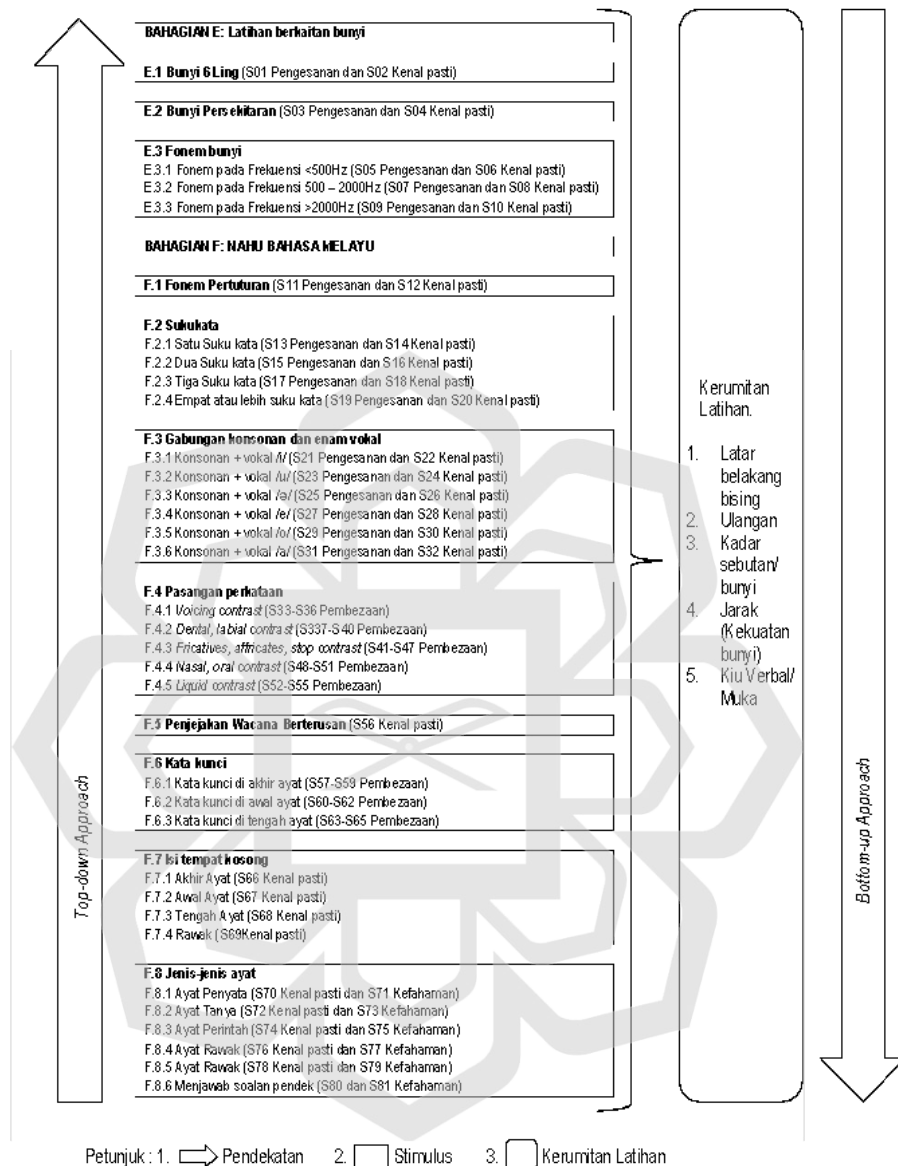
1.2 Rangka kerja Isi Kandungan PLAM

Rangka kerja isi kandungan PLAM dalam rajah 2 menunjukkan secara terperinci setiap matlamat yang perlu dicapai di dalam PLAM mengikut pendekatan, kebolehan auditori dan stimulus yang perlu dilakukan seperti yang telah diterangkan di dalam 1.1.1, 1.1.2 dan 1.1.3.

Rangka kerja isi kandungan PLAM membantu jurupulih memantau keseluruhan latihan seperti yang telah dicadangkan di dalam 1.1. Secara amnya, setiap bahagian latihan auditori di dalam **Rajah 2** merangkumi latihan auditori bagi setiap jenis stimulus (jenis bunyi/ nahu bahasa melayu) dengan menyasarkan kebolehan auditori yang khusus bagi setiap stimulus. Di setiap bahagian latihan, terdapat pelbagai kerumitan latihan yang akan diperkenalkan kepada pelatih.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 7

Rajah 2: Rangka Kerja Isi Kandungan PLAM



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

2. ARAHAN UMUM

Arahan umum ialah penerangan ringkas perkara-perkara yang menjadi asas PLAM.

2.1 Jurupulih

Individu yang memberikan latihan. Terdiri daripada audiologis, patologis pertuturan-bahasa atau profesional yang telah mendapat latihan untuk menjalankan latihan ini.

2.2 Latihan untuk Jurupulih

Setiap jurupulih mesti menghadiri dua kali sesi ceramah berkaitan PLAM dan lulus Ujian Kelayakan Jurupulih PLAM yang disediakan oleh pihak PLAM. Pelatih juga perlu menghadiri latihan praktikal yang ditetapkan oleh pihak PLAM.

2.3 Pelatih

Individu yang menerima latihan PLAM. Latihan ini sesuai untuk individu bermasalah pendengaran pasca-pertuturan (*post-lingual*) berumur 12 tahun ke atas²². Individu tersebut mestilah menggunakan bahasa Melayu sebagai medium pertuturan sebelum disahkan mempunyai masalah pendengaran.

2.4 Bahasa dan Dialek Latihan

Latihan ini sesuai untuk semua penutur bahasa Melayu standard. Dialek tidak boleh digunakan dalam semua bahagian latihan berkaitan pengesanan, pembedaan dan kenal pasti. Bagi bahagian kefahaman, jawapan pelatih menggunakan dialek adalah diterima.

2.5 Gerak Kerja Latihan

Gerak kerja latihan PLAM ialah cara PLAM dijalankan secara keseluruhan bermula daripada ujian saringan sehingga tamat latihan. Rajah 3 menunjukkan gerak kerja keseluruhan PLAM.

2.6 Jangka Masa Latihan

30 minit hingga 60 minit² untuk setiap latihan. Namun jangka masa latihan boleh dikurangkan atau dipanjangkan mengikut keupayaan pelatih.

2.7 Frekuensi Latihan

Latihan digalakkan untuk dilakukan sekurang-kurangnya sebanyak satu kali sesi latihan untuk setiap minggu² bersama jurupulih. Namun, sesi latihan boleh ditambah mengikut keupayaan jurulatih dan pelatih.

2.8 Bahan Latihan

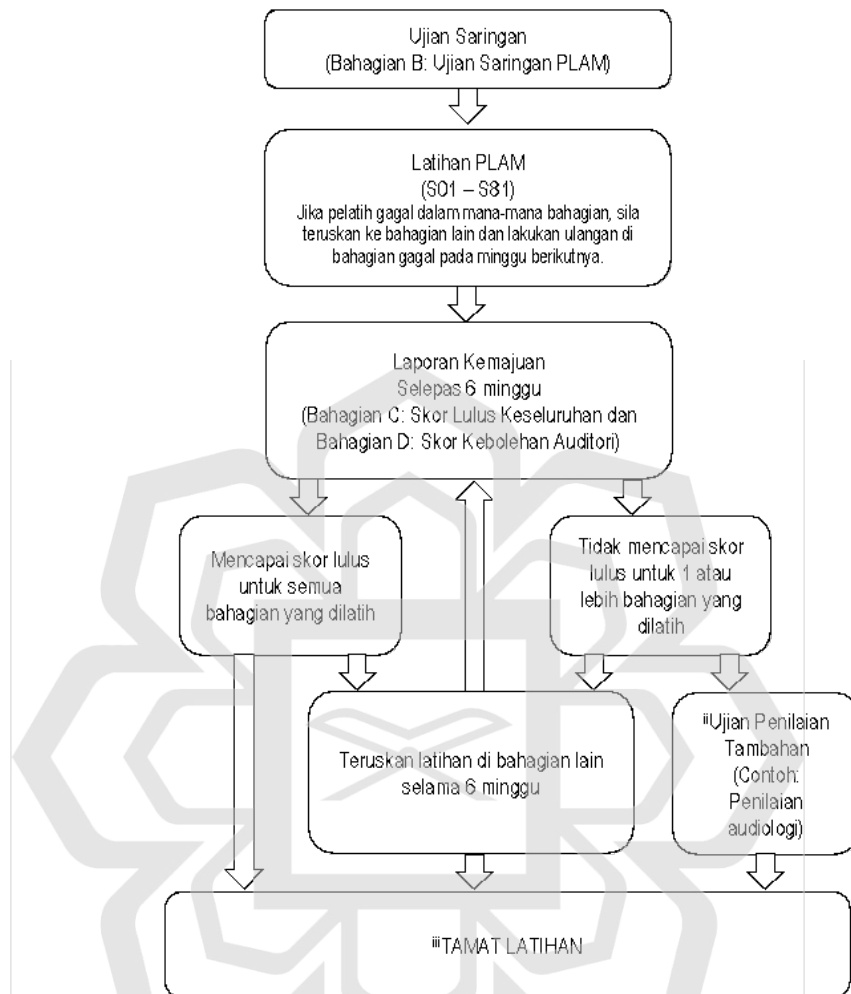
Bahan latihan yang disediakan di dalam PLAM mempunyai salinan khusus untuk jurupulih dan pelatih. Pelatih hanya dibenarkan melihat bahan latihan khusus untuk pelatih sahaja untuk mengekalkan kerumitan latihan yang digunakan dan mengelakkan pelatih mempunyai jangkaan jawapan sebelum latihan. Jurupulih boleh memilih mana-mana stimulus untuk memulakan latihan mengikut kesediaan pelatih.

2.9 Tempat Latihan

Bersemuka di klinik. Pemilihan berdasarkan keselesaan dan persetujuan kedua-dua jurulatih dan pelatih. Tempat haruslah senyap tanpa bunyi bising. Susun atur bilik untuk latihan dengan bunyi bising dan bunyi persekitaran digambarkan dalam Rajah 4.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 9

Rajah 3: Gerak Kerja PLAM



ⁱⁱ Penilaian tambahan:

- Apabila didapati pelatih tidak memberi sebarang respons positif kepada latihan.
- Apabila masalah pelatih tertumpu kepada perkara-perkara lain seperti masalah alat, masalah emosi dan mental yang memerlukan rujukan kaunseling/psikiatri atau masalah selain masalah pendengaran.

ⁱⁱⁱ Tamat latihan:

- Apabila pelatih dan jurupuluh berpuas hati dengan kemajuan dan mampu menggunakan hasil latihan dalam kehidupan harian. Namun digalakkan untuk menamatkan latihan apabila selesai melakukan kesemua latihan di dalam PLAM.
- Tamat latihan jika didapati pelatih tidak sesuai berada di dalam PLAM dan memerlukan rujukan kepada latihan lain atau profesional lain.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 10

2.10 Laporan Kemajuan dan Tamat latihan

Satu blok sesi PLAM adalah selama enam minggu². Selepas itu, jurupulih harus menilai kemajuan pelatih dengan memastikan skor yang diperoleh adalah lulus untuk setiap bahagian. Jika telah lulus untuk setiap bahagian, latihan boleh diteruskan atau boleh ditamatkan mengikut persetujuan pelatih.

Jika terdapat satu atau lebih bahagian yang tidak lulus, latihan boleh ditambah selama enam minggu lagi di bahagian sama atau di bahagian lain. Hal ini untuk memberi pengalaman latihan yang berbeza kepada pelatih dan menggalakkan pelatih menggunakan kebolehan sedia ada untuk mencapai kebolehan baru. Setelah itu, jurupulih harus melakukan penilaian semula. Jika telah lulus untuk setiap bahagian, latihan boleh diteruskan atau boleh ditamatkan mengikut persetujuan pelatih. Pada peringkat ini, jika masih ada satu atau lebih bahagian tidak lulus, jurupulih mesti melakukan penilaian tambahan atau membuat rujukan. Lihat Rajah 3 untuk gerak kerja keseluruhan PLAM sehingga tamat latihan.

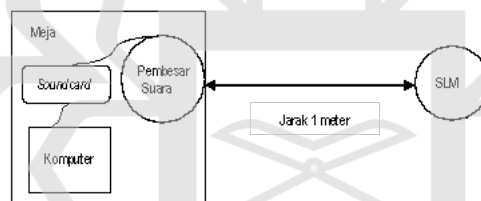
3 PERSEDIAAN SEBELUM LATIHAN

Persediaan sebelum latihan ialah perkara yang perlu disediakan dan dibuat oleh jurupulih dan pelatih sebelum latihan dimulakan.

3.1 Kalibrasi

Kalibrasi dilakukan ke atas bunyi yang akan digunakan menggunakan 'bunyi kalibrasi' yang disediakan di dalam PLAM. Susun *soundcard*, pembesar suara (*speaker*) dan *Sound Level Meter* (SLM) seperti dalam rajah 4

Rajah 4: Aturan bilik untuk kalibrasi



3.1.1 Tetapan Sound Card

Sambungkan sound card kepada komputer/komputer riba menggunakan kabel 1 (telah dilabelkan 'kabel 1' pada kabel ini) kepada *port* USB di komputer/komputer riba. Tetapkan *volume* komputer kepada maksimum. Untuk *sound card*, tetapkan *echo* dan *mic* pada tahap minimum, manakala *treble*, *bass*, *record*, *mic* dan *monitor* pada tahap maksimum (lihat rajah 5).

Rajah 5: Tetapan Sound Card



3.1.2 Tetapan Pembesar Suara (Speaker)

Sambungkan pembesar suara kepada *sound card* menggunakan 'kabel 2' (telah dilabelkan 'kabel 2' pada kabel ini). Pastikan pembesar suara telah bersambung kepada *sound card* seperti dalam rajah 6. Sumber tenaga (*power source*) pembesar suara boleh disambung terus kepada *plug* atau kepada komputer/komputer riba (dilabel dengan 'kabel 3'). Tetapkan *volume*, *treble* dan *bass* pada tahap maksimum.

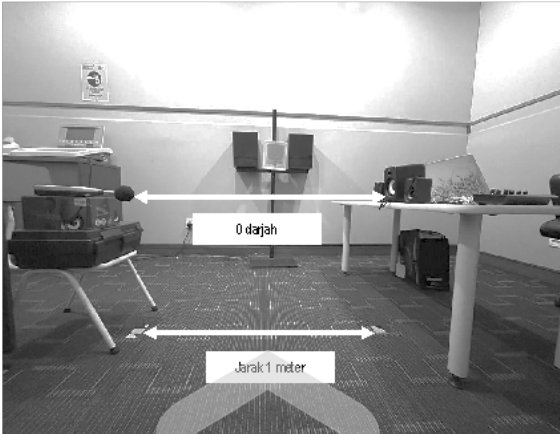
Rajah 6: Sambungan antara pembesar suara dan *sound card*



3.1.3 Tetapan Sound Level Meter (SLM)

Tetapkan SLM kepada *fast response* dan pilih *A-weighting*. Letakkan SLM pada jarak 1 meter daripada pembesar suara pada tahap 0 darjah seperti dalam rajah 4. Pastikan tiada sebarang halangan antara SLM dan pembesar suara. Mikrofon SLM perlu dalam keadaan tergantung seperti rajah 7.

Rajah 7: Kedudukan Mikrofon SLM



3.1.4 Pengukuran Stimulus Kalibrasi

Pilih stimulus bernama 'bunyi kalibrasi' (*white noise* 65 dB A) daripada bunyi yang disertakan bersama PLAM. Mainkan bunyi itu daripada komputer/komputer riba. Ukur bunyi yang dihasilkan dengan menggunakan SLM. SLM harus merekodkan bunyi pada *Long term average of fast response (LAFeq)* pada 65 dB (± 2 dB) untuk dianggap sebagai berjaya dan boleh memulakan latihan. Rajah 8 menunjukkan hasil bunyi yang harus diperolehi daripada SLM.

Rajah 8: Bacaan SLM



3.1.5 Penyelesaian Masalah (*Troubleshooting*)

Jika hasil bacaan tidak menunjukkan LAFeq pada tahap 65 dB (± 2 dB), pastikan semak semula tetapan komputer/komputer riba, *sound card*, pembesar suara dan jarak. Pastikan kesemua arahan pada 3.1.1, 3.1.2, 3.1.3, 3.1.4 dan 3.1.5 telah dipatuhi.

3.2 Persediaan Jurupulih

Jurupulih perlu menerangkan kepada pelatih tentang PLAM seperti yang terkandung di dalam 1. Pengenalan, 2. Rangka Kerja dan 3. Arahan Umum. Pastikan pelatih memahami, yang latihan ini memerlukan komitmen daripada jurupulih dan pelatih. Nyatakan kesediaan untuk membincangkan dapatan latihan dan perancangan latihan untuk setiap sesi. Sediakan pen dan kertas untuk memulakan latihan.

Kesemua latihan perlu dilakukan di tempat yang senyap tanpa bunyi bising. Untuk stimulus yang perlu diberi bunyi bising dan stimulus bunyi persekitaran, jurupulih akan menyediakan bunyi tersebut menggunakan *soundcard* dan pembesar suara yang telah disediakan bersama PLAM mengikut rajah 9.

Jurupulih akan memberi arahan mengikut latihan berdasarkan arahan khusus yang telah disediakan seperti contoh berikut:

1.1 BUNYI ENAMLING (LING SIX SOUNDS)

Arahan: Perkenalkan semua bunyi kepada pelatih seperti dalam Stimulus 1 dengan menyebut bunyi dan menunjuk gambar yang mewakili bunyi itu. Apabila pelatih sudah mengenali bunyi dengan menunjuk gambar atau menyebut bunyi yang didengar dengan tepat, lakukan ujian dengan memberi bunyi secara rawak dan mengikut setiap kerumitan latihan.

3.3 Aturan Bilik untuk Latihan

3.3.1 Aturan bilik umum

Pada setiap peringkat latihan PLAM, kedudukan jurupulih dan pelatih berada di dalam keadaan berhadapan dan pada jarak 1 meter seperti rajah 9. Jurupulih boleh menggunakan meja atau tidak di hadapan pelatih.

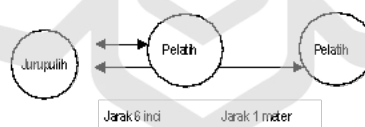
Rajah 9: Aturan Bilik untuk Latihan



3.3.2 Aturan Bilik untuk Kerumitan 'jarak'

Untuk latihan pada jarak berbeza, tetapkan jarak antara jurupulih dan pelatih mengikut latihan seperti dalam rajah 10. Jurupulih boleh menggunakan meja atau tidak di hadapan pelatih.

Rajah 10: Aturan Bilik untuk Latihan dengan Kerumitan Latihan 'jarak'

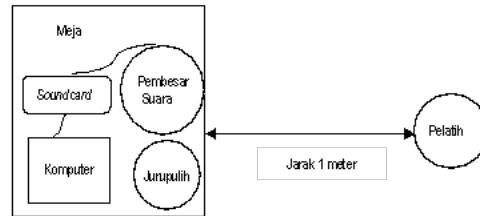


3.3.3 Aturan Bilik untuk Latihan dengan Bunyi Bising dan Latihan Bunyi Persekitaran.

Aturan bilik untuk latihan dengan bunyi bising dan bunyi persekitaran adalah seperti rajah 11 dan pada jarak 1 meter.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 14

Rajah 11: Aturan Bilik untuk Latihan dengan Bunyi Bising dan Latihan Bunyi Persekitaran



3.4 Persediaan Pelatih

Pelatih perlu mendengar arahan yang diberi oleh jurupulih. Latihan perlu dilakukan di premis jurupulih, dimana semua kelengkapan dan aturan bilik akan disediakan oleh jurupulih. Pelatih perlu peka dan mencatat segala nasihat dan cadangan jurupulih untuk kegunaan sendiri.

4 UJIAN SARINGAN PLAM

Ujian saringan PLAM telah disediakan dalam 'Bahagian B: Borang Ujian Saringan PLAM'. Ujian saringan ini mewakili setiap bahagian di dalam PLAM. Arahan ujian telah dinyatakan dalam borang tersebut termasuk cara pengiraan skor. Hasil dapatan ujian saringan ini boleh dijadikan markah asas untuk memilih bahagian mana yang akan dimulakan. Lihat skor yang tertinggi. Mulakan latihan di bahagian skor yang tertinggi dan mengikut pendekatan sama ada *bottom-up* atau *top-down* seperti yang telah diterangkan sebelum ini.

Ujian saringan perlu dilakukan sebelum pelatih memulakan latihan dan sebelum tamat latihan seperti yang dinyatakan dalam rajah 3. Semua markah perlu di hantar kepada pihak PLAM melalui pautan borang Google.

5 CARA PENYAMPAIAN LATIHAN

Setiap stimulus perlu disampaikan mengikut kerumitan latihan. Kerumitan latihan membantu peserta mendengar dengan lebih jelas atau membantu peserta mendengar dalam situasi sebenar. Jurupulih perlu memberikan latihan mengikut kesemua kerumitan latihan untuk memberikan pengalaman mendengar yang pelbagai kepada peserta.

5.1 Pendekatan (*approach*)

Jurupulih boleh memilih sama ada ingin memulakan latihan daripada "bunyi kepada ayat" (*bottom-up approach*) atau daripada "ayat kepada bunyi" (*top-down approach*). Pendekatan ini boleh dipilih mengikut masalah pelatih dan kesesuaian pelatih. Disarankan agar latihan dimulakan dengan kebolehan yang telah dikuasai oleh pelatih supaya pelatih kekal bermotivasi untuk meneruskan latihan. Lihat 1.1.1 untuk penerangan lanjut.

5.2 Matlamat

5.2.1 Kebolehan Auditori

PLAM menyediakan target untuk mencapai empat kebolehan auditori iaitu 1. Pengesanan, 2. Pembezaan, 3. Kenal pasti dan 4. Kefahaman. Setiap kebolehan auditori ini telah disusun mengikut stimulus yang sesuai supaya target kebolehan ini dapat dicapai. Jurupulih perlu peka bahawa setiap stimulus ini mungkin menguji kebolehan auditori yang berbeza. Arahan spesifik untuk melatih setiap kebolehan auditori telah disediakan dalam setiap bahagian.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 15

Latihan boleh dimulakan dengan latihan kenal pasti. Jika pelatih berjaya melakukan latihan kenal pasti, ini bermakna pelatih juga berjaya untuk latihan pengesanan. Markah boleh diberikan kepada kedua-dua latihan (pengesanan dan kenal pasti). Latihan tidak perlu diulang di bahagian pengesanan.

5.2.2 Stimulus

Terdapat dua jenis stimulus. Stimulus bunyi memerlukan jurupulih membunyikan atau memainkan bunyi yang disediakan dalam program ini. Stimulus bunyi yang perlu dibunyikan adalah 1. Bunyi 6 Ling dan 2. Bunyi pertuturan mengikut frekuensi. Manakala bunyi yang perlu dimainkan (disediakan bersama PLAM) adalah stimulus untuk bunyi persekitaran.

Terdapat empat peringkat stimulus pertuturan di dalam PLAM iaitu 1. Fonem, 2. Perkataan, 3. Penjejukan Wacana Berterusan dan 4. Ayat. Stimulus pertuturan ini telah disusun mengikut peringkat dan sesuai digunakan secara *bottom-up* atau *top-down*. Ini bermakna jurupulih tidak semestinya perlu melatih pelatih di peringkat yang sama jika pelatih gagal. Namun, latihan boleh diteruskan untuk meningkatkan kebolehan pelatih di peringkat yang lain untuk terus merangsang kebolehan pelatih bagi peringkat tersebut. Seterusnya, latihan boleh diulang semula di peringkat yang gagal tadi untuk terus meningkatkan kemahiran pelatih di semua peringkat.

5.2.3 Kerumitan Latihan

Kerumitan Latihan adalah cara stimulus disampaikan kepada pelatih. Terdapat lima kerumitan yang mewakili situasi paling mudah didengar sehingga situasi sukar didengar iaitu (a.) keadaan mudah didengar dan (b.) keadaan sukar didengar^{2,20}.

- i. Latar belakang bising
 - a. Sampaikan stimulus dalam keadaan senyap. Rekod respons di bawah kotak "tiada".
 - b. Sampaikan stimulus dengan memasang bunyi bising yang telah disertakan di dalam PLAM. Rekod respons di bawah kotak "ada".
- ii. Ulangan
 - a. Sampaikan stimulus dengan ulangan. Rekod respons di bawah kotak "ada ulangan".
 - b. Sampaikan stimulus tanpa ulangan. Rekod respons di bawah kotak "tiada ulangan".
- iii. Kadar sebutan/bunyi
 - a. Sampaikan stimulus dengan lebih panjang selama 3-5 saat. Rekod respons di bawah kotak "panjang".
 - b. Sampaikan stimulus dengan kadar biasa. Rekod respons di bawah kotak "biasa".
- iv. Jarak
 - a. Sampaikan stimulus pada jarak 6 inci dengan menggunakan suara biasa tanpa sebarang penekanan. Rekod respons di bawah kotak "6 inci".
 - b. Sampaikan stimulus pada jarak 1 meter dengan menggunakan suara biasa tanpa sebarang penekanan. Rekod respons di bawah kotak "1 meter".
- v. Kiu Verbal/Kiu Muka
 - a. Sampaikan stimulus dengan menunjukkan kiu muka seperti gerak bibir atau memek muka. Rekod respons di bawah kotak "ada kiu".

Setiap stimulus pertuturan harus disebut oleh jurupulih mengikut kerumitan latihan yang dikehendaki. Dalam keadaan biasa, jurupulih mestilah sentiasa menggunakan suara, kekuatan suara dan kenyaringan suara yang sebenar kecuali seperti yang dikehendaki dalam latihan.

Bagi memulakan latihan, dicadangkan supaya gunakan stimulus dengan bunyi bising, tanpa bantuan ulangan, kadar sebutan biasa, jarak 1 meter dan tanpa kiu verbal/muka.

Jika pelatih berjaya, ini bermakna markah '1' perlu diberikan dalam kesemua kerumitan latihan dalam kedua-dua situasi iaitu situasi 1. ada bunyi bising; tanpa bantuan ulangan (1 markah), dengan bantuan ulangan (1 markah), kadar sebutan biasa (1 markah), kadar sebutan panjang (1 markah), jarak 1 meter (1 markah), jarak 6 inci (1 markah) dan tanpa kiu verbal/muka (1 markah), dengan kiu verbal/muka (1 markah) dan situasi 2. tanpa bunyi bising; tanpa bantuan ulangan (1 markah), dengan bantuan ulangan

(1 markah), kadar sebutan biasa (1 markah), kadar sebutan panjang (1 markah), jarak 1 meter (1 markah), jarak 6 inci (1 markah) dan tanpa kiu verbal/muka (1 markah), dengan kiu verbal/muka (1 markah). Latihan tidak perlu diulang di bahagian yang telah berjaya.

6 CARA MEREKOD RESPONS DAN INTERPRETASI SKOR

Terdapat empat jenis borang skor disediakan untuk merekodkan respons di dalam PLAM iaitu:

- Skor Latihan setiap stimulus (Borang S01 hingga S81)
- Skor Lulus Keseluruhan (Bahagian C: Skor lulus Keseluruhan)
- Graf skor (Carta C.1 hingga C.4)
- Skor Kebolehan Auditori (Bahagian D: Skor Kebolehan Auditori)

Setiap respons hendaklah direkodkan secara manual di dalam borang yang telah disediakan di dalam PLAM.

6.1 Skor ID

Setiap stimulus di dalam PLAM telah diberi nombor supaya mudah dikenal pasti bermula daripada S01 sehingga S81 (rujuk 'Bahagian C: Skor Lulus Keseluruhan'). Nombor ini disebut sebagai skor ID di dalam PLAM. Terdapat 81 stimulus dalam keseluruhan PLAM.

6.2 Skor Latihan Sesi

Skor latihan sesi ialah skor dapatan untuk setiap latihan yang dilakukan terhadap pelatih. Setiap borang skor telah dinomborkan bermula S01 hingga S81. Tandakan (1) untuk setiap respons tepat yang diberikan oleh peserta. Tandakan (0) untuk respons yang salah atau tidak menunjukkan respons yang dikehendaki seperti yang dinyatakan di dalam setiap bahagian.

Jadual 1 dan jadual 2 menunjukkan contoh skor yang diperolehi untuk latihan pengesanan dan kenal pasti fonem pada frekuensi >2000Hz. Untuk setiap respons pelatih, telah ditandakan '1' sebagai respons tepat dan '0' sebagai respons salah.

Berdasarkan respons di dalam jadual 1 ini, didapati skor 'tepat' latihan **pengesanan untuk bunyi /t/, /k/ dan /f/** diperolehi dengan menggunakan stimulus dalam bunyi bising, 'tanpa ulangan', bunyi pada 'kadar biasa', bunyi pada jarak '6 inci' dan '1 meter' dan tanpa 'kiu verbal/muka'. Manakala **pengesanan untuk bunyi /f/ dan /s/** memerlukan ulangan dalam situasi yang sama iaitu stimulus dalam bunyi bising, bunyi pada 'kadar biasa', bunyi pada jarak '6 inci' dan '1 meter' dan tanpa 'kiu verbal/muka'.

Jadual 1: Contoh Latihan Fonem pada Frekuensi >2000 Hz untuk S11. Pengesanan

Kerumitan Latihan	Stimulus	Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
	/t/	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	/f/	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	/k/	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	/f/	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	/s/	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	JUMLAH	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	78
		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	80

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 17

- i. **/f/ dan /ff/**; pelatih boleh mendengar tanpa bunyi bising tanpa bantuan-bantuan lain.
- ii. **/f/ dan /fs/**; pelatih boleh mendengar bunyi ini tanpa bunyi bising pada jarak 6 inci.
- iii. **/fk/**; pelatih boleh mendengar dengan ulangan pada situasi stimulus dalam bunyi bising, bunyi pada 'kadar biasa', bunyi pada jarak '6 inci' dan '1 meter' dan tanpa 'kui verbal/muka'.

Jadual 2: Contoh Latihan Fonem pada Frekuensi >2000 Hz untuk S12. Kenal pasti

[illegible]

Boleh disimpulkan bahawa pelatih mempunyai keupayaan seperti berikut:

- i. Pengesanan bunyi fonem pada frekuensi >2000 Hz:
 - pelatih boleh mengesan bunyi dalam bunyi bising hanya menggunakan bantuan ulangan.
- ii. Kenal pasti bunyi fonem pada frekuensi >2000 Hz
 - pelatih boleh kenal pasti bunyi tanpa bunyi bising dan dengan jarak dekat (6 inci).

Jurupuluh perlu melihat jenis kerumitan latihan yang dikuasai pelatih untuk mengetahui kekuatan (*strength*) dan kelemahan (*weakness*) pelatih. Kemajuan dan keyakinan pelatih boleh ditingkatkan dengan menambah atau mengurangkan bantuan kepada pelatih untuk mendengar. Perkara ini juga menggambarkan strategi komunikasi yang boleh digunakan oleh pelatih di dalam komunikasi sebenar di luar latihan. Maklumkan kepada pelatih kebolehan ini untuk membantu pelatih menggunakan kebolehan ini dalam kehidupan seharian. Dengan memberitahu kemampuan pelatih kepada pelatih, diharapkan supaya pelatih tahu menggunakan strategi ini di dalam komunikasi harian.

6.3 Skor Lulus Keseluruhan

Skor lulus ialah skor yang diperoleh untuk setiap latihan. Setiap skor yang diperoleh perlu dikira peratus dan dimasukkan di dalam borang 'Bahagian C: Skor Lulus Keseluruhan'.

Peratus skor lulus adalah 50%. Peratus lulus menunjukkan pelatih mempunyai potensi untuk menguasai asas kebolehan auditori di dalam bahagian yang dilatih. Namun pelatih digalakkan untuk mencapai skor peratus 75% bagi menggalakkan pelatih belajar mendengar dalam situasi yang rumit. Oleh itu, target skor utama latihan PLAM yang perlu dicapai oleh pelatih adalah 75% dan ke atas.

Jadual 3 menunjukkan contoh skor dan peratus yang diperolehi untuk stimulus fonem pada frekuensi >2000 Hz. Berdasarkan contoh ini, pelatih berjaya menguasai kebolehan pengesanan kerana mencapai skor 97.5%. Namun, pelatih tidak menunjukkan asas kebolehan kenal pasti kerana mempunyai markah 47.5% (<50% skor lulus). Markah tidak lulus ini menunjukkan latihan yang sama boleh diulang atau latihan boleh diteruskan ke latihan lain (rujuk Rajah 3: Gerak Kerja PLAM).

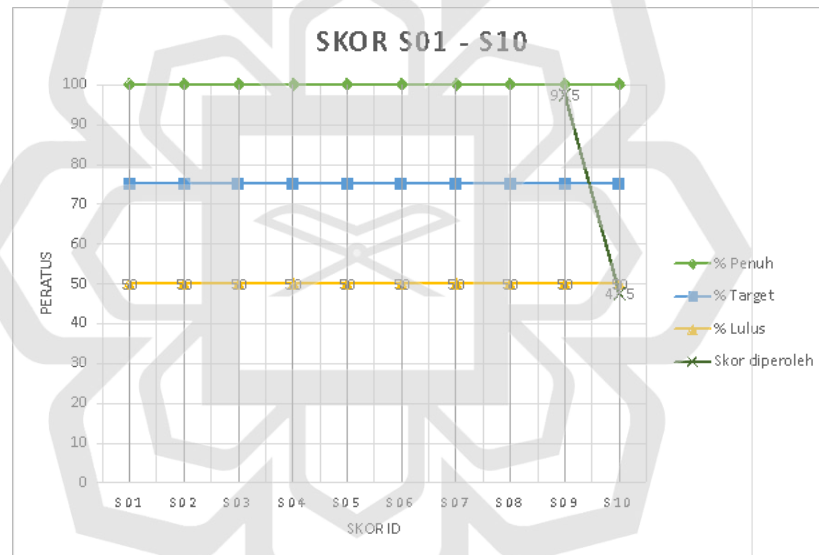
Jadual 3: Contoh Skor Lulus Keseluruhan

No.	Stimulus		Tarikh	Jumlah Skor Penuh	Skor lulus 50%	Jumlah Skor di peroleh	% Skor di peroleh
Bahagian E Latihan berkaitan jenis bunyi	E.3 Fonem Bunyi	E.3.3 Fonem pada frekuensi >2000 hz	S09 Pengesanan	90	60	78	97.5
			S10 Kenalpasti	90	60	38	47.5

6.4 Graf Skor

Graf skor ialah graf untuk melihat kemajuan keseluruhan pelatih. Masukkan peratus skor yang diperolehi ke dalam carta C.1 (untuk stimulus S01 hingga S30), carta C.2 (untuk stimulus S31 hingga S60) atau carta C.3 (untuk stimulus S61 hingga S81). Carta 1 menunjukkan contoh skor diperolehi dibandingkan dengan skor lulus. Melalui carta ini perlu diperhatikan bahawa pelatih telah mencapai markah lulus 50% untuk S09 pengesanan fonem pada frekuensi >2000 hz dan tidak mencapai markah lulus untuk S10 kenal pasti fonem pada frekuensi >2000 hz. Jurupulih boleh menukar bahagian latihan atau menjadikan kerumitan latihan sebagai strategi komunikasi kepada pelatih.

Carta 1: Contoh Skor Diperolehi dalam Carta Skor



6.5 Skor Kebolehan Auditori

Skor kebolehan auditori ialah skor yang dikira khusus untuk melihat skor kebolehan auditori pelatih. Isikan 'Bahagian D: Skor Kebolehan Auditori' berdasarkan markah yang diperolehi dari 'Bahagian C: Skor Lulus Keseluruhan'. Skor yang direkodkan ialah skor berdasarkan kebolehan auditori.

Jadual 4 menunjukkan contoh jumlah markah yang diperolehi oleh pelatih iaitu 130 ayat rawak (S77) dan 98 untuk topik diri sendiri (S80). Tiada markah untuk topik informasi umum kerana tiada latihan dijalankan. Jadi markah hanya dikira berdasarkan latihan yang dilakukan (S77: Ayat Rawak + S80: Topik: Diri Sendiri):

$$\text{SKOR LULUS: } \frac{\text{Jumlah keseluruhan skor diperolehi} \times 100}{\text{Jumlah keseluruhan skor penuh}}$$

$$\frac{218 \times 100}{300} = 76\%$$

Jadual 4: Contoh Skor Kebolehan Auditori

Kebolehan Auditori Ketahanan	No.	Stimulus	Jumlah Skor Penuh	Jumlah Skor diperolehi
	S71	Ayat nyata	150	Tiada
	S73	Ayat tanya	150	Tiada
	S75	Ayat perintah	150	Tiada
	S77	Ayat rawak	150	130
	S79	Ayat rawak	150	Tiada
	S80	Topik: Diri Sendiri	150	98
	S81	Topik: Informasi Umum	150	Tiada
JUMLAH KESELURUHAN SKOR DIPEROLEHI (Hanya Latihan yang dibuat)				303
JUMLAH KESELURUHAN SKOR PENUH (Hanya Latihan yang dibuat)			385	
SKOR LULUS: JUMLAH KESELURUHAN SKOR DIPEROLEHI X 100			78.7%	
JUMLAH KESELURUHAN SKOR PENUH				

Berdasarkan markah ini, dapat diketahui kebolehan auditori yang telah dikuasai untuk kefahaman telah mencapai markah lulus untuk S77 Ayat Majmuk dan S80 Topik: Diri Sendiri.

Perlu diperhatikan, bahawa skor lulus adalah untuk menggalakkan pelatih mencapai kebolehan tersebut dengan kukuh. Namun, jurupuluh perlu sentiasa peka dengan kemajuan pelatih kerana kemajuan yang sedikit mungkin menunjukkan pelatih menguasai strategi komunikasi untuk mengatasi masalah yang dihadapi.

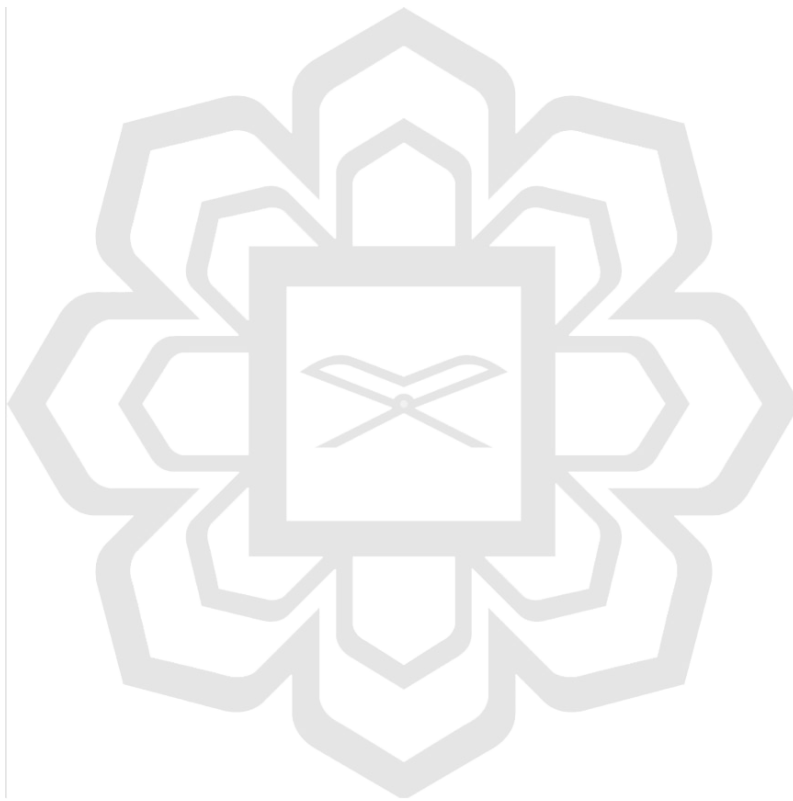
7. Rujukan

1. Moore DR, Amitay S. Auditory training: Rules and applications [Internet]. Vol. 28, Seminars in Hearing. 2007. p. 99–109. Available from: <http://www.researchgate.net/publication/234075620>
2. Marhaban JA, Rahmat S, Mohamed Zain NA, Dzulkarnain AAA. Auditory Training Programme for Adult with Hearing Loss: A Scoping Review. Kuantan; 2021.
3. Halliday LF, Moore DR, Taylor JL, Amitay S. Dimension-specific attention directs learning and listening on auditory training tasks. *Attention, Perception, Psychophys.* 2011;73(5):1329–35.
4. Edwards B. A model of auditory-cognitive processing and relevance to clinical applicability. In: *Ear and Hearing*. Lippincott Williams and Wilkins; 2016. p. 85S-91S.
5. Vandergrift L. 1. Listening To Learn or Learning To Listen? *Annu Rev Appl Linguist.* 2004;24:3–25.
6. Erber NP, Alenciewicz CM. Audiologic evaluation of deaf children. *J Speech Hear Disord.* 1976;41(2):256–67.
7. Erber NP. *Auditory Communication for Deaf Children: A Guide for Teachers, Parents and Health Professionals*. ACER Press; 2011.
8. Welling DR, Ukstins CA. *Fundamentals of Audiology for the Speech-Language Pathologist*. Burlington, United States of America: Jones & Bartlett Learning; 2015.
9. Ling D. *Foundations of Spoken Language for Hearing-impaired Children*. Washington: Alexander Graham Bell Association for the Deaf; 1989.
10. Agung KB, Purdy SC, Kitamura C. The ling sound test revisited. *Aust New Zeal J Audiol.* 2005;27(1):33–41.
11. Northern JL, Downs MP. *Hearing in Children*. 5th ed. Juliet TL, Napora LS, Williams PC, editors. Baltimore, USA: Lippincott Williams & Wilkins; 2002.
12. Mukari SZ, Said H. The development of Malay speech audiometry. *Med J Malaysia.* 1991;46(3):262–8.
13. Klangporkun N, Orsuwan C, Tantibundhit C, Pitahawatchai P. Predictions from "speech banana" and audiograms: Assessment of hearing deficits in Thai hearing loss patients. *J Acoust Soc Am.* 2013;134(5):4132–4132.
14. Jabbar S, Abu Bakar NA, Baharom N, Jasmani F, editors. *Kamus Dewan Perdana*. Kuala Lumpur, Malaysia: Dewan Bahasa dan Pustaka; 2021.
15. Teoh BS. *The Sound System of Malay Revisited*. First. Ampang, Malaysia: Dewan Bahasa dan Pustaka; 1994.
16. M. Onn F, editor. *Bunga Rampai Fonologi Bahasa Melayu*. Petaling Jaya, Malaysia: Fajar Bakti Sdn Bhd; 1988.
17. Schoepflin JR, Levitt H. Continuous discourse tracking: An analysis of the procedure. *J Commun Disord.* 1991;24(3):237–49.
18. Che Ngah AR, Lin AH, Abdul Malek SS, Abdullah N Lo. *Kurikulum Standard Sekolah Rendah Bahasa Melayu Tahun 1 Buku Teks. Pertama*. Jepon N, Sanid N, editors. Kuala Lumpur, Malaysia: Dewan Bahasa dan Pustaka; 2016.
19. Shaari AS, Yusoff N, Awang MI. *Bahasa Melayu Komunikasi. Pertama*. Mohd A, Na'im F, Abdul Halim N, Abdul Rahman Y, Md. Hashim H, editors. Bentong, Malaysia: PTS Publications & Distributor Sdn. Bhd.; 2003.
20. Estabrooks W, Marlowe J. *The Baby Is Listening: An Educational Tool for Professionals Who Work with Children Who Are Deaf or Hard of Hearing*. 1st ed. Washington, United States of America: Plural Publishing Inc.; 2000.
21. Amirullah NA, Rahmat S, Dzulkarnain AAA, Maamor N, Jamaludin MK. *Calibrating Different Sounds for Sound Therapy : A General Guide*.
22. Owens RE. *Language Development: An Introduction*. 7th (International). Boston: Allyn & Bacon; 2008.

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Penghargaan

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APPENDIX XI

PLAM JURUPULIH



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		S09 Pengesanan
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		S24 Kenalpasti
		S25 Pengesanan
		S26 Kenalpasti
		S27 Pengesanan
		S28 Kenalpasti
		S29 Pengesanan

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F.4 Pasangan perkataan	F.3.5 Konsonan + vokal /q/	S30	Kenalpasti	48	
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S51		Pembezaan antara /j/ dan /k, g/	60		
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S62			Pembezaan perkataan (minimal pairs) dalam ayat	71	
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PEMAKAIAN ALAT BANTU DENGAR

Tidak memakai alat

Memakai alat

Kanan : _____

h	h	b	b	t	t	t	t

Tarikh mula memakai alat:

Kiri : _____

h	h	b	b	t	t	t	t

Tarikh mula memakai alat:

Tempoh pemakaian alat dalam sehari : _____ jam

Adakah alat bantu dengar ini membantu anda mendengar lebih baik? Ya / Tidak

SITUASI YANG SUKAR UNTUK MENDENGAR:

1. _____
2. _____
3. _____
4. _____
5. _____

JANGKAAN SELEPAS LATIHAN:

1. _____
2. _____
3. _____
4. _____
5. _____

A.2. JURUPULIH

NAMA:

TARIKH LAHIR:

h	h	b	b	t	t	t	t

UMUR:

 tahun

JANTINA:

Lelaki	Perempuan

NO. TELEFON:

 bimbit

 pejabat

PEKERJAAN:

ALAMAT INSTITUSI ATAU TEMPAT KERJA:

Diisi oleh:

Cop rasmi:

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BAHAGIAN B: BORANG UJIAN SARINGAN PLAM

B.1. Ujian Kenalpasti Bunyi Persekitaran

Pelatih perlu menyebut semula stimulus yang didengar **atau** menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) **atau** menulis semula stimulus yang didengar **atau** melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.1.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising								JUMLAH SEMUA
	Ungaran		Kadar sebutan		Jarak		Klu verbal/ muka		Ungaran		Kadar sebutan		Jarak		Klu verbal/ muka		
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	
Stimulus																	
Kucing																	
Guruh																	
JUMLAH	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	

Markah lulus minima = 24

Latihan boleh bermula dari S03 dan S05

B.2. Ujian Kenalpasti Fonem

Pelatih perlu menyebut semula stimulus yang didengar **atau** menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) **atau** menulis semula stimulus yang didengar **atau** melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.2.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ungan		Kadar sebutan		Jarak		Klu verbal/ muka		Ungan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
/a/																
/i/																
/u/																
/m/																
/s/																
/f/																
JUMLAH	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	JUMLAH SEMUA
	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	96

Markah lulus minima = 72

Latihan boleh bermula dari S01, S07, S09, S11 dan S13

B.3. Ujian Kenalpasti Perkataan (berbeza sukukata)

Pelatih perlu menyebut semula stimulus yang didengar **atau** menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) **atau** menulis semula stimulus yang didengar **atau** melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.3.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus bas																
isi																
mengkuang																
keluarga																
JUMLAH	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																JUMLAH SEMUA
																80

Markah lulus minima = 60

Latihan boleh bermula dari S15, S17, S19 dan S21

B.4. Ujian Kenalpasti Perkataan (gabungan konsonan dan enam vokal)

Pelatih perlu menyebut semula stimulus yang didengar **atau** menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) **atau** menulis semula stimulus yang didengar **atau** melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.4.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
minit																
putih																
gelap																
keju																
topi																
satu																
JUMLAH	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
																JUMLAH SEMUA
																96

Markah lulus minima = 72

Latihan boleh bermula dari S01, S07, S09, S11 dan S13

B.5. Ujian Pembezaan Perkataan

Sebut salah satu perkataan. Pelatih perlu menyebut semula stimulus yang didengar **atau** menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) **atau** menulis semula stimulus yang didengar **atau** melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.5.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
bagi	pagi																
titi	pipi																
suka	cuka																
nadi	tadi																
rang	yang																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
JUMLAH SEMUA																	
80																	

Markah lulus minima = 60

Latihan boleh bermula dari S35, S39, S43, S50 dan S54

B.6. Ujian Pembezaan Ayat

Sebut salah satu perkataan. Pelatih perlu menyebut semula stimulus yang didengar **atau** menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) **atau** menulis semula stimulus yang didengar **atau** melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.6.

Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising							
		Ungaran		Kadar sebutan	Jarak	Kiu verbal/ muka	Ungaran		Kadar sebutan	Jarak	Kiu verbal/ muka				
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus															
Ramai orang sedang beratur di															
bank	zoo														
Ayam	Ikan														
goreng ini terlebih masin															
Jika pergi ke kedai, tolong belikan															
ubi	roti														
bakar dua set															
JUMLAH		3	3	3	3	3	3	3	3	3	3	3	3	3	3
JUMLAH SEMUA															
48															

Markah lulus minima = 36

Latihan boleh bermula dari S59, S62, S65

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 9

B.7. Ujian Kenalpasti Ayat

Pelatih perlu menyebut semula stimulus yang didengar **atau** menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) **atau** menulis semula stimulus yang didengar **atau** melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.7.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
Apa khabar anda hari ini?																
Apakah pekerjaan awak?																
Apakah <u>sarapan</u> <u>kegemaran</u> awak?																
Kurangkan makan makanan berminyak.																
JUMLAH	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
JUMLAH SEMUA																64

Markah lulus minima = 48

Latihan boleh bermula dari S58, S68, S69, S70, S71, S72, S74, S76, S78 dan S80

B.8. Ujian Kefahaman Ayat

Pelatih perlu memberi respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan dengan tepat. Jawapan 'tepat' bermakna pelatih boleh memberi jawapan sebenar atau menyatakan tidak tahu kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap. Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Guna Stimulus B.8.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
Siapa nama penuh anda?																
Adakah gula manis?																
JUMLAH	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
JUMLAH SEMUA																32

Markah lulus minima = 24

Latihan boleh bermula dari S82 dan S83

*Masukkan skor ke dalam pautan borang google setiap kali ujian saringan dilakukan.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 10

BAHAGIAN C: SKOR LULUS KESELURUHAN

No.	Stimulus	Tarikh	Jumlah Skor Penuh	Jumlah Skor diperoleh	Peratus Skor (%)
Bahagian E Latihan berkaitan jenis bunyi	E.1 Bunyi enam lina (<i>six sounds</i>)	S01 Pengesanan	96		
		S02 Kenalpasti	96		
	E.2 Bunyi persekitaran (<i>environmental sounds</i>)	S03 Pengesanan	144		
		S04 Kenalpasti	144		
	E.3 Fonem Bunyi	S05 Pengesanan	176		
		S06 Kenalpasti	176		
	E.3.1 Fonem pada frekuensi <500 hz	S07 Pengesanan	112		
		S08 Kenalpasti	112		
	E.3.2 Fonem pada frekuensi 500 – 2000 hz	S09 Pengesanan	80		
	E.3.3 Fonem pada frekuensi >2000 hz	S10 Kenalpasti	80		
Bahagian F Nahu bahasa melayu	F.1 Fonem pertuturan	S11 Pengesanan	464		
		S12 Kenalpasti	464		
	F.2 Sukukata	F.2.1 Satu sukukata	320		
		S13 Pengesanan	320		
		S14 Kenalpasti	320		
		F.2.2 Dua sukukata	384		
		S15 Pengesanan	384		
		S16 Kenalpasti	384		
		F.2.3 Tiga sukukata	384		
		S17 Pengesanan	384		
		S18 Kenalpasti	384		
		F.2.4 Empat dan lebih sukukata	384		
		S19 Pengesanan	384		
		S20 Kenalpasti	384		
	F.3 Perkataan dengan Gabungan Konsonan dan Enam Vokal	F.3.1 Konsonan + vokal /i/	368		
		S21 Pengesanan	368		
		S22 Kenalpasti	368		
		F.3.2 Konsonan + vokal /u/	368		
		S23 Pengesanan	368		
		S24 Kenalpasti	368		
		F.3.3 Konsonan + vokal /e/	304		
		S25 Pengesanan	304		
		S26 Kenalpasti	304		
		F.3.4 Konsonan + vokal /o/	368		
		S27 Pengesanan	368		
		S28 Kenalpasti	368		

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

	F.4 Pasangan perkataan	F.3.5 Konsonan + vokal /b/	S29	Pengesanan		368	
			S30	Kenalpasti		368	
		F.3.6 Konsonan + vokal /a/	S31	Pengesanan		368	
			S32	Kenalpasti		368	
		F.4.1 Voicing contrast	S33	Pembedaan antara /b/ dan /p/		80	
			S34	Pembedaan antara /b/ vs /f/		80	
			S35	Pembedaan antara /g/ dan /k/		80	
			S36	Pembedaan antara /b, d, g/ dan /p, t, k/		80	
		F.4.2 Dental/ labial contrast	S37	Pembedaan antara /t/ dan /b/		80	
			S38	Pembedaan antara /t/ dan /p/		80	
			S39	Pembedaan antara /b/ dan /b/		80	
			S40	Pembedaan antara /t/ dan /t/		80	
		F.4.3 Fricatives, affricates, stop contrast	S41	Pembedaan antara /t/ dan /t/		80	
			S42	Pembedaan antara /s/ dan /z/		80	
			S43	Pembedaan antara /f/ dan /tʃ/		80	
			S44	Pembedaan antara /h/ dan /ʔ/		80	
			S45	Pembedaan antara /s/ dan /j/		80	
			S46	Pembedaan antara /s/ dan /tʃ/		80	
			S47	Pembedaan antara /s/ vs /ʃ/		80	
		F.4.4 Nasal/oral contrast	S48	Pembedaan antara /m/ dan /p, b/		80	
			S49	Pembedaan antara /n/ dan /t, d/		80	
			S50	Pembedaan antara /ŋ/ dan /k, g/		80	
			S51	Pembedaan antara /r/ dan /k, g/		80	
		F.4.5 Liquids contrast	S52	Pembedaan antara /l/ dan /r/		80	
			S53	Pembedaan antara /l/ dan /l/		80	
			S54	Pembedaan antara /l/ dan /j/		80	
			S55	Pembedaan Antara /l/ dan /j, r/		80	
			S56	Kenalpasti		704	
		F.5 Penjejakan wacana berterusan					
		F.6 Kata kunci					
		F.6.1 Kata kunci di akhir ayat	S57	Pembedaan perkataan (rawak) dalam ayat		80	
			S58	Pembedaan perkataan (sama suku kata) dalam ayat		128	
			S59	Pembedaan perkataan (minimal pairs) dalam ayat		80	
		F.6.2 Kata kunci di awal ayat	S60	Pembedaan perkataan (rawak) dalam ayat		80	
			S61	Pembedaan perkataan (sama suku kata) dalam ayat		128	
			S62	Pembedaan perkataan (minimal pairs) dalam ayat		80	

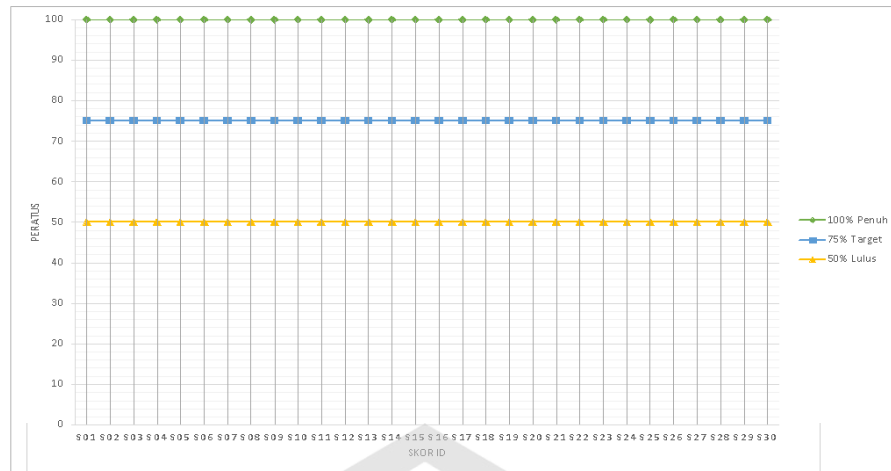
Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

					Tarikh:
F.7 Isi tempat kosong	F.6.3 Kata kunci di tengah ayat	963	Pembedaan perkataan (rawak) dalam ayat	80	
		964	Pembedaan perkataan (sama sukukata) dalam ayat	128	
		965	Pembedaan perkataan (minimal pairs) dalam ayat	80	
	F.7.1 Akhir ayat	966	Kenalpasti	240	
	F.7.2 Awal ayat	967	Kenalpasti	240	
	F.7.3 Tengah ayat	968	Kenalpasti	240	
		F.7.4 Rawak	969	Kenalpasti	240
F.8 Jenis-jenis ayat	F.8.1 Ayat penyata	970	Kenalpasti	240	
		971	Kefahaman	240	
	F.8.2 Ayat tanya	972	Kenalpasti	240	
		973	Kefahaman	240	
	F.8.3 Ayat perintah	974	Kenalpasti	240	
		975	Kefahaman	240	
	F.8.4 Ayat rawak	976	Kenalpasti	240	
		977	Kefahaman	240	
	F.8.5 Ayat rawak	978	Kenalpasti	240	
		979	Kefahaman	240	
	F.8.6 Menjawab soalan pendek	980	Kefahaman (Topik: Diri sendiri)	240	
		981	Kefahaman (Topik: Informasi Umum)	240	

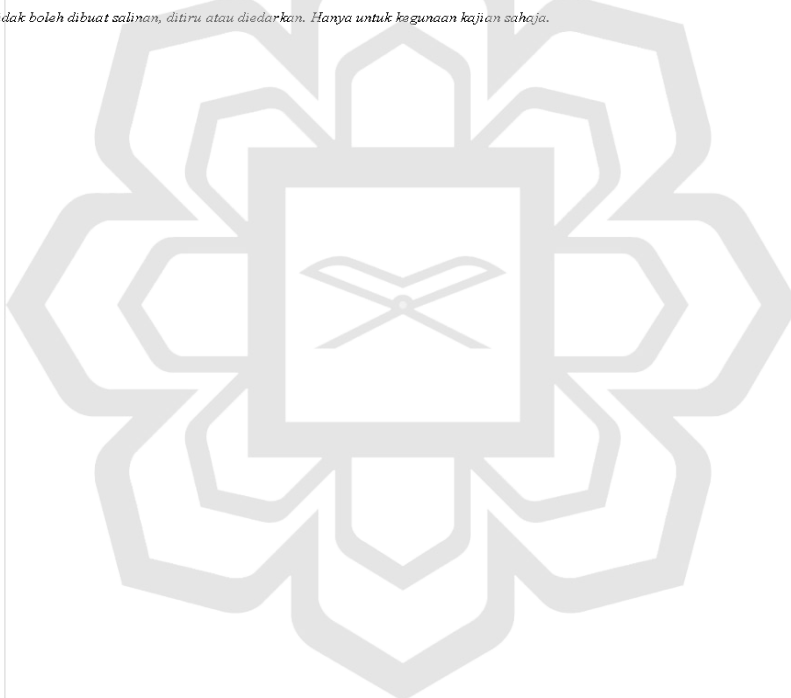
*Pantau kemajuan pelatih untuk setiap enam minggu.
Rujuk rajah 3. Gerak kerja di dalam manual PLAM.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

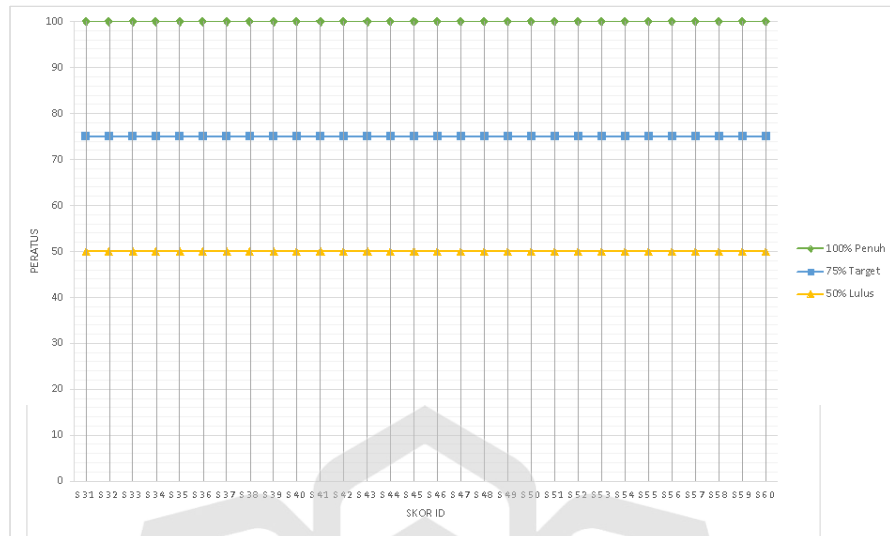
Carta C.1: Skor Diperoleh dalam Carta Skor S01 – S30



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

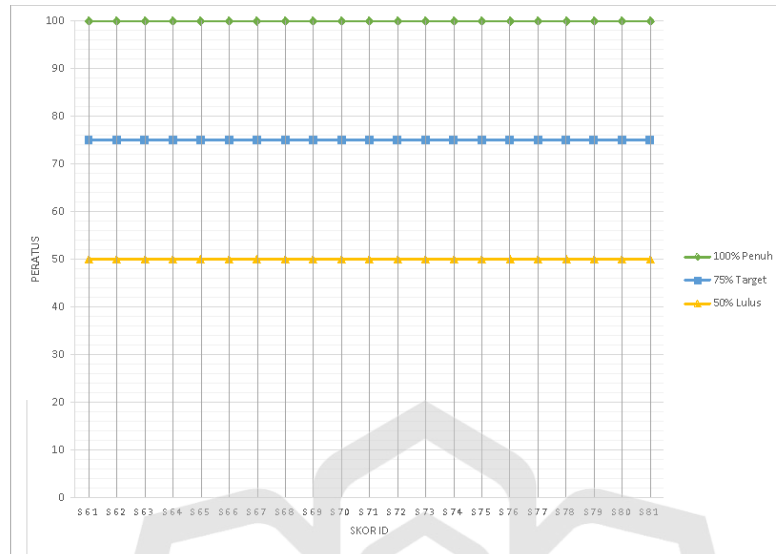


Carta C2: Skor Diperoleh dalam Carta Skor S31 – S60



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Carta C.3: Skor Diperoleh dalam Carta Skor S61 – S81



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

BAHAGIAN D: SKOR KEBOLEHAN AUDITORI

Skor kebolehan auditori hanya merujuk kepada latihan auditori yang dilatih. Pengiraan skor adalah seperti yang diterangkan dalam manual PLAM bahagian 6.5.

D.1. Kebolehan Auditori Pengesanan

Kebolehan Auditori	Skor ID	Stimulus	Jumlah Skor Penuh	Jumlah Skor diperoleh	
Pengesanan	S01	Bunyi enamling	96		
	S03	Bunyi persekitaran	144		
	S05	Fonem pada frekuensi <500 hz	176		
	S07	Fonem pada frekuensi 501 – 2000 hz	112		
	S09	Fonem pada frekuensi >2000 hz	80		
	S11	Fonem pertuturan	464		
	S13	Satu suku kata	320		
	S15	Dua suku kata	384		
	S17	Tiga suku kata	384		
	S19	Empat dan lebih suku kata	384		
	S21	Konsonan +vokal /i/	368		
	S23	Konsonan +vokal /u/	368		
	S25	Konsonan +vokal /e/	304		
	S27	Konsonan +vokal /ə/	368		
	S29	Konsonan +vokal /a/	368		
	S31	Konsonan +vokal /ə/	368		
	JUMLAH KESELURUHAN SKOR DIPEROLEH (Hanya Latihan yang dibuat)				
	JUMLAH KESELURUHAN SKOR PENUH (Hanya Latihan yang dibuat)				
SKOR LULUS: JUMLAH KESELURUHAN SKOR DIPEROLEH X 100					
JUMLAH KESELURUHAN SKOR PENUH					

Tarikh: _____

D.2. Kebolehan Auditori Pembezaan

Kebolehan Auditori Pembezaan	No.	Stimulus	Jumlah Skor Penuh	Jumlah Skor diperoleh
	S33	i. /b/ dan /p/	80	
	S34	ii. /d/ vs /t/	80	
	S35	iii. /g/ dan /k/	80	
	S36	iv. /b, d, g/ dan /p, t, k/	80	
	S37	i. /t/ dan /b/	80	
	S38	ii. /d/ dan /p/	80	
	S39	iii. /d/ dan /b/	80	
	S40	iv. /t/ dan /p/	80	
	S41	i. /t/ dan /h/	80	
	S42	ii. /s/ dan /z/	80	
	S43	iii. /tʃ/ dan /dʒ/	80	
	S44	iv. /h/ dan /ʔ/	80	
	S45	v. /s/ dan /ʃ/	80	
	S46	vi. /s/ dan /dʒ/	80	
	S47	vii. /s/ vs /tʃ/	80	
	S48	i. /m/ dan /p, b/	80	
	S49	ii. /h/ dan /t, d/	80	
	S50	iii. /ŋ/ dan /k, g/	80	
	S51	iv. /p/ dan /k, g/	80	
	S52	i. /t/ dan /h/	80	
	S53	ii. /t/ dan /ʃ/	80	
	S54	iii. /h/ dan /ʃ/	80	
	S55	iv. /t/ dan /ʃ, r/	80	
	S57	i. perkataan rawak	80	
	S58	ii. sama sukukata	128	
	S59	iii. (minimal pairs)	80	
	S60	i. perkataan rawak	80	
	S61	ii. sama sukukata	128	
	S62	iii. (minimal pairs)	80	
	S63	i. perkataan rawak	80	
	S64	ii. sama sukukata	128	
	S65	iii. (minimal pairs)	80	
JUMLAH KESELURUHAN SKOR DIPEROLEH (Hanya Latihan yang dibuat)				
JUMLAH KESELURUHAN SKOR PENUH (Hanya Latihan yang dibuat)				
SKOR LULUS: JUMLAH KESELURUHAN SKOR DIPEROLEH X 100				
JUMLAH KESELURUHAN SKOR PENUH				

Tarikh: _____

D.3. Kebolehan Auditori Kenalpasti

Kebolehan Auditori	No.	Stimulus	Jumlah Skor Penuh	Jumlah Skor diperoleh
Kenalpasti	S02	Bunyi enam ling	96	
	S03	Bunyi persekitaran	144	
	S06	Fonem pada frekuensi <500 hz	176	
	S08	Fonem pada frekuensi 501 – 2000 hz	112	
	S10	Fonem pada frekuensi >2000 hz	80	
	S12	Fonem pertuturan	464	
	S14	Satu sukukata	320	
	S16	Dua sukukata	384	
	S18	Tiga sukukata	384	
	S20	Empat dan lebih sukukata	384	
	S22	Konsonan + vokal /i/	368	
	S24	Konsonan + vokal /u/	368	
	S26	Konsonan + vokal /a/	304	
	S28	Konsonan + vokal /e/	368	
	S30	Konsonan + vokal /o/	368	
	S32	Konsonan + vokal /ə/	368	
	S56	Penjejakan wacana berterusan	704	
	S66	Akhir Ayat	240	
	S67	Awal Ayat	240	
	S68	Tengah Ayat	240	
	S69	Rawak	240	
	S70	Ayat penyata	240	
	S72	Ayat tanya	240	
	S74	Ayat perintah	240	
	S76	Ayat rawak	240	
	S78	Ayat rawak	240	
JUMLAH KESELURUHAN SKOR DIPEROLEH (Hanya Latihan yang dibuat)				
JUMLAH KESELURUHAN SKOR PENUH (Hanya Latihan yang dibuat)				
SKOR LULUS: $\frac{\text{JUMLAH KESELURUHAN SKOR DIPEROLEH} \times 100}{\text{JUMLAH KESELURUHAN SKOR PENUH}}$				

D.4. Kebolehan Auditori Kefahaman

Kebolehan Auditori	No.	Stimulus	Jumlah Skor Penuh	Jumlah Skor diperoleh
Kefahaman	S71	Ayat penyata	240	
	S73	Ayat tanya	240	
	S75	Ayat perintah	240	
	S77	Ayat rawak	240	
	S79	Ayat rawak	240	
	S80	Topik: Diri Sendiri	240	
	S81	Topik: Informasi Umum	240	
JUMLAH KESELURUHAN SKOR DIPEROLEH (Hanya Latihan yang dibuat)				
JUMLAH KESELURUHAN SKOR PENUH (Hanya Latihan yang dibuat)				
SKOR LULUS: $\frac{\text{JUMLAH KESELURUHAN SKOR DIPEROLEH} \times 100}{\text{JUMLAH KESELURUHAN SKOR PENUH}}$				

Tarikh: _____

BAHAGIAN E: LATIHAN BERKAITAN JENIS BUNYI**E.1 BUNYI ENAM LING (LING SIX SOUNDS)**

Arahan: Perkenalkan semua bunyi kepada pelatih seperti dalam Rajah 1 dengan menyebut bunyi dan menunjukkan gambar yang mewakili bunyi itu. Apabila pelatih telah kenal bunyi dengan menunjukkan gambar atau menyebut bunyi dengan tepat apa yang didengar, lakukan ujian dengan memberi bunyi secara rawak dan mengikut setiap kerumitan latihan.

S01. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'.

Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA				
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan			Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang		1 meter	6 inci	Tiada	Ada
Stimulus																	
/a/																	
/i/																	
/u/																	
/m/																	
/s/																	
/j/																	
JUMLAH	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	96	

S02. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tanda kan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA				
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan			Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada	Tiada	Ada	Biasa	Panjang		1 meter	6 ind	Tiada	Ada
Stimulus																	
/a/																	
/i/																	
/u/																	
/m/																	
/s/																	
/j/																	
JUMLAH	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 20

Tarikh: _____

E.2 BUNYI PERSEKITARAN (ENVIRONMENTAL SOUNDS)

Arahan: Perkenalkan semua bunyi kepada pelatih dengan memainkan bunyi untuk didengar. Padankan setiap bunyi dengan nama bunyi dalam stimulus 1. Pastikan pelatih dapat menyamai bunyi dan nama bunyi itu.

S03. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan		Latar belakang bising				Tanpa latar belakang bising			
			Ulangan		Jarak		Ulangan		Jarak	
	Tiada	Ada	1 meter	6 inci	Tiada	Ada	1 meter	6 inci	Jumlah	Semua
Kapal terbang										
Tepuk tangan										
Bayi menangis										
Burung										
Enjin kereta dimulakan										
Kucing										
Sudu dawan										
Lembu										
Cengkerik										
Orang ramai										
Anjing										
Ketukan pintu										
Itik										
Kunci										
Siren polis										
Guruh										
Trafik										
Air menitik										
JUMLAH	18	18	18	18	18	18	18	18	18	144

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 21

Tarikh: _____

S04. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tanda kan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Latar belakang bising				Tanpa latar belakang bising			
	Ulangan		Jarak		Ulangan		Jarak	
	Tiada	Ada	1 meter	6 inci	Tiada	Ada	1 meter	6 inci
Kapal terbang								
Tepuk tangan								
Bayi menangis								
Burung								
Enjin kereta dimulakan								
Kucing								
Sudu cawan								
Lembu								
Cengkerik								
Orang ramai								
Anjing								
Ketukan pintu								
Itik								
Kunci								
Siren polis								
Guruh								
Trafik								
Air menitik								
JUMLAH	18	18	18	18	18	18	18	18
JUMLAH SEMUA								144

Tarikh: _____

E.3 FONEMBUNYI

E.3.1 Fonem pada Frekuensi <500 Hz.

Arahan: Perkenalkan semua bunyi kepada pelatih dengan menyebut bunyi tersebut untuk didengar. Padankan setiap bunyi dengan nama bunyi dalam stimulus 2. Pastikan pelatih dapat menyamai bunyi dan nama bunyi itu.

S05. Pengesanan

Pelatih perlu menyebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada/tiada' atau menulis 'ada/tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
/u/																
/e/																
/i/																
/n/																
/t/																
/k/																
/d/																
/b/																
/m/																
/ŋ/																
/l/																
JUMLAH																
	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	176

Tarikh: _____

S06. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tanda kan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising					
			Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Tiada	Ada	Biasa	Panjang
/u/														
/e/														
/i/														
/v/														
/g/														
/u/														
/d/														
/b/														
/n/														
/ŋ/														
/l/														
JUMLAH	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11	/11
													JUMLAH SEMUA	176

Tarikh: _____

E.32 Fonem pada Frekuensi 500 – 2000 Hz

Arahan: Perkenalkan semua bunyi kepada pelatih dengan menyebut bunyi tersebut untuk didengar. Padankan setiap bunyi dengan nama bunyi dalam stimulus 3. Pastikan pelatih dapat menyamai bunyi dan nama bunyi itu.

S07. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising									
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																	
/o/																	
/i/																	
/a/																	
/r/																	
/p/																	
/h/																	
/g/																	
JUMLAH	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	JUMLAH SEMUA
																	112

S08. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising									
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
/o/																
/i/																
/a/																
/r/																
/p/																
/h/																
/g/																
JUMLAH	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	JUMLAH SEMUA
																112

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 25

Tarikh: _____

E.3.3 Fonem pada Frekuensi >2000 Hz

Arahan: Perkenalkan semua bunyi kepada pelatih dengan menyebut bunyi tersebut untuk didengar. Padankan setiap bunyi dengan nama bunyi dalam stimulus 4. Pastikan pelatih dapat menyamai bunyi dan bunyi fonetik itu.

S09. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/mengeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising								JUMLAH SEMUA
			Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada			
/t/																			
/f/																			
/k/																			
/h/																			
/s/																			
JUMLAH	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
																	80		

S10. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
			Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan			Jarak		Klu verbal/ muka																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci		Tiada	Ada																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	/t/	/f/	/k/	/h/	/s/	JUMLAH	/t/	/f/	/k/	/h/	/s/	JUMLAH	/t/	/f/		/k/	/h/	/s/	JUMLAH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

Tarikh: _____

BAHAGIAN F: NAHU BAHASA MELAYU**F.1 FONEMPERTUTURAN**

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 5. Pastikan pelatih dapat menyamai apa yang didengar dan bunyi fonetik itu. Target adalah fonem yang terkandung di dalam perkataan itu.

S11. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
/i/																
/u/																
/e/																
/ə/																
/o/																
/a/																
/m/																
/n/																
/ŋ/																
/p/																
/b/																
/t/																
/d/																
/k/																
/g/																
/tʃ/																
/dʒ/																

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 27

Tanah:

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ungan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ungan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
/t/																
/n/																
/s/																
/z/																
/p/																
/h/																
/l/																
/v/																
/j/																
/w/																
/r/																
JUMLAH	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	JUMLAH SEMUA
	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	464

Tarikh: _____

S12. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tanda kan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan Stimulus	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
/l/																
/u/																
/a/																
/e/																
/o/																
/i/																
/m/																
/n/																
/ŋ/																
/ɪ/																
/ʊ/																
/b/																
/p/																
/d/																
/t/																
/k/																
/g/																
/ʃ/																
/tʃ/																

Tarikh:

Kerumitan Latihan Stimulus	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa Panjang	1 meter	6 ind	6 ind	Tiada	Ada	Tiada	Ada	Biasa Panjang	1 meter	6 ind	6 ind	Tiada	Ada
A/																
N/																
/s/																
/z/																
/j/																
/h/																
/t/																
/l/																
/m/																
/n/																
/r/																
JUMLAH	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	/29	464

Tarikh: _____

F.2 SUKUKATA

F.2.1 Satu Sukukata

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 6. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S13. Pengesanan

Pelatih perlu menyebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada/tiada' atau menulis 'ada/tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
bas																
bank																
gam																
hak																
jam																
kek																
kau																
lap																
mi																
nak																
pos																
ru																
sen																
sup																
pau																
tin																
wang																
yang																
dan																
zat																
JUMLAH	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	JUMLAH SEMUA
																320

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 31

Tarikh: _____

S14. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
bas																
bank																
gam																
hak																
jam																
kek																
kau																
lap																
mi																
nak																
pos																
ru																
sen																
sup																
pau																
tin																
wang																
yang																
dan																
zat																
JUMLAH	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	/20	JUMLAH SEMUA
																320

Tarikh: _____

F.22 Dua Sukukata

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 7. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S15. Pengesanan

Pelatih perlu menyebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada/tiada' atau menulis 'ada/tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
isi																
elok																
aku																
ubi																
otak																
bisa																
gangsa																
ufti																
roti																
inti																
engsel																
angkat																
undi																
ombak																
bimbang																
tembak																
bantu																
sumbat																
borang																
ibu																
pilih																
bulan																
ilmu																
takut																
JUMLAH	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	JUMLAH SEMUA 384

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 33

Tarikh: _____

S16. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																	
isi																	
elok																	
aku																	
ubi																	
otak																	
bisa																	
gangsa																	
ufti																	
roti																	
inti																	
engsel																	
angkat																	
undi																	
ombak																	
bimbang																	
tembak																	
bantu																	
sumbat																	
borang																	
ibu																	
pilih																	
bulan																	
ilmu																	
takut																	
JUMLAH		/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	JUMLAH SEMUA
																	384

Tarikh: _____

F.2.3 Tiga Sukukata

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 3. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S17. Pengesanan

Pelatih perlu menyebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') atau mengangguk kepala/mengeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada/tiada' atau menulis 'ada/tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada
Stimulus mengkuang																
biawak																
usia																
semua																
sempurna																
tempua																
jadual																
istana																
kalendar																
ijazah																
ilmiah																
kemboja																
gelanggang																
cecair																
tuala																
bahasa																
tempurung																
belanja																
basikal																
amanah																
cangkerang																
cuaca																
durian																
telefon																
JUMLAH	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	JUMLAH SEMUA
																384

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 35

Tarikh: _____

S18. Kemalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada
Stimulus																
mengkuang																
biawak																
usia																
semua																
sempurna																
tempua																
jadual																
istana																
kalendar																
ijazah																
ilmiah																
kemboja																
gelanggang																
cecair																
tuala																
bahasa																
tempurung																
belanja																
basikal																
amanah																
cangkerang																
cuaca																
durian																
telefon																
JUMLAH	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	JUMLAH SEMUA 384

Tarikh: _____

F.2.4 Empat dan Lebih Sukukata

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 9. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S19. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising										Tanpa latar belakang bising									
	Unggan		Kadar sebutan		Jarak		Klu verbal/ muka		Unggan		Kadar sebutan		Jarak		Klu verbal/ muka		Unggan		Kadar sebutan	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang
Stimulus																				
keluarga																				
sederhana																				
kebangsaan																				
universiti																				
akuarium																				
kecemasan																				
pekerjaan																				
anugerah																				
masyarakat																				
bahagian																				
matahari																				
cenderamata																				
pelihara																				
samudera																				
tanggungjawab																				
istimewa																				
operasi																				
warganegara																				
destinasi																				
perkataan																				
laksamana																				
sentiasa																				
olahraga																				
tradisional																				
JUMLAH	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	JUMLAH SEMUA
																				384

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 37

Tarikh: _____

S20. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
keluarga																	
sederhana																	
kebangsaan																	
universiti																	
akuarium																	
kecemasan																	
pekerjaan																	
anugerah																	
masyarakat																	
bahagian																	
matahari																	
cenderamata																	
pelihara																	
samudera																	
tanggungjawab																	
istimewa																	
operasi																	
warganegara																	
destinasi																	
perkataan																	
laksamana																	
sentiasa																	
olahraga																	
tradisional																	
JUMLAH		/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	/24	JUMLAH SEMUA
																	384

Tarikh: _____

F.3 PERKATAAN DENGAN GABUNGAN KONSONAN DAN ENAM VOKAL

F.3.1 Konsonan + Vokal /i/

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 10. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu. Target adalah sukukata yang digaris.

S21. Pengesanan

Pelatih perlu menyebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') atau mengangguk kepala/mengeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada/tiada' atau menulis 'ada/tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
minit																
nilai																
nyiru																
ngiau																
pintu																
bila																
tiar																
diri																
kipas																
gigit																
cili																
ijmat																
fikir																
vitamin																
siang																
zرافah																
syiling																
hidung																
riang																
limau																
vis																
wira																
adik																
JUMLAH	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	368

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 39

Tarikh: _____

S22. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising										Tanpa latar belakang bising									
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka					
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada				
Stimulus																				
m ⁱ n ⁱ t																				
n ⁱ l ^a i																				
n ^y i ^r u																				
n ^g i ^a u																				
p ⁱ n ^t u																				
b ⁱ l ^a																				
t ⁱ k ^a r																				
d ⁱ r ⁱ																				
k ⁱ p ^a s																				
g ⁱ g ⁱ t																				
c ⁱ l ⁱ																				
j ⁱ m ^a t																				
f ⁱ k ⁱ r																				
v ⁱ t ^a m ⁱ n																				
s ⁱ a ⁿ g																				
z ⁱ r ^a f ^a h																				
s ^y i ^l i ⁿ g																				
h ⁱ d ^u n ^g																				
r ⁱ a ⁿ g																				
l ⁱ m ^a u																				
y ⁱ s																				
w ⁱ r ^a																				
a ^d i ^k																				
JUMLAH	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23			JUMLAH SEMUA	
																			368	

Tarikh: _____

F.3.2 Konsonan + Vokal /u/

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 11. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu. Target adalah sukukata yang digaris.

S23. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau menganggu kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan Stimulus	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
muka																
nuri																
nyut																
ngundang																
putih																
buku																
tujuh																
duduk																
kuda																
gula																
guba																
jual																
fungsi																
vulkan																
sudu																
zu																
syukur																
hujan																
rumah																
lukis																
yuran																
wujud																
tusuk																
JUMLAH																
	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
JUMLAH SEMUA																368

Tarikh: _____

S24. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
<u>m</u> uka																
<u>n</u> uri																
<u>n</u> yut																
<u>ng</u> undang																
<u>pu</u> ti																
<u>bu</u> ku																
<u>tu</u> juh																
<u>du</u> duk																
<u>ku</u> da																
<u>gu</u> la																
<u>cu</u> ba																
<u>ju</u> al																
<u>fun</u> ksi																
<u>vu</u> lkan																
<u>su</u> du																
<u>zu</u>																
<u>syu</u> kur																
<u>hu</u> jan																
<u>ru</u> mah																
<u>lu</u> kis																
<u>yur</u> an																
<u>wu</u> jud																
<u>tu</u> suk																
JUMLAH																JUMLAH SEMUA
	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	368

Tarikh: _____

F.3.3 Konsonan + Vokal /a/

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 12. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu. Target adalah sukukata yang digaris.

S25. Pengesanan

Pelatih perlu menyebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada/tiada' atau menulis 'ada/tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
<u>mekar</u>																
<u>negara</u>																
<u>nyepi</u>																
<u>ngeri</u>																
<u>penuh</u>																
<u>benda</u>																
<u>telur</u>																
<u>demam</u>																
<u>kedai</u>																
<u>gelap</u>																
<u>cepat</u>																
<u>jemput</u>																
<u>fertigasi</u>																
<u>versi</u>																
<u>sebut</u>																
<u>helai</u>																
<u>renang</u>																
<u>lembu</u>																
<u>welas</u>																
JUMLAH																
	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	304

Tarikh: _____

S26. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus mekar																
negara																
nvepi																
ngeri																
penuh																
benda																
telur																
demam																
kedai																
gelap																
cepat																
jemput																
fertigasi																
versi																
sebut																
helai																
renang																
lembu																
welas																
JUMLAH																JUMLAH SEMUA
	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	304

Tarikh: _____

F.3.4 Konsonan + Vokal /e/

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 13. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu. Target adalah sukukata yang digaris.

S27. Pengeesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																
meja																
nenek																
nyeksa																
ngelak																
pensel																
beca																
teks																
desa																
keju																
gebang																
cerak																
jeti																
feri																
vena																
seimbang																
zeta																
syer																
helo																
reka																
lebar																
yeti																
web																
tenggek																
JUMLAH	/23	23	/23	23	/23	23	/23	23	/23	23	/23	23	/23	23	/23	23
																JUMLAH SEMUA
																368

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 45

Tarikh: _____

S28. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tanda kan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan	Stimulus	Latar belakang bising								Tanpa latar belakang bising							
		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
	meja																
	nenek																
	nyeksa																
	ngelak																
	pensel																
	beca																
	teks																
	desa																
	keju																
	gebang																
	cerek																
	jet																
	feri																
	vena																
	seimbang																
	zeta																
	syer																
	helo																
	reka																
	lebar																
	yeti																
	web																
	tenggek																
	JUMLAH	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	JUMLAH SEMUA 368

Tarikh: _____

F.3.5 Konsonan + Vokal /ə/

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 14. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu. Target adalah sukukata yang digaris.

S29. Pengesanan

Pelatih perlu menyebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada'/'tiada' atau menulis 'ada'/'tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan Stimulus	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
motor																
nota																
nyonya																
ngocok																
polis																
bola																
topi																
donut																
kolam																
gosok																
comel																
johan																
folio																
vokal																
sotong																
zohor																
syot																
hoki																
roti																
lori																
yoga																
woksyop																
berok																
JUMLAH	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	JUMLAH SEMUA
																368

Tarikh: _____

S30. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Latar belakang bising								Tanpa latar belakang bising							
	Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
	Taala	Ada	Biasa	Panjang	1 meter	6 inci	Taala	Ada	Taala	Ada	Biasa	Panjang	1 meter	6 inci	Taala	Ada
motor																
nota																
nyonya																
nggocok																
polis																
bola																
topi																
donut																
kolam																
gosok																
comel																
johan																
folio																
vokal																
sotong																
zohor																
syot																
hoki																
roti																
lori																
yoga																
woksyop																
berok																
JUMLAH																
	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
	JUMLAH SEMUA															368

Tarikh: _____

F.3.6 Konsonan + Vokal /a/

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 15. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu. Target adalah sukukata yang digaris.

S31. Pengesanan

Pelatih perlu menyebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') atau mengangguk kepala/menggeleng kepala atau membuat isyarat tangan yang difahami sebagai 'ada/tiada' atau menulis 'ada/tiada'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising									
		Ulangan		Kadar sebutan		Jarak		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka			
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
<u>maju</u>																	
<u>naga</u>																	
<u>nyamuk</u>																	
<u>nganga</u>																	
<u>pagi</u>																	
<u>baca</u>																	
<u>tali</u>																	
<u>dapur</u>																	
<u>kacang</u>																	
<u>gajah</u>																	
<u>cawan</u>																	
<u>jagung</u>																	
<u>faham</u>																	
<u>van</u>																	
<u>satu</u>																	
<u>zaman</u>																	
<u>syair</u>																	
<u>habis</u>																	
<u>rajin</u>																	
<u>laju</u>																	
<u>yakin</u>																	
<u>wangi</u>																	
<u>kotak</u>																	
JUMLAH		/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	JUMLAH SEMUA
																	368

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 49

Tarikh: _____

S32. Kenalpasti

Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tanda 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising									
			Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada		
maju																		
naga																		
nyamuk																		
nganga																		
pagi																		
baca																		
tali																		
dapur																		
kacang																		
gajah																		
cawan																		
jagung																		
faham																		
van																		
satu																		
zaman																		
syair																		
habis																		
rajin																		
laju																		
yakin																		
wangi																		
kotak																		
JUMLAH	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	/23	JUMLAH SEMUA
																		368

Tarikh: _____

F.4 PASANGAN PERKATAAN**F.4.1 Voicing Contrast**

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 16. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S33. Pembezaan antara /b/ dan /p/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA					
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan				Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang			1 meter	6 inci	Tiada	Ada
Stimulus																			
bagi	pagi																		
tebak	tepak																		
abi	api																		
badan	padan																		
berang	perang																		
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
		80																	

S34. Pembezaan antara /d/ vs /t/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA					
				Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan				Jarak		Kiu verbal/ muka	
dari	tari	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada				
diri	tiri																				
jadi	jati																				
dada	data																				
dayang	tayang																				
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5				
		80																			

Tarikh: _____

S35. Pembezaan antara /g/ dan /k/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan	Latar belakang biseng						Tanpa latar belakang biseng						JUMLAH SEMUA				
			Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan			Jarak		Kiu verbal/ muka	
			Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang		1 meter	6 inci	Tiada	Ada
gaya	kaya																		
garam	karam																		
bagi	baki																		
gelap	kelab																		
garang	karang																		
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	80

S36. Pembezaan antara /b, d, g/ dan /p, t, k/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan	Latar belakang bisung						Tanpa latar belakang bisung						JUMLAH SEMUA				
			Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan			Jarak		Kiu verbal/ muka	
			Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang		1 meter	6 inci	Tiada	Ada
had	hak																		
tekad	tekak																		
baku	paku																		
sebab	sebat																		
gali	tali																		
JUMLAH			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	80

Tarikh: _____

F.42 Dental Labial Contrast

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 17. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S37. Pembezaan antara /t/ dan /b/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
tadi	badi																
itu	ibu																
tuli	buli																
tahu	bahu																
terus	berus																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																	JUMLAH SEMUA
																	80

S38. Pembezaan antara /d/ dan /p/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka		Ungaran		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
darah	parah																
dayang	payang																
ada	apa																
daku	paku																
sedia	sepia																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																	JUMLAH SEMUA
																	80

Tarikh: _____

S39. Pembezaan antara /d/ dan /b/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising								
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		
		Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada	
																		Stimulus
daki	baki																	
dayang	bayang																	
datu	batu																	
dalam	balam																	
dan	ban																	
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	JUMLAH SEMUA
																		80

S40. Pembezaan antara /t/ dan /p/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising								JUMLAH SEMUA
		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	
Stimulus																		
titi	pipi																	
tekan	pekan																	
tuan	puan																	
satu	sapu																	
tadi	padi																	
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	80

Tarikh: _____

F.4.3 Fricatives, Affricates, Stop Contrast

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 18. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S41. Pembezaan antara /f/ dan /v/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																	
feri	veri																
fokal	vokal																
fila	vila																
firus	virus																
fisa	visa																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
JUMLAH SEMUA																	80

S42. Pembezaan antara /s/ dan /z/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA					
				Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan				Jarak		Klu verbal/ muka	
				Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang			1 meter	6 inci	Tiada	Ada
sat	zat																				
asap	azab																				
sakat	zakat																				
saman	zaman																				
sarah	zarah																				
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	80		

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 55

Tarikh: _____

S43. Pembezaan antara /q/ dan /q:/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus	jari																
cari	juri																
baca	baja																
cucuk	jujuk																
cam	jam																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		80															

S44. Pembezaan antara /h/ dan /p/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus	sesak																
awah	awak																
balah	balak																
agah	agak																
arah	arak																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		80															

Tanah: _____

S45. Pembezaan antara /s/ dan /ʃ/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA				
				Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan			Jarak		Kiu verbal/ muka	
sarat	syarat	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	80		
siling	syiling																			
sah	shah																			
asik	asyik																			
sifar	syifa																			
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			

S46. Pembezaan antara /s/ dan /dʒ/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA				
				Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan			Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada			
silat jilat																				
susur jujur																				
asar ajar																				
sasa jasa																				
salur jalur																				
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	80		

Tarikh: _____

S47. Pembezaan antara /s/ vs /ʃ/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ungan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ungan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																	
satu	catu																
suka	cuka																
solek	colek																
usap	ucap																
asar	acar																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																JUMLAH SEMUA	
																80	

Tarikh: _____

F.4.4 Nasa/Crai Contrast

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 19. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S48. Pembezaan antara /m/ dan /p, b/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
mati	pati																
muka	buka																
samar	sabar																
kumur	kubur																
malam	malap																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																	JUMLAH SEMUA
																	80

S49. Pembezaan antara /n/ dan /t, d/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Kiu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
nak	tak																
naik	daik																
nampak	tampak																
nadi	tadi																
anau	atau																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																	JUMLAH SEMUA
																	80

Tarikh: _____

S50. Pembezaan antara /n/ dan /k, g/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																	
sangat	sangat																
bunga	buka																
bangi	bagi																
ingat	ikat																
pegat	pekat																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																JUMLAH SEMUA	
																80	

S51. Pembezaan antara /v/ dan /k, g/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka	
		Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada
Stimulus																	
nyata	kata																
nyanyi	kaki																
bunga	buka																
nyala	gala																
sunyi	sugi																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
																JUMLAH SEMUA	
																80	

F.4.5 Liquids Contrast

Arahan: Perkenalkan semua perkataan kepada pelatih dengan menyebut perkataan tersebut. Padankan setiap perkataan yang didengar dengan perkataan dalam stimulus 20. Pastikan pelatih dapat menyamai apa yang didengar dan nama perkataan itu.

S52. Pembezaan antara *ll* dan *lrl*

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA	
		Ulangan		Kadar sebutan		Jarak		Ulangan		Kadar sebutan		Jarak			
		Tiada	Ada	Bes	Panjang	1 meter	5 inci	Tiada	Ada	Bes	Panjang	1 meter	5 inci		
Stimulus															
lalat	ralat														
lusa	rusa														
laga	raga														
lalang	larang														
lantai	rantai														
JUMLAH		/	/	/	/	/	/	/	/	/	/	/	/	/	80

S53. Pembezaan antara *ll* dan *ljl*

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan						Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA
		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka				
		Tiada	Ada	Biasa	Panjang	1 meter	5 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	5 inci	Tiada	Ada			
bali	bayi																			
balu	bayu																			
siang	siang																			
salur	sayur																			
bala	baya																			
JUMLAH		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	80	

Tarikh: _____

S54. Pembedaan antara /r/ dan /l/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bisling								Tanpa latar belakang bisling							
		Ulangan		Kadar sebutan		Jarak		Klu verbal / muka		Ulangan		Kadar sebutan		Jarak		Klu verbal / muka	
		Tiatla	Aila	Bilaa	Panjang	1 meter	5 inci	Tiatla	Aila	Tiatla	Aila	Bilaa	Panjang	1 meter	5 inci	Tiatla	Aila
Stimulus	sayang																
ru	yu																
rang	yang																
mara	maya																
kara	kaya																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		80															

S55. Pembedaan antara /l/ dan /j/

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bisling								Tanpa latar belakang bisling							
		Ulangan		Kadar sebutan		Jarak		Klu verbal / muka		Ulangan		Kadar sebutan		Jarak		Klu verbal / muka	
		Tiatla	Aila	Bilaa	Panjang	1 meter	5 inci	Tiatla	Aila	Tiatla	Aila	Bilaa	Panjang	1 meter	5 inci	Tiatla	Aila
Stimulus	balu																
	bayu																
balu	baru																
balang	barang																
balang	bayang																
layu	rayu																
JUMLAH		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
		80															

Tarikh: _____

F.5 PENJEJAKAN WACANA BERTERUSAN

Arahan: Bacakan cerita dalam teks 1 kepada pelatih. Minta pelatih mengikut penceritaan dengan menunjukkan jari pada setiap perkataan dan BERHENTI apabila cerita berhenti. Pelatih perlu ulang perkataan terakhir yang didengar.

S58. Kenalpasti

Tandakan 1 jika berjaya dan 0 jika tidak berjaya didalam bahagian 'respons'. Target adalah perkataan yang digaris.

Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising					
	Unggan		Kadar sebutan		Jarak		Unggan		Kadar sebutan		Jarak	
	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Biasa	Panjang	1 meter	6 inci
Stimulus												
Kononnya pada zaman <u>dahulu</u>												
tumbuh sebatang <u>pokok</u>												
yang aneh di sebuah <u>hutan</u>												
Penghuni hutan tersebut dilarang memakan buah dari pokok <u>itu</u>												
Pada suatu hari, sekumpulan <u>gajah</u>												
bermain-main di sekitar kawasan pokok aneh <u>itu</u>												
Gajah-gajah itu <u>tidak</u>												
berani untuk mendekati pokok itu apalagi cuba memakan <u>buahnya</u>												
<u>Namun</u>												
dalam kumpulan gajah itu, <u>ada</u>												
seekor gajah yang teringin hendak memakan buah dari pokok aneh <u>itu</u>												
"Agaknya, apa akan terjadi sekiranya buah itu dimakan?" Gajah itu berkata dalam <u>hati</u>												
"Baik aku <u>cuba</u> "												

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Stimulus	Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising						Tingkat	
		Ulangan		Kadar sebutan		Jarak		Ulangan		Kadar sebutan		Jarak			
		Tidak Ada	Ada	Benar	Salah	1 meter	6 ind	Tidak Ada	Ada	Benar	Salah	1 meter	6 ind		
Setiap hari, gajah itu mendekati pokok aneh itu.															
Pada suatu hari, gajah itu <u>terlupa</u>															
akan amaran yang sering <u>didengarnya</u>															
Gajah itu memakan buah larangan <u>tersebut</u> .															
Tiba-tiba gajah mendapati dirinya berubah menjadi seekor burung yang <u>ganjil</u> .															
Kemudian gajah berubah menjadi burung ganjil yang lain <u>pula</u> .															
Namun, gajah tetap berasa tidak puas <u>hati</u> .															
Apabila penat menjadi <u>burung</u> .															
gajah berubah menjadi seekor ikan. Gajah boleh berenang dan bermain di <u>dasar sungai</u> .															
Malangnya ikan-ikan lain tidak mahu berkawan <u>dengannya</u> .															
"Ikan apakah itu?" Ikan-ikan itu bertanya sesama <u>sendiri</u> .															
Semua ikan tidak berani mendekati gajah <u>itu</u> .															
Gajah itu pun naik ke tebing sungai dan berubah menjadi <u>buaya</u> .															
Malangnya, semua buaya <u>mentertawakannya</u> .															
"Nak dikatakan buaya bentuknya tidak seperti <u>buaya</u> "															
Buaya-buaya itu mengejeknya sambil ketawa berdekah- <u>dekah</u> .															
Disebabkan gajah sering dketawakan oleh hawan-hawan <u>lain</u> .															

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Kerumitan Latihan	Tangkai									
	Latar belakang bising					Tanpa latar belakang bising				
	Ulangan	Kadar sebutan	Jarak	Kiri verbal/ muka	Kiri verbal/ muka	Ulangan	Kadar sebutan	Jarak	Kiri verbal/ muka	Kiri verbal/ muka
Stimulus	Tidak	Ada	Elaan	Panjang	1 meter	6 inci	Tidak	Ada	Elaan	Panjang
gajah itu pun berubah menjadi seekor naga.										
"Kali ini tiada siapa yang berani mentertawakan aku," kata gajah itu.										
Sayangnya, haiwan-haiwan lain tidak takut.										
Malah, semuanya										
tergelak apabila melihat gajah yang berubah menjadi naga itu.										
Gajah itu pun naik berang dan										
berubah menjadi burung, ikan, buaya dan naga dengan sekali gus.										
Bentuknya aneh sekali.										
Gajah itu menyesal kerana										
tidak bersyukur dengan apa-apa yang ada pada dirinya.										
Setiap hari gajah itu pun berdoa										
agar dikembalikan kepada bentuk asal. Akhirnya, pada suatu hari,										
apabila gajah itu terseor daripada tidur, badannya										
berubah menjadi seekor gajah semula.										
Kini gajah itu kembali menjadi seekor gajah seati										
JUMLAH	44	44	44	44	44	44	44	44	44	44
										JUMLAH SEMUA
										704

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

[illegible]

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

SS9. Pembezaan perkataan (*minimal pairs*) dalam ayat.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Kerumitan Latihan		Latar belakang bising								Tanpa latar belakang bising							
		Ungaran				Kiu verbal/ muka				Ungaran				Kiu verbal/ muka			
		Tidala	Ada	Biasa	Panjang	1 meter	6 inci	Tidala	Ada	Tidala	Ada	Biasa	Panjang	1 meter	6 inci	Tidala	Ada
Stimulus	Ibu sedang membeli sebiji																
	sayung.																
	jagung.																
Abang sedang mengecat																	
	siling.																
Bilik itu gelap kerana keadaan																	
	syiling.																
	malam.																
Tukang masak sedang memasak kuah																	
	malap.																
	pengat.																
	pekat.																
Negara itu sedang kucar-kacir kerana rakyatnya sedang																	
	berang.																
	perang.																
JUMLAH		/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	JUMLAH SEMUA 80

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

F.6.2 Kata Kunci di Awal Ayat

Arahan: Bacakan ayat dalam stimulus 22 kepada pelatih. Sebut dengan jelas dan pastikan pelatih dapat menyamai ayat yang didengar dan dibaca. Nyatakan terdapat dua pilihan perkataan pada awal ayat. Pelatih perlu pilih perkataan yang disebut jurupulih.

S60. Pembezaan perkataan (rawak) dalam ayat.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising							
		Ulangan		Kadar sebutan		Jarak	Kui verbal/ muka	Ulangan		Kadar sebutan		Jarak	Kui verbal/ muka		
		Tiada Ada	Biasa	Panjang	1 meter			6 inci	Tiada Ada	Tiada Ada	Biasa			Panjang	1 meter
Polis	telah menjumpai kereta yang hilang minggu lepas.														
Bomba															
Ayam	goreng ini terlebih masin.														
Ikan															
Cincin	emas dia hilang semasa berkelah.														
Rantai															
Bas	itu sedang menghantar pelajar ke sekolah.														
Van															
Harimau	adalah haiwan pemangsa.														
Singa															
JUMLAH		/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5	/5
JUMLAH SEMUA															80

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

S6 1. Pembezaan perkataan (sama sukukata) dalam ayat.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tanda kan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus		Kerumitan Latihan	Latar belakang bising								Tanpa latar belakang bising								Jumlah SEMUA		
			Unggan		Kadar sebutan		Jarak		Kiu verbal/ muka		Unggan		Kadar sebutan		Jarak		Kiu verbal/ muka				
			Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada			
Sup	itu sangat panas. Hati-hati apabila makan.																				
Mi																					
Tin	telah disimpan di bawah almari.																				
Wang																					
Inti	kuih ini sangat sedap dan pedas.																				
Isi																					
Ilmu	amat diperlukan untuk menyinari hidup.																				
Bulan																					
Istana	sukar diperolehi tanpa usaha.																				
Ijazah																					
Mengkuang	dihampar untuk pertandingan silat.																				
Gelanggang																					
Samudera	sering dijadikan metafora dalam puisi.																				
Matahari																					
Masyarakat	Malaysia hidup aman damai.																				
Warganegara																					
JUMLAH			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	128

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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Tangk: _____

S62. Pembezaan perkataan (*minimal pairs*) dalam ayat.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan	Latar belakang bising				Tanpa latar belakang bising			
		Unggan		Kadar sebutan		Unggan		Kadar sebutan	
		Tiada	Ada	Biaya	Panjang	Tiada	Ada	Biaya	Panjang
Muka	buku menjadi aktiviti anak muda sekarang.								
Buka									
Lantai	itu sangat berkilat selepas di cuci.								
Rantai									
Salur	air di laman telah bocor.								
Jalur									
Tuan	diminta hadir untuk mesyuarat tahunan.								
Puan									
Cucuk	kayu disusun sekitar kebun untuk menghalang binatang perosak.								
Jujuk									
JUMLAH		5	5	5	5	5	5	5	5
		Jumlah semua							
		80							

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tanah: _____

F.8.3 Kata Kunci Di Tengah Ayat

Arahan: Bacakan ayat dalam stimulus 23 kepada pelatih. Sebut dengan jelas dan pastikan pelatih dapat menyamai ayat yang didengar dan dibaca. Nyatakan terdapat dua pilihan perkataan pada pertengahan ayat. Pelatih perlu pilih perkataan yang disebut junjupuh.

S63. Pembezaan perkataan (rawak) dalam ayat.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus			Kerumitan Latihan		Latar belakang bisang						Tanpa latar belakang bisang									
					Ulangan		Kadar sebutan		Jarak		Kui verbal/ ruka		Ulangan		Kadar sebutan		Jarak		Kui verbal/ ruka	
					Tiada	Ada	Biasa	Penjing	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Penjing	1 meter	6 inci	Tiada	Ada
Rumah warna	hijau	itu sangat cantik.																		
	kuning																			
Kucing itu sedang mengoyang-goyangkan	kepala	ke kiri dan ke kanan.																		
	ekor																			
Jangan lupa masukkan	gula	dalam masakan itu.																		
	garam																			
Pemberita televisyen	melaporkan	berita terkini setiap malam.																		
	mendedahkan																			
Orang ramai dinasihatkan untuk	berlari	setiap hari untuk menjaga kesihatan.																		
	bersenam																			
JUMLAH			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
			JUMLAH SEMUA																80	

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

S64. Pembedaan perkataan (sama suku kata) dalam ayat.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika benar dan 0 jika tidak benar.

Stimulus	Kerumitan Latihan	Latar belakang bising										Tanpa latar belakang bising									
		Ulangan					Jarak					Ulangan					Jarak				
		Tiada	Ada	Elasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Tiada	Ada	Elasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada
Mereka sedang membincangkan kes tiada hak di kalangan kanak-kanak.	zat																				
Cikgu pesan supaya membawa jam esok ke sekolah.	gam																				
Jika pergi ke kedai, tolong belikan ubi bakar dua set.	reti																				
Adik sedang memanggil ibu dengan penuh kasih sayang.	aku																				
Benda itu tidak dapat dikenal pasti kerana tempurung nya berbentuk pelik.	cengkerang																				
Ali suka telefon yang berwarna merah.	basikal																				
Setiap orang mempunyai pekerjaan sendiri.	tanggungjawab																				
Persembahan itu terlihat istimewa apabila ditarikan oleh kanak-kanak.	tradisional																				
JUMLAH		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	JUMLAH SEMUA
																					128

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

S65. Pembezaan perkataan (*minimal pairs*) dalam ayat.

Sebut salah satu perkataan dalam padanan. Pelatih perlu menyebut semula stimulus yang didengar atau menunjuk kepada stimulus yang didengar (dalam bentuk tulisan atau gambar) atau menulis semula stimulus yang didengar atau melukis semula stimulus yang didengar. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus			Kerumitan Latihan	Latar belakang bising						Tanpa latar belakang bising						JUMLAH SEMUA				
				Ungaran		Kadar sebutan		Jarak		Klu verbal/ muka		Ungaran		Kadar sebutan			Jarak		Klu verbal/ muka	
				Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang		1 meter	6 inci	Tiada	Ada
Hati-hati, kerana sungai itu			dalam																	
Kesemua			balang																	
			barang																	
Burung itu membuat tanda			sarang																	
			sayang																	
Abu sering terlihat			ru																	
			yu																	
Ustaz sedang			asar																	
			ajar																	
JUMLAH				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	80	

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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F.7 ISI TEMPAT KOSONG

F.7.1 Akhir Ayat

Arahan: Bacakan satu persatu ayat dalam stimulus 24 kepada pelatih. Nyatakan kepada pelatih terdapat satu, dua atau tiga perkataan yang tiada dalam setiap ayat di dalam stimulus 25 yang diberi. Pelatih perlu dengar dengan teliti dan ULANG atau TULIS perkataan yang tiada itu.

S66. Kenalpasti

Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Target adalah perkataan yang digaris. Catatkan juga jumlah perkataan yang berjaya diulang.

Stimulus	Kerumitan Latihan						Latar belakang biang						Tempa latar belakang biang					
	Unggan		Kadar sebutan		Jarak		Kui verbal/ muka		Unggan		Kadar sebutan		Jarak		Kui verbal/ muka			
	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter	6 ind	Tiada	Ada		
Apa khabar anda hari ini?																		
Adakah anda sihat?																		
Adakah anda sudah bersarapan?																		
Adakah anda tidur nyenyak semalam?																		
Adakah anda mempunyai sebarang penyakit?																		
Lakukan senaman seperti berjalan di sekitar rumah pada setiap hari.																		
Apakah sukan kegemaran anda?																		
Kesihatan amatlah penting untuk kita semua.																		
Jika anda berasa tidak sihat, silalah segera berjumpa dengan doktor.																		
Kesihatan merangkumi dua aspek iaitu kesihatan fizikal dan mental.																		
Jangan abaikan kesihatan diri.																		
Kita seharusnya minum lapan gelas air sehari.																		
Makanlah makanan yang berkhasiat.																		
Berapa jam sehari awak bersenam?																		
Adakah anda gembira sekarang?																		
JUMLAH	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	JUMLAH SEMUA
																		240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

F.7.2 Awai Ayat

Arahan: Bacakan ayat dalam stimulus 25 kepada pelatih. Nyatakan kepada pelatih terdapat satu, dua atau tiga perkataan yang tiada dalam stimulus 26 yang diberi. Pelatih perlu dengar dengan teliti dan ULANG perkataan yang tiada itu.

S67. Kenalpasti

Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Target adalah perkataan yang digaris. Catatkan juga jumlah perkataan yang berjaya diulang.

Stimulus	Kerumitan				Latar belakang lising								Tanpa latar belakang lising								JUMLAH SEMUA
	Latihan				Ulangan				Jarak				Ulangan				Jarak				
	Tiada	Ada	Kadar sebutan	Kiut verbal/muka	Tiada	Ada	Kadar sebutan	Kiut verbal/muka	Tiada	Ada	Kadar sebutan	Kiut verbal/muka	Tiada	Ada	Kadar sebutan	Kiut verbal/muka					
Apakah pekerjaan awak?																					
Bagaimanakah awak pergi ke tempat kerja?																					
Pukul berapakah awak pulang dari kerja?																					
Di mana awak bekerja?																					
Terdapat pelbagai jenis pekerjaan di Malaysia.																					
Saya boleh menyumbang idea dan tenaga untuk memajukan profesion pekerjaan saya.																					
Tugas seseorang perlu dilaksanakan dengan amanah.																					
Kita mestilah amanah ketika melaksanakan tugas sebagai seorang pekerja.																					
Kita haruslah menghormati profesion lain.																					
Banyak aktiviti bersama keluarga boleh dilakukan semasa cuti.																					
1 Mei adalah hari pekerja sedunia.																					
Saya sangat sayangkan pekerjaan saya.																					
Hati apakah awak cuti bekerja?																					
Apakah pekerjaan idaman awak?																					
Adakah anda menyukai pekerjaan anda?																					
JUMLAH	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	240	

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

F.7.3 Tengah Ayat

Arahan: Bacakan ayat dalam stimulus 26 kepada pelatih. Nyatakan kepada pelatih terdapat satu, dua atau tiga perkataan yang tiada dalam stimulus 27 yang diberi. Pelatih perlu dengar dengan teliti dan ULANG perkataan yang tiada itu.

S68. Kenalpasti

Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Target adalah perkataan yang digaris. Catatkan juga jumlah perkataan yang berjaya diulang.

Stimulus	Kerumitan Latihan								Tanpa latar belakang biasa								JUMLAH SEMUA
	Latar belakang biasa				Tanpa latar belakang biasa				Latar belakang biasa				Tanpa latar belakang biasa				
	Unggan	Kadar sebutan	Jarak	Kiri verbal/ muka	Unggan	Kadar sebutan	Jarak	Kiri verbal/ muka	Unggan	Kadar sebutan	Jarak	Kiri verbal/ muka	Unggan	Kadar sebutan	Jarak	Kiri verbal/ muka	
	Tidih	Ada	Bersa	Panjang	1 meter	6 inci	Tidih	Ada	Tidih	Ada	Bersa	Panjang	1 meter	6 inci	Tidih	Ada	
Apakah perkara <u>pertama</u> yang awak lakukan setelah bangun dan tidur?																	
Apakah <u>sarapan</u> <u>kegemaran</u> awak?																	
Adakah <u>awak</u> memakai <u>syampu</u> rambut setiap hari?																	
Ketuk pintu <u>sebelum</u> masuk ke dalam rumah.																	
Jangan lupa <u>tutup</u> <u>tingkap</u> dan pintu sebelum malam.																	
Tolong buang sampah di dalam <u>tong</u> <u>sampah</u> <u>besar</u> di luar rumah.																	
Sebelum <u>tidur</u> kita haruslah menggosok gigi supaya gigi tidak rosak.																	
Jangan <u>tidur</u> <u>lewat</u> untuk menjaga kesihatan.																	
Sila bersihkan <u>meja</u> makan setiap kali selesai makan.																	
Saya akan membaca <u>buku</u> setiap hari.																	
Makan <u>ubat</u> <u>sebelum</u> tidur.																	
Makan bersama-sama <u>keluarga</u> <u>boleh</u> mengeratkan tali persaudaraan.																	
Saya mempunyai <u>hai</u> <u>hobi</u> untuk mengisi masa lapang.																	
Cuci pakaian <u>pada</u> hari Sabtu.																	
Kemas rumah dan <u>sapu</u> <u>sampah</u> <u>pada</u> setiap pagi.																	
JUMLAH	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

F.7.4 Rawak

Arahan: Bacakan ayat dalam stimulus 27 kepada pelatih. Nyatakan kepada pelatih terdapat satu, dua atau tiga perkataan yang tiada dalam stimulus 25 yang diberi. Pelatih perlu dengar dengan teliti dan ULANG perkataan yang tiada itu.

S69. Kenalpasti

Tandakan 1 jika berjaya dan 0 jika tidak berjaya. Target adalah perkataan yang digaris. Catatkan juga jumlah perkataan yang berjaya diulang.

Stimulus	Kerumitan Latihan					Latar belakang bising					Tanpa latar belakang bising				
	Ulangan		Kadar sebutan		Jarak	Kiu verbal/ ruka		Ulangan		Kadar sebutan		Jarak	Kiu verbal/ ruka		
	Tiada	Ada	Biasa	Panjang		Tiada	Ada	Tiada	Ada	Tiada	Ada				
Saya mempunyai <u>alahan</u> terhadap makanan <u>laut</u> .															
Kita harus mengurangkan penggunaan <u>garam</u> dalam masakan.															
Sayur-sayuran dan buah-buahan adalah <u>makanan yang sihat</u> .															
<u>Elakkan</u> makan makanan yang manis.															
Apakah <u>makanan</u> <u>kegemaran</u> awak?															
Siapakah yang <u>memasak</u> nasi <u>goreng</u> ini?															
Di manakah awak membeli kuih <u>tepung pelita</u> ini?															
Bagaimanakah cara untuk memasak nasi <u>ayam</u> ?															
Makanan yang <u>seimbang</u> amatlah penting untuk <u>membekalkan</u> zat dan nutrien yang cukup.															
Kurangkan makan makanan berminyak.															
Piramid makanan adalah <u>panduan</u> terbaik untuk pemakanan yang sihat.															
Sayur-sayuran dan buah-buahan baik untuk <u>kesihatan</u> .															
Saya belum makan lagi.															
Makanan yang <u>dihinggap</u> <u>lalat</u> tidak elok untuk di makan.															
Pastikan makanan yang dibeli masih <u>segar</u> .															
JUMLAH	15	15	15	15	15	15	15	15	15	15	15	15	15	JUMLAH SEMUA 240	

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

F.8 JENIS-JENIS AYAT**F.8.1 Ayat Penyata**

Arahan: Tunjukkan rajah 2 kepada pelatih. Perkenalkan watak dan perbuatan yang mungkin berlaku di dalam gambar. Kenalkan: 1. Ayah, 2. Ibu, 3. Kakak, 4. Abang, 5. Adik, 6. Tali leher, 7. Belon, 8. Corak bintang di baju kakak, 9. Beg kecil dipegang ibu, 10. Alat permainan, 11. Cermin mata bentuk oval dan 12. Baju kemeja.

Sebut dengan jelas dan pastikan pelatih dapat menyamai ayat yang didengar dengan gambar yang dilihat. Maklumkan kepada pelatih bahawa setiap ayat mempunyai kaitan secara langsung atau tidak langsung dengan gambar ini.

S70. Kenalpasti

Minta pelatih MENGULANG sebutan keseluruhan perkataan dalam ayat yang didengar. Kira jumlah perkataan yang diulang pelatih. Tandakan 1 jika pelatih berjaya menyebut KESEMUA perkataan dalam ayat dan 0 jika tidak lengkap atau tidak berjaya. Catatkan juga jumlah perkataan yang berjaya diulang.

Stimulus	Kerumitan Latihan	Jumlah perkataan	Latar belakang bising					Tanpa latar belakang bising				
			Unggan		Kadar sebutan		Jarak	Klu verbal/ muka		Unggan	Kadar sebutan	
			Tidaka	Ada	Biasa	Panjang		Tidaka	Ada		Tidaka	Ada
Adik sedang menconteng.		3										
Ayah memakai tali leher.		4										
Ayah tersenyum gembira.		3										
Kakak memegang tiga biji belon.		5										
Ada corak bintang di baju kakak.		5										
Ibu membawa beg kecil.		4										
Ada air tertumpah dari cawan.		5										
Alat permainan adik bersepad di lantai.		5										
Cermin mata abang berbentuk oval.		5										
Baju adik kotor.		3										

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Stimulus		Kerumitan Latihan	Jumlah perkataan	Tarih														
				Latar belakang biasa				Tanpa latar belakang biasa										
				Ulangan	Kadar sebutan	Jarak	Ku verbal/ muka	Ulangan	Kadar sebutan	Jarak	Ku verbal/ muka							
				Tiada	Ada	Baru	Panjang	1 meter	6 in	Tiada	Ada	Tiada	Ada	Baru	Panjang	1 meter	6 in	Tiada
Ayah sedang melambai tangan.			4															
Hanya adik yang tidak senyum.			5															
Adik sedang melukis.			3															
Abang suka belajar subjek Matematik.			5															
Ayah memakai baju kemeja.			4															
JUMLAH			63	15	15	15	15	15	15	15	15	15	15	15	15	15	15	JUMLAH SEMUA
				15	15	15	15	15	15	15	15	15	15	15	15	15	15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

571. Keahaman

Tanya pelatih sama ada pelatih faham atau tidak faham ayat yang didengar. Pelatih perlu memberi respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan dengan tepat. Jawapan 'tepat' bermakna pelatih boleh memberi jawapan sebenar atau menyatakan 'tidak tahu' kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan	Latar belakang bisang						Tanpa latar belakang bisang							
		Unggan		Kalir sebutan	Jarak	Ku verbal/ muka	Unggan		Kalir sebutan	Jarak	Ku verbal/ muka				
		Tiada	Ada	Blasa	Pangang	1 meter	6 inci	Tiada	Ada	Blasa	Pangang	1 meter	6 inci	Tiada	Ada
Adik sedang menconteng.															
Ayah memakai tali leher.															
Ayah tersenyum gembira.															
Kakam memegang tiga biji belon.															
Ada corak bintang di baju kakak.															
Ibu membawa beg kecil.															
Ada air tertumpah dari cawan.															
Alat permainan adik bersepad di lantai.															
Cermin mata abang berbentuk oval.															
Baju adik kotor.															
Ayah sedang melambai tangan.															
Hanya adik yang tidak senyum.															
Adik sedang melukis.															
Abang suka belajar subjek Matematik.															
Ayah memakai baju kemeja.															
JUMLAH															JUMLAH SEKOLAH
		15	15	15	15	15	15	15	15	15	15	15	15	15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

F82 Ayat Tanya

Arahan: Tunjukkan rajah 3 kepada pelatih. Perkenalkan watak dan perbuatan yang mungkin berlaku di dalam gambar.
Kenalkan: 1. Kerusi, 2. Meja, 3. Rak, 4. Kaunter dan 5. Lauk-pauk.

Sebut dengan jelas dan pastikan pelatih dapat menyamai ayat yang didengar dengan gambar yang dilihat. Maklumkan kepada pelatih bahawa setiap ayat mempunyai kaitan secara langsung atau tidak langsung dengan gambar ini.

S72. Kenalpasti

Minta pelatih MENGULANG sebutan keseluruhan perkataan dalam ayat yang didengar. Kira jumlah perkataan yang diulang pelatih. Tandakan 1 jika pelatih berjaya menyebut KESEMUA perkataan dalam ayat dan 0 jika tidak lengkap atau tidak berjaya.

Stimulus	Kerumitan Latihan	Jumlah perkataan	Latar belakang bising				Tanpa latar belakang bising			
			Unggan		Kadar sebutan		Unggan		Kadar sebutan	
			Tiada	Ada	Biasa	Panjang	Tiada	Ada	Biasa	Panjang
Ada berapa kerusi?		3								
Ada berapa meja dalam restoran ini?		6								
Di mana nasi?		2								
Apa yang di jual di sini?		4								
Apa yang di susun di rak belakang kaunter?		6								
Berapa harga makanan yang dibeli?		5								
Siapa nak ikut saya beli makanan?		6								
Kamu suka makan ayam masak kari?		6								
Apa yang kamu ingin beli di sini?		6								
Di mana sayur-sayuran?		2								

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tanah:

Stimulus	Kerumitan Latihan	Jumlah petak	Latar belakang bising						Tanpa latar belakang bising						Jumlah SEMUA			
			Ungaran		Kadar sebutan		Jarak	Ku verbal/ muka	Ungaran		Kadar sebutan		Jarak	Ku verbal/ muka				
			Tiada	Ada	Biasa	Panjang	1 meter 6 inci	Tiada	Ada	Tiada	Ada	Biasa	Panjang	1 meter 6 inci		Tiada	Ada	
Di mana pelayan restoran?		3																
Kamu suka makan apa?		4																
Di sini ada jual roti canai?		5																
Lauk apa yang paling sedap?		5																
Tunjukkan di mana lauk-pauk?		3																
Jumlah		66	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tanya pelatih sama ada

	Kerumitan Latihan	Latar belakang bising				Tanpa latar belakang bising			
		Ungaran	Kadar sebutan	Jarak	Kiu verbal/ muka	Ungaran	Kadar sebutan	Jarak	Kiu verbal/ muka
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21	21	21
22	22	22	22	22	22	22	22	22	22
23	23	23	23	23	23	23	23	23	23
24	24	24	24	24	24	24	24	24	24
25	25	25	25	25	25	25	25	25	25
26	26	26	26	26	26	26	26	26	26
27	27	27	27	27	27	27	27	27	27
28	28	28	28	28	28	28	28	28	28
29	29	29	29	29	29	29	29	29	29
30	30	30	30	30	30	30	30	30	30
31	31	31	31	31	31	31	31	31	31
32	32	32	32	32	32	32	32	32	32
33	33	33	33	33	33	33	33	33	33
34	34	34	34	34	34	34	34	34	34
35	35	35	35	35	35	35	35	35	35
36	36	36	36	36	36	36	36	36	36
37	37	37	37	37	37	37	37	37	37
38	38	38	38	38	38	38	38	38	38
39	39	39	39	39	39	39	39	39	39
40	40	40	40	40	40	40	40	40	40
41	41	41	41	41	41	41	41	41	41
42	42	42	42	42	42	42	42	42	42
43	43	43	43	43	43	43	43	43	43
44	44	44	44	44	44	44	44	44	44
45	45	45	45	45	45	45	45	45	45
46	46	46	46	46	46	46	46	46	46
47	47	47	47						

[illegible]

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F.8.3 Ayat Perintah

Arahan: Tunjukkan rajah 4 kepada pelatih. Perkenalkan watak dan perbuatan yang mungkin berlaku di dalam gambar.

Kenalpasti: 1. Tempat letak kereta, 2. Rumah satu tingkat, 3. Rumah dua tingkat, 4. Sekolah, 5. Stesen bas, 6. Balai polis, 7. Peti surat, 8. Bendera, 9. Jalan dan 10. Pintu balai polis

Sebut dengan jelas dan pastikan pelatih dapat menyamai ayat yang didengar dengan gambar yang dilihat. Maklumkan kepada pelatih bahawa setiap ayat mempunyai kaitan secara langsung atau tidak langsung dengan gambar ini.

S74. Kenalpasti

Minta pelatih MENGULANG sebutan keseluruhan perkataan dalam ayat yang didengar. Kira jumlah perkataan yang diulang pelatih. Tandakan 1 jika pelatih berjaya menyebut KESEMUA perkataan dalam ayat dan 0 jika tidak lengkap atau tidak berjaya.

Stimulus	Kerumitan Latihan	Jumlah perkataan	Latar belakang bising								Tanpa latar belakang bising							
			Ungaran		Kadar sebutan		Jarak		Kira verbal / muka		Ungaran		Kadar sebutan		Jarak		Kira verbal / muka	
			Tekah	Ala	Elasa	Papang	1 meter	6 inci	Tekah	Ala	Tekah	Ala	Elasa	Papang	1 meter	6 inci	Tekah	Ala
Tunjuk semua tempat letak kereta.		5																
Tunjuk semua rumah satu tingkat.		5																
Pergi ke sekolah.		2																
Lalu di hadapan stesen bas.		4																
Tunjuk balai polis dan stesen bas.		6																
Kira semua rumah dua tingkat.		5																
Pergi ke tempat letak kereta sebelah sekolah.		6																
Pergi ke hadapan stesen bas.		4																
Pergi ke rumah di sebelah balai polis.		5																
Cari peti surat.		3																

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Stimulus	Kerumitan Latihan	Jumlah perkataan	Latar belakang bising								Tanpa latar belakang bising											
			Ungtaran		Kadar sebutan		Jarak		Klu verbal/ muka		Ungtaran		Kadar sebutan		Jarak		Klu verbal/ muka					
			Tiada		Ada		Biasa		Panjang		1 meter		5 inci		Tiada		Ada		Tiada		Ada	
			Tiada		Ada		Tiada		Ada		Tiada		Ada		Tiada		Ada		Tiada		Ada	
Kira semua bangunan dalam peta.		5																				
Tunjuk balai polis dan semua rumah.		6																				
Cari bendera.		2																				
Tunjuk bangunan di sebelah sekolah.		4																				
Tunjuk pintu balai polis.		4																				
Jumlah		65	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

S75. Kefahaman

Tanya pelatih sama ada pelatih faham atau tidak faham ayat yang didengar. Pelatih perlu memberi respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan dengan tepat. Jawapan 'tepat' bermakna pelatih boleh memberi jawapan sebenar atau menyatakan 'tidak tahu' kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

memberi jawapan lain yang menunjukkan pelain tamam. Jawapan tidak penuh dalam ayat lengkap. Tandakan '1' jika berjaya dan '0' jika tidak berjaya.																		
Stimulus	Kerumitan Latihan						Latar belakang biasa				Tanpa latar belakang biasa							
							Ungkapan	Kadar sebutan	Jarak	Ku verbal/ muka	Ungkapan	Kadar sebutan	Jarak	Ku verbal/ muka				
	Tiada	Ada	Biasa	Paling	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Tiada	Ada	Biasa	Paling	1 meter	6 inci	Tiada	Ada
Tunjuk semua tempat letak kereta.																		
Tunjuk semua rumah satu tingkat.																		
Pergi ke sekolah.																		
Lalu di hadapan stesen bas.																		
Tunjuk balai polis dan stesen bas.																		
Kira semua rumah dua tingkat.																		
Pergi ke tempat letak kereta sebelah sekolah.																		
Pergi ke hadapan stesen bas.																		
Pergi ke rumah di sebelah balai polis.																		
Cari peti surat.																		
Kira semua bangunan dalam peta.																		
Tunjuk balai polis dan semua rumah.																		
Cari bendera.																		
Tunjuk bangunan di sebelah sekolah.																		
Tunjuk pintu balai polis.																		
JUMLAH																		JUMLAH SEMUA
	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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Tarikh: _____

F.8.4 Ayat Rawak

Arahan: Tunjukkan rajah 5 kepada pelatih. Perkenalkan watak dan perbuatan yang mungkin berlaku di dalam gambar.

Kenalkan: 1. Awan, 2. Pokok kelapa, 3. Kerang, 4. Siput, 5. Ombak, 6. Matahari, 7. Langit, 8. Pelampung, 9. Penyodok, 10. Bola dan 11. Baldi.

Sebut dengan jelas dan pastikan pelatih dapat menyamai ayat yang didengar dengan gambar yang dilihat. Maklumkan kepada pelatih bahawa setiap ayat mempunyai kaitan secara langsung atau tidak langsung dengan gambar ini.

S76. Kenalpasti

Minta pelatih MENGULANG sebutan keseluruhan perkataan dalam ayat yang didengar. Kira jumlah perkataan yang diulang pelatih. Tandakan 1 jika pelatih berjaya menyebut KESEMUA perkataan dalam ayat dan 0 jika tidak lengkap atau tidak berjaya.

perkataan dalam ayat dan 0 jika tidak mengikut atau tidak beraya		Kerumitan Latihan	Jumlah perkataan	Latar belakang biasa						Tanpa latar belakang biasa						
				Unggan		Kadar sebutan	Jarak	Klu verbal/ muka		Unggan		Kadar sebutan	Jarak	Klu verbal/ muka		
Tiada	Ada			Blaua	Paling	1 meter	6 inci	Tiada	Ada	Tiada	Ada	Blaua	Paling	1 meter	6 inci	Tiada
Stimulus																
Tunjuk awan dan pokok kelapa.		5														
Mana bola dan pelampung?		4														
Sila kutip kerang dan siput.		5														
Ada satu tapak sulaiman.		4														
Ombak pantai sangat tenang.		4														
Malahari memancar dengan cahaya indah.		5														
Tunjuk ombak dan langit.		4														
Ada pelampung, bola dan penyodok.		5														
Petik buah kelapa untuk diminum.		5														
Masukkan semua siput ke dalam baldi.		5														

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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	Kerumitan Latihan	Jumlah perkataan	Latar belakang bising								Tanpa latar belakang bising								Jumlah semua	
			Ulangan				Jarak				Ulangan				Jarak					
			Kadar sebutan		Kui verbal/ muka		Kadar sebutan		Kui verbal/ muka		Kadar sebutan		Kui verbal/ muka		Kadar sebutan		Kui verbal/ muka			
			Tisla	Ada	Biasa	Panjang	1 meter	6 inci	Tisla	Ada	Tisla	Ada	Biasa	Panjang	1 meter	6 inci	Tisla	Ada		
Stimulus																				
Kira semua siput.		3																		
Kira semua awan kecil.		4																		
Ada berapa buah kelapa?		4																		
Ada sebiji bola dalam gambar.		5																		
Mana baldi, bola dan pelampung?		5																		
Jumlah		67	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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S77. Keahaman

Tanya pelatih sama ada pelatih faham atau tidak faham ayat yang didengar. Pelatih perlu memberi respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan dengan tepat. Jawapan tepat bermakna pelatih boleh memberi jawapan sebenar atau menyatakan 'tidak tahu' kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan	Latar belakang bising										Tanpa latar belakang bising										JUMLAH SEMUA
		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka		Ulangan		Kadar sebutan		Jarak		Klu verbal/ muka						
		Tisla	Ada	Biasa	Panjang	1 meter	6 inci	Tisla	Ada	Tisla	Ada	Biasa	Panjang	1 meter	6 inci	Tisla	Ada					
Tunjuk awan dan pokok kelapa.																						
Mana bola dan pelampung?																						
Sila kutip kerang dan siput.																						
Ada satu tapak sulaiman.																						
Ombak pantai sangat tenang.																						
Malahari memancar dengan cahaya indah.																						
Tunjuk ombak dan langit.																						
Ada pelampung, bola dan penyodok.																						
Petik buah kelapa untuk diminum.																						
Masukkan semua siput ke dalam baldi.																						
Kira semua siput.																						
Kira semua awan kecil.																						
Ada berapa buah kelapa?																						
Ada sebiji bola dalam gambar.																						
Mana baldi, bola dan pelampung?																						
JUMLAH		/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	240		

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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Tarikh: _____

F.8.5 Ayat Rawak

Arahan: Tunjukkan rajah 6 kepada pelatih. Perkenalkan watak dan perbuatan yang mungkin berlaku di dalam gambar.
Kenakan: 1. Lukisan pemandangan di tepi pantai, 2. Bantal kecil, 3. Sofa, 4. Lampu, 5. Tingkap, 6. Pasu bunga tanah liat, 7. Permaidani dan 8. Lantai.

Sebut dengan jelas dan pastikan pelatih dapat menyamai ayat yang didengar dengan gambar yang dilihat. Muktumikan kepada pelatih bahawa setiap ayat mempunyai kaitan secara langsung atau tidak langsung dengan gambar ini.

S78. Kenalpasti

Minta pelatih MENGULANG sebutan keseluruhan perkataan dalam ayat yang didengar. Kira jumlah perkataan yang diulang pelatih. Tandakan 1 jika pelatih berjaya menyebut KESEMUA perkataan dalam ayat dan 0 jika tidak lengkap atau tidak berjaya.

Stimulus	Kerumitan Latihan	Jumlah perkataan	Latar belakang bising				Tanpa latar belakang bising			
			Unggan	Kadar sebutan	Jarak	Ku verbal/ muka	Unggan	Kadar sebutan	Jarak	Ku verbal/ muka
			Tiada	Ada	Biasa Panjang	1 meter 6 inci	Tiada	Ada	Biasa Panjang	1 meter 6 inci
Mana lukisan pemandangan di tepi pantai?		5								
Terdapat empat bantal kecil di sofa.		5								
Meja kopi berbentuk tiga segi.		5								
Ada pokok berdaun cantik di sebelah sofa.		6								
Jangan lupa pasang lampu.		4								
Tingkap-tingkap besar mengindahkan ruang tamu.		5								
Lampu dinding itu terlalu terang.		5								
Pasu bunga dibuat daripada tanah liat.		6								
Tunjuk semua bantal kecil.		4								
Di mana langsir?		2								

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

	Kerumitan Latihan	Jumlah perkataan	Latar belakang bisik								Tanpa latar belakang bisik								Jumlah semua
			Unggan				Kawar sebatan				Jarak				Kiu verbal/ muka				
			Unggan		Kawar sebatan		Jarak		Kiu verbal/ muka		Unggan		Kawar sebatan		Jarak		Kiu verbal/ muka		
			Tidak	Ada	Biasa	Panjang	1 meter	6 inci	Tidak	Ada	Tidak	Ada	Biasa	Panjang	1 meter	6 inci	Tidak	Ada	
Stimulus																			
Lantai bersih berkilat.		3																	
Kerusi ini amat empuk.		4																	
Permaidani dihampar di hadapan sofa.		4																	
Tunjuk pokok dalam gambar?		4																	
Adakah terdapat jam dinding dalam gambar?		6																	
Jumlah		68	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh :

S79. Kerahaman

Tanya pelatih sama ada pelatih faham atau tidak faham ayat yang didengar. Pelatih perlu memberi respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan dengan tepat. Jawapan 'tepat' bermakna pelatih boleh memberi jawapan sebenar atau menyatakan 'tidak tahu' kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan					Tema literbelakang biring				
	Literbelakang biring					Tema literbelakang biring				
	Ungan	Kadar sebutan	Jarak	Ku verbal/ muka		Ungan	Kadar sebutan	Jarak	Ku verbal/ muka	
Mana lukisan pemandangan di tepi pantai?	Tiada	Ada	Biasa	Panjang	1 meter	6 inci	Tiada	Ada	Tiada	Ada
Terdapat empat bantal kecil di sofa.										
Meja kopi berbentuk tiga segi.										
Ada pokok berdaun cantik di sebelah sofa.										
Jangan lupa pasang lampu.										
Tingkap-tingkap besar mengindahkan ruang tamu.										
Lampu dinding itu terlalu terang.										
Pasu bunga dibuat daripada tanah liat.										
Tunjuk semua bantal kecil.										
Di mana langsir?										
Lantai bersih berkilat.										
Kerusi ini amat empuk.										
Permaidani dihamper di hadapan sofa.										
Tunjuk pokok dalam gambar?										
Adakah terdapat jam dinding dalam gambar?										
JUMLAH										JUMLAH SEMUA
	/15	/15	/15	/15	/15	/15	/15	/15	/15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarik:

F.8.6 Menjawab Soalan Pendek

Arahan: Terangkan kepada pelatih yang tiada sebarang salinan stimulus akan diberikan. Minta pelatih jawab soalan yang didengar.

S80. Ketahanan (Topik: Diri sendiri)

Tanya pelatih sama ada pelatih faham atau tidak faham ayat yang didengar. Pelatih perlu memberi respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan dengan tepat. Jawapan 'tepat' bermakna pelatih boleh memberi jawapan sebenar atau menyatakan 'tidak tahu' kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap. Soalan yang diberi boleh dipermudahkan atau ditambah penjelasan dan mesti diletakkan sebagai ada 'ulangan'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Kerumitan Latihan		Latar belakang bising				Tanpa latar belakang bising								
			Ulangan		Jarak		Kui verbal/ruka		Ulangan		Jarak		Kui verbal/ruka		
			Tiada	Ada	Basa	Panjang	1 meter	6 inci	Tiada	Ada	Basa	Panjang	1 meter	6 inci	Tiada
Siapa nama penuh anda?															
Apakah nama timangan anda?															
Siapa nama ibu dan bapa anda?															
Adakah anda sudah berkahwin?															
Apakah pekerjaan anda?															
Bilakah tarikh lahir anda?															
Berapakah umur anda?															
Berapakah tinggi anda?															
Di manakah anda tinggal?															
Dimanakah anda dilahirkan?															
Berikan alamat penuh anda.															
Apakah nombor telefon anda?															
Dengan apa anda datang tadi?															
Siapakah yang tinggal bersama anda?															
Berapa jumlah adik beradik anda?															
Jumlah	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	/15	240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

Tarikh: _____

S81. Kefahaman (Topik: Informasi Umum)

Tanya pelatih sama ada pelatih faham atau tidak faham ayat yang didengar. Pelatih perlu memberi respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan dengan tepat. Jawapan 'tepat' bermakna pelatih boleh memberi jawapan sebenar atau menyatakan 'tidak tahu' kerana tiada pengetahuan tentang jawapan soalan itu atau memberi jawapan lain yang menunjukkan pelatih faham. Jawapan tidak perlu dalam ayat lengkap. Soalan yang diberi boleh dipermudahkan atau ditambah penjelasan dan mesti diletakkan sebagai ada 'ulangan'. Tandakan 1 jika berjaya dan 0 jika tidak berjaya.

Stimulus	Latar belakang bising				Tanpa latar belakang bising			
	Kerumitan Latihan		Ungaran		Kerumitan Latihan		Ungaran	
	Tiada	Ada	Kadar sebulan	Jarak	Tiada	Ada	Kadar sebulan	Jarak
Bagaimana cuaca hari ini?								
Apakah berita terkini hari ini?								
Siapakah Perdana Menteri kita sekarang?								
Adakah malam tadi hujan?								
Di mana tempat pelancongan yang digemari?								
Bangunan apa tertinggi di Malaysia?								
Sebutkan negeri yang bermula dengan huruf "S"?								
Kucing ada berapa kaki?								
Binatang apa yang berbisa?								
Apakah ibu negara Malaysia?								
Dalam setahun ada berapa bulan?								
Bunga apa yang wangi?								
Adakah gula manis?								
Namakan kereta keluaran Malaysia.								
Namakan makanan yang pedas.								
Jumlah	/15	/15	/15	/15	/15	/15	/15	/15
								Jumlah Semua
								240

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

APPENDIX XII

PLAM PELATIH



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Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 2

BAHAGIAN B: BORANG UJIAN SARINGAN PLAM

Arahan: Sila dengar arahan dari jurupulih.

B.1 Ujian Kenalpasti Bunyi Persekitaran

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus B.1.

KUCING	GURUH

B.2 Ujian Kenalpasti Fonem

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus B.2

/a/	/i/	/u/	
/m/	/s/	/ʃ/	

B.3 Ujian Kenalpasti Perkataan (berbeza sukukata)

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus B.3

bas	isi	
mengkuang	keluarga	

B.4 Ujian Kenalpasti Perkataan (gabungan konsonan dan enam vokal)

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus B.4

minit	putih
gelap	keju
topi	satu

B.5 Ujian Pembezaan Perkataan

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus B.5

bagi	pagi
titi	pipi
suka	cuka
nadi	tadi
rang	yang

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

B.6. Ujian Pembezaan Ayat

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus B.6

Ramai orang sedang beratur di	bank zoo

Ayam goreng ini terlebih masin
Ikan

Jika pergi ke kedai, tolong belikan	ubi roti	bakar dua set

B.7 Ujian Kenalpasti Ayat

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus B.7

Apa khabar anda hari _____?	
_____ pekerjaan awak?	
Apakah _____ awak?	
Kurangkan makan makanan _____.	

B.8 Ujian Kefahaman Ayat

Arahan: Beri respons kepada stimulus yang didengar dengan cara menunjukkan pada gambar yang betul atau menjawab soalan yang diberi. Anda boleh memberi apa-apa jawapan yang menggambarkan kefahaman anda dalam ayat lengkap atau ayat perbualan biasa.

-tiada bantuan visual-

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 5

BAHAGIAN E: LATIHAN BERKAITAN JENIS BUNYI

E.1 BUNYI ENAM LING (LING SIX SOUNDS)

Arahan: Anda akan diperkenalkan kepada bunyi seperti di dalam Rajah 1. Apabila anda telah kenal bunyi dan gambar tersebut, anda diminta sama ada

1. Sebut 'ada'/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/tiada') **atau** angguk kepala/geleng kepala **atau** buat isyarat tangan yang difahami sebagai 'ada'/tiada' **atau** tulis 'ada'/tiada'.
2. Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Rajah 1: Bunyi Enam Ling

/a/ 	/i/ 
/u/ 	/m/ 
/s/ 	/ʃ/ 

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 6

E.2 BUNYI PERSEKITARAN

Arahan: Anda akan diperkenalkan kepada bunyi berikut. Apabila anda telah kenal bunyi, anda diminta sama ada

1. Sebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') **atau** angguk kepala/geleng kepala **atau** buat isyarat tangan yang difahami sebagai 'ada/tiada' **atau** tulis 'ada/tiada'.
2. Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus 1: Bunyi Persekitaran

Kapal Terbang	Tepuk Tangan
Bayi Menangis	Burung
Enjin Kereta Dimulakan	Kucing
Sudu Cawan	Lembu
Cengkerik	Orang Ramai
Anjing	Ketukan Pintu
Itik	Kunci
Siren Polis	Guruh
Trafik dan hon	Air Menitik

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 7

E.3 FONEMBUNYI

Arahan: Anda akan diperkenalkan kepada bunyi berikut. Apabila anda telah kenal bunyi, anda diminta sama ada

1. Sebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') **atau** angguk kepala/geleng kepala **atau** buat isyarat tangan yang difahami sebagai 'ada'/'tiada' **atau** tulis 'ada'/'tiada'.
2. Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

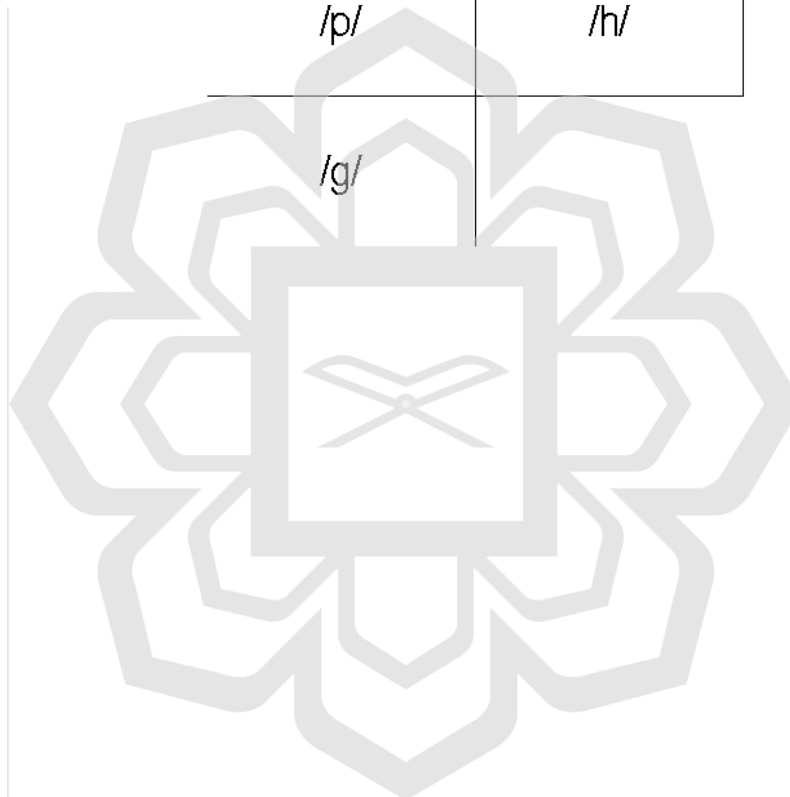
Stimulus 2: Fonem pada Frekuensi <500 Hz

/u/		/e/	/z/
/v/		/dʒ/	/m/
/d/		/b/	/n/
/ŋ/		/l/	

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 8

Stimulus 3: Fonem pada Frekuensi 501 – 2000 Hz

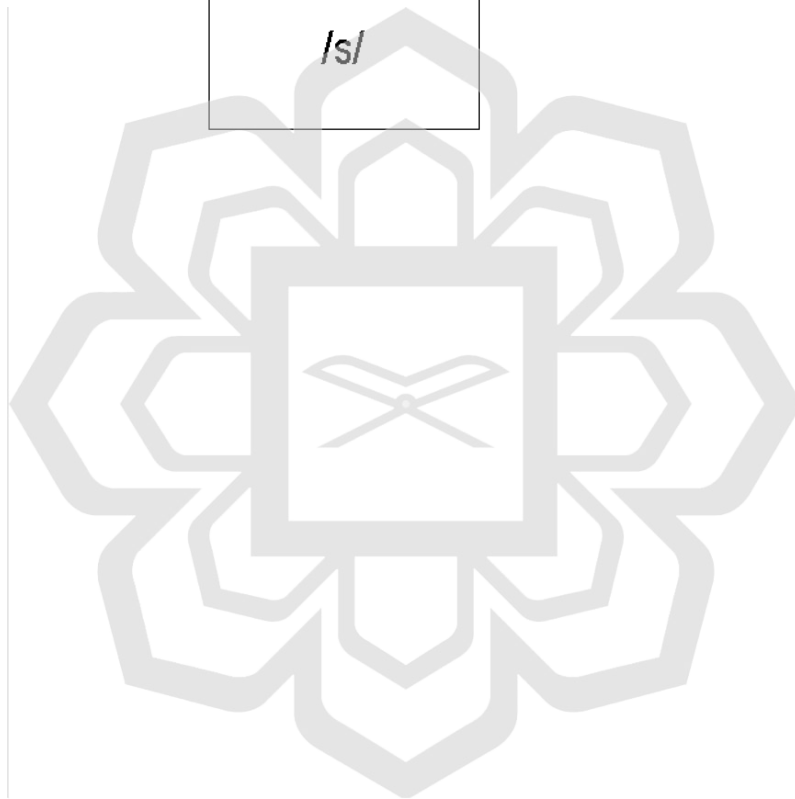
/o/	/l/
/a/	/r/
/p/	/h/
/g/	



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 9

Stimulus 4: Fonem pada Frekuensi >2000 Hz

/tʃ/	/ʃ/
/k/	/f/
/s/	



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 10

BAHAGIAN F: NAHU BAHASA MELAYU

Arahan: Anda akan diperkenalkan kepada bunyi berikut. Apabila anda telah kenal bunyi, anda diminta sama ada

1. Sebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') **atau** angguk kepala/geleng kepala **atau** buat isyarat tangan yang difahami sebagai 'ada/tiada' **atau** tulis 'ada/tiada'.
2. Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

F.1 FONEM

Stimulus 5: Fonem Pertuturan

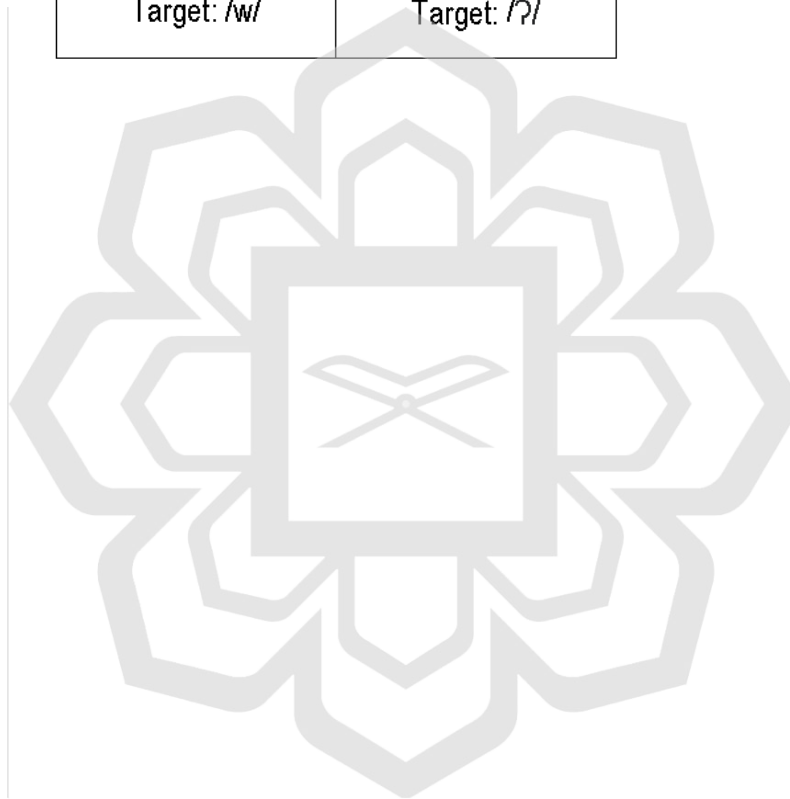
iii (kotor) Target: /i/	u, u, u (monyet) Target: /u/	errr (fikir) Target: /ə/
eh? (terkejut) Target: /e/	Ooo (faham) Target: /o/	aaa (kapal terbang) Target: /a/
mmm (sedap) Target: /m/	ne no (ambulans) Target: /n/	nyii (nyamuk) Target: /ŋ/
ting-tong (loceng) Target: /ŋ/	pop (meletup) Target: /p/	bam (bola) Target: /b/

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 11

tap tap (air) Target: /t/	dup dap (jantung) Target: /d/	kuek-kuek (itik) Target: /k/
gong gong (anjing) Target: /g/	cit-cit (tikus) Target: /tʃ/	jom (ajak) Target: /dʒ/

fuh (tiup) Target: /f/	vroom (kereta) Target: /v/	ssss (ular) Target: /s/
zzz (lebah) Target: /z/	shh (diam) Target: /ʃ/	haha (ketawa) Target: /h/

brrrr (sejuk) Target: /r/	lala (nyanyi) Target: /l/	yeah (gembira) Target: /j/
wow (cantik) Target: /w/	tok tok (ketuk pintu) Target: /ʔ/	



F.2 SUKUKATA

Arahan: Anda akan diperkenalkan kepada bunyi berikut. Apabila anda telah kenal bunyi, anda diminta sama ada

1. Sebut 'ada/tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada/tiada') **atau** angguk kepala/geleng kepala **atau** buat isyarat tangan yang difahami sebagai 'ada/tiada' **atau** tulis 'ada/tiada'.
2. Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus 6: Satu Sukukata

bas	bank	gam	hak

jam	kek	kau	lap
mi	nak	pos	ru
sen	sup	pau	tin
wang	yang	dan	zat

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 14

Stimulus 7: Dua Sukukata

isi	elok	aku	ubi
otak	bisa	gangsa	ufti

roti	inti	engsel	angkat
undi	ombak	bimbang	tembak

bantu	sumbat	borang	ibu
pilih	bulan	ilmu	takut

Stimulus 8: Tiga Sukukata

mengkuang	biawak	usia	semua
sempurna	tempua	jadual	istana

kalendar	ijazah	ilmiah	kemboja
gelanggang	cecair	tuala	bahasa
tempurung	belanja	basikal	amanah
cangkerang	cuaca	durian	telefon

Stimulus 9: Empat dan Lebih Sukukata

keluarga	sederhana	kebangsaan
universiti	akuarium	kecemasan

pekerjaan	anugerah	masyarakat
bahagian	matahari	cenderamata

pelihara	samudera	tanggungjawab
istimewa	operasi	warganegara

destinasi	perkataan	laksamana
sentiasa	olahraga	tradisional

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 17

F.3 PERKATAAN DENGAN GABUNGAN KONSONAN DAN ENAM VOKAL

Arahan: Anda akan diperkenalkan kepada bunyi berikut. Apabila anda telah kenal bunyi, anda diminta sama ada

1. Sebut 'ada'/'tiada' (atau sebarang sebutan yang menggambarkan stimulus 'ada'/'tiada') **atau** angguk kepala/geleng kepala **atau** buat isyarat tangan yang difahami sebagai 'ada'/'tiada' **atau** tulis 'ada'/'tiada'.
2. Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus 10: Konsonan + Vokal /i/

minit	nilai	nyiru	ngiau
pintu	bila	tikar	diri
kipas	gigit	cili	jimat
fikir	vitamin	siang	zirafah
syiling	hidung	riang	limau
yis	wira	adik	

Stimulus 11: Konsonan + Vokal /u/

muka	nuri	nyut	ngundang
putih	buku	tujuh	duduk

kuda	gula	cuba	jual
fungsi	vulkan	sudu	zoo

syukur	hujan	rumah	lukis
yuran	wujud	tusuk	

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 19

Stimulus 12: Konsonan + Vokal /a/

mekar	negara	nyepi	ngeri

penuh	benda	telur	demam
kedai	gelap	cepat	jemput

fertigasi	versi	sebut	helai
renang	lembu	welas	

Stimulus 13: Konsonan + Vokal /e/

meja	nenek	nyeksa	ngelak
pensel	beca	teks	desa

keju	gebang	cerek	jeti
feri	vena	sembang	zeta

syer	helo	reka	lebar
yeti	web	tenggek	

Stimulus 14: Konsonan + Vokal /o/

motor	nota	nyonya	ngocok
polis	bola	topi	donut

kolam	gosok	comel	johan
folio	vokal	sotong	zohor

syot	hoki	roti	lori
yoga	woksyop	berok	

Stimulus 15: Konsonan + Vokal /e/

maju	naga nyamuk	nganga
pagi	baca tali	dapur

kacang	gajah cawan	jagung
faham	van satu	zaman

syair	habis rajin	laju
yakin	wangi kotak	

F.4 PASANGAN PERKATAAN

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus 16: Voicing Contrast

/b/	/p/
bagi	pagi
tebak	tepak
abi	api
badan	padan
berang	perang
/d/	/t/
dari	tari
diri	tiri
jadi	jati
dada	data
dayang	tayang

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 24

/g/	/k/
gaya	kaya
garam	karam
bagi	baki
gelap	kelab
garang	karang

/b,d,g/	/p,t,k/
had	hak
tekad	tekak
baku	paku
sebab	sebat
gali	tali

Stimulus 17: *Dental/Labial Contrast*

/t/	/b/
tadi	badi
itu	ibu
tuli	buli
tahu	bahu
terus	berus

/d/	/p/
darah	parah
dayang	payang
ada	apa
daku	paku
sedia	sepia

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 26

/d/ daki	/b/ baki
dayang	bayang
datu	batu
dalam	balam
dan	ban
/t/ titi	/p/ pipi
tekan	pekan
tuan	puan
satu	sapu
tadi	padi

Stimulus 18: *Fricatives, Affricates, Stop Contrast*

/f/	/v/
feri	veri
fokal	vokal
fila	vila
firus	virus
fisa	visa

/s/	/z/
sat	zat
asap	azab
sakat	zakat
saman	zaman
sarah	zarah

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 28

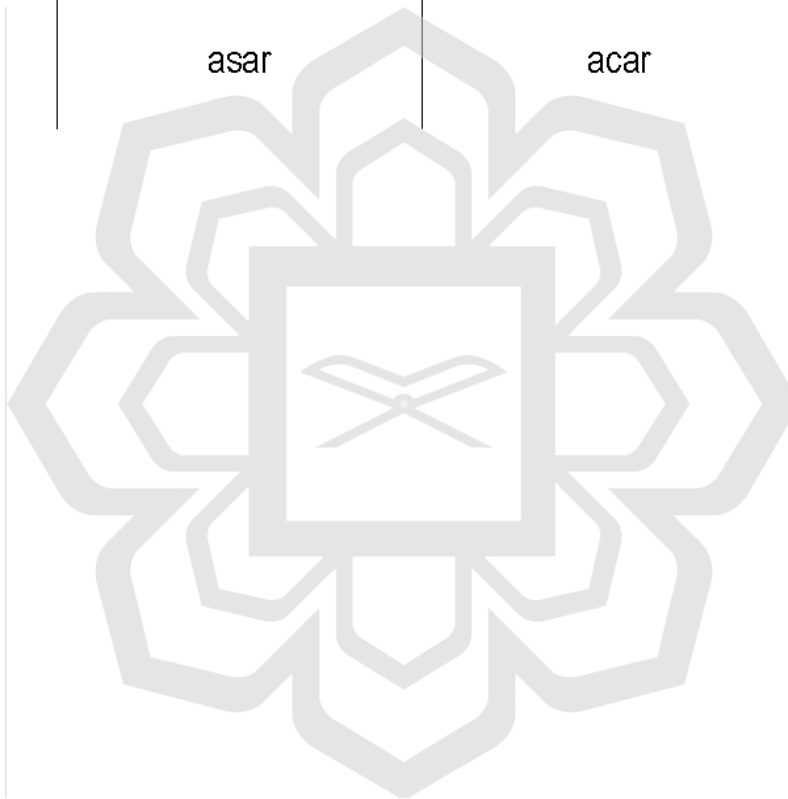
/t/	/dʒ/
cari	jari
curi	juri
baca	baja
cucuk	jujuk
cam	jam

/h/	/ʔ/
sesah	sesak
awah	awak
balah	balak
agah	agak
arah	arak

/s/	/ʃ/
sarat	syarat
siling	syiling
sah	shah
asik	asyik
sifar	syifa

/s/	/dʒ/
silat	jilat
susur	jujur
asar	ajar
sasa	jasa
salur	jalur

/s/ satu	/tj/ catu
suka	cuka
solek	colek
usap	ucap
asar	acar



Stimulus 19: *Nasal/Oral Contrast*

/m/	/p, b/
mati	pati
muka	buka
samar	sabar
kumur	kubur
malam	malap
/n/	/t, d/
nak	tak
naik	daik
nampak	tampak
nadi	tadi
anau	atau

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 32

/ŋ/	/k, g/
sangat	sagat
bunga	buka
bangi	bagi
ingat	ikat
pengat	pekat
/ɲ/	/k, g/
nyata	kata
nyanyi	kaki
bunga	buka
nyala	gala
sunyi	sugi

Stimulus 20: *Liquids Contrast*

<i>l/</i>	<i>r/</i>
lalat	ralat
lusa	rusa
laga	raga
lalang	larang
lantai	rantai
<i>l/</i>	<i>l/</i>
bali	bayi
balu	bayu
silang	siang
salur	sayur
bala	baya

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 34

/r/ sarang	/j/ sayang
ru	yu
rang	yang
mara	maya
kara	kaya
/l/ balu	/j, r/ bayu
balu	baru
balang	barang
balang	bayang
layu	rayu

F.5 PENJEJAKAN WACANA BERTERUSAN

Arahan: Anda dikehendaki mengikut penceritaan dengan menunjukkan jari pada setiap perkataan yang didengar dan BERHENTI apabila cerita berhenti. Sila ulang perkataan terakhir yang didengar.

Teks 1: Gajah Sejati oleh Yusof Gajah

Kononnya pada zaman dahulu tumbuh sebatang pokok yang aneh di sebuah hutan. Penghuni hutan tersebut dilarang memakan buah dari pokok itu.

Pada suatu hari, sekumpulan gajah bermain-main di sekitar Kawasan pokok aneh itu. Gajah-Gajah itu tidak berani untuk mendekati pokok itu apalagi cuba memakan buahnya. Namun, dalam kumpulan gajah itu, ada seekor gajah yang teringin hendak memakan buah dari pokok aneh itu.

“Agaknya, apa akan terjadi sekiranya buah itu dimakan?” Gajah itu berkata dalam hati.

“Baik aku cuba.”

Setiap hari, gajah itu mendekati pokok aneh itu. Pada suatu hari, gajah itu terlupa akan amaran yang sering didengarnya. Gajah itu memakan buah larangan tersebut. Tiba-tiba gajah mendapati dirinya berubah menjadi seekor burung yang ganjil. Kemudian gajah berubah menjadi burung ganjil yang lain pula.

Namun, gajah tetap berasa tidak puas hati. Apabila penat menjadi burung, gajah berubah menjadi seekor ikan. Gajah boleh berenang dan bermain di dasar sungai. Malangnya ikan-ikan lain tidak mahu berkawan dengannya.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 36

“Ikan apakah itu?” Ikan-ikan itu bertanya sesama sendiri.

Semua ikan tidak berani mendekati gajah itu. Gajah itu pun naik ke tebing sungai dan berubah menjadi buaya. Malangnya, semua buaya mentertawakannya.

“Nak dikatakan buaya bentuknya tidak seperti buaya.” Buaya-buaya itu mengejeknya sambil ketawa berdekah-dekah.

Disebabkan gajah sering diketawakan oleh haiwan-haiwan lain, gajah itu pun berubah menjadi seekor naga.

“Kali ini tiada siapa yang berani mentertawakan aku,” kata gajah itu,

Sayangnya, haiwan-haiwan lain tidak takut. Malah, semuanya tergelak apabila melihat gajah yang berubah menjadi naga itu.

Gajah itu pun naik berang dan berubah menjadi burung, ikan, buaya dan naga dengan sekali gus. Bentuknya aneh sekali.

Gajah itu menyesal kerana tidak bersyukur dengan apa-apa yang ada pada dirinya. Setiap hari gajah itu pun berdoa agar dikembalikan kepada bentuk asal.

Akhirnya, pada suatu hari, apabila gajah itu tersedar daripada tidur, badannya berubah menjadi seekor gajah semula. Kini gajah itu kembali menjadi seekor gajah sejati

F.6 KATA KUNCI

Arahan: Sebut semula **atau** tunjuk **atau** tulis **atau** lukis semula stimulus yang didengar.

Stimulus 21: Kata Kunci Di Akhir Ayat

Pembezaan perkataan (rawak) dalam ayat.

Setiap pagi jangan lupa buka	tingkap. langsir.	
Siapa yang datang	semalam?	
	esok?	
Kakak sedang membaca	novel. majalah.	
Cikgu baru itu akan mengajar subjek	Matematik.	
	sukan.	
Pelukis itu melukis pemandangan di tepi	bukit-bukau. sawah.	

Pembezaan perkataan (sama sukukata) dalam ayat.

Ramai orang sedang beratur di	bank.	
	zoo.	
Kedai sedang membuat jualan murah untuk semua jenis	pau.	
	kek.	
Ali sedang mendengar bunyi	ombak.	
	tembak.	
Kerajaan zaman dahulu membayar cukai dengan	ufti.	
	gangsa.	
Setiap perancangan harus ditulis di	jadual.	
	kalendar.	
Pendaki gunung telah terjumpa Gua	Tempua.	
	Kemboja.	
Peserta kursus itu sedang menerima	anugerah.	
	cenderamata.	
Kanak-kanak tadika dibawa melawat	akuarium.	
	universiti.	

Pembezaan perkataan (minimal pairs) dalam ayat.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 39

Ibu sedang membeli sebiji	sayung.
	jagung.

Abang sedang mengecat	siling.
	syiling.

Bilik itu gelap kerana keadaan	malam.
	malap.

Tukang masak sedang memasak	pengat.
kuah	pekat.

Negara itu sedang kucar-kacir kerana	berang.
rakyatnya sedang	perang.

Stimulus 22: Kata Kunci Di Awal Ayat

Pembezaan perkataan (rawak) dalam ayat.

Polis	telah menjumpai kereta yang hilang minggu lepas.
Bomba	

Ayam	goreng ini terlebih masin.
Ikan	

Cincin	emas dia hilang semasa berkelah.	
Rantai		

Bas	itu sedang menghantar pelajar ke sekolah.	
Van		

Harimau	adalah haiwan pemangsa.	
Singa		

Pembezaan perkataan (sama sukukata) dalam ayat.

sup	itu sangat panas. Hati-hati apabila makan.
mi	

tin	telah disimpan di bawah almari.
wang	

Inti	kuih ini sangat sedap dan pedas.
Isi	

Ilmu	amat diperlukan untuk menyinari hidup.
Bulan	

Istana	sukar diperoleh tanpa usaha.
Ijazah	

Mengkuang	dihampar untuk pertandingan silat.
Gelanggang	

Samudera	sering dijadikan metafora dalam puisi.
Matahari	

Masyarakat	Malaysia hidup aman damai.
Warganegara	

Pembezaan perkataan (*minimal pairs*) dalam ayat.

Muka	buku menjadi aktiviti anak muda
Buka	sekarang.

Lantai	itu sangat berkilat selepas di cuci.
Rantai	

Salur	air di laman telah bocor.
Jalur	

Tuan	diminta hadir untuk mesyuarat tahunan.
Puan	

Cucuk	kayu disusun sekitar kebun untuk
Jujuk	menghalang binatang perosak.

Stimulus 23: Kata Kunci di Tengah Ayat

Pembezaan perkataan (rawak) dalam ayat.

Rumah warna	hijau kuning	itu sangat cantik.
Kucing itu sedang mengoyang-goyangkan	kepala ekor	ke kiri dan ke kanan.
Jangan lupa masukkan	gula garam	dalam masakan itu.
Pemberita televisyen	melaporkan mendedahkan	berita terkini setiap malam.
Orang ramai dinasihatkan untuk	berlari bersenam	setiap hari untuk menjaga kesihatan.

Pembezaan perkataan (sama sukukata) dalam ayat.

Mereka sedang membincangkan kes tiada	hak zat	di kalangan kanak-kanak.

Cikgu pesan supaya membawa	jam gam	esok ke sekolah.

Jika pergi ke kedai, tolong belikan	ubi roti	bakar dua set

Adik sedang memanggil	ibu aku	dengan penuh kasih sayang.

Benda itu tidak dapat dikenal pasti kerana	tempurung cengkerang	nya berbentuk pelik.

Ali suka	telefon basikal	yang berwarna merah.

Setiap orang mempunyai	pekerjaan tanggungjawab	sendiri.

Persembahan itu terlihat	istimewa tradisional	apabila ditarikan oleh kanak-kanak.

Pembezaan perkataan (minimal pairs) dalam ayat.

Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja. 45

Hati-hati, kerana sungai itu	dalam	dan tidak nampak dasarnya.
	balam	

Kesemua	balang	tersebut harus disimpan rapi.
	barang	

Burung itu membuat tanda	sarang	kepada anak-anaknya.
	sayang	

Abu sering terlihat	ru	di pantai itu.
	yu	

Ustaz sedang	asar	di surau.
	ajar	

F.7 ISI TEMPAT KOSONG

Arahan: Dengar kesemua perkataan dalam ayat berikut. Sebut semula **atau** tulis semula perkataan yang berada di tempat kosong.

Stimulus 24: Kesihatan

Apa khabar anda hari ____?	
Adakah ____ ____?	
Adakah ____ ____ ____?	
Adakah anda tidur nyenyak ____?	
Adakah anda mempunyai ____ ____?	
Lakukan senaman seperti berjalan di sekitar rumah ____ ____ ____.	
Apakah sukan kegemaran ____?	
Kesihatan amatlah penting untuk ____ ____.	
Jika anda berasa tidak sihat, silalah segera ____ ____ ____.	
Kesihatan merangkumi dua aspek iaitu kesihatan fizikal dan ____.	
Jangan abaikan ____ ____.	
Kita seharusnya minum lapan ____ ____ ____.	
Makanlah makanan yang ____.	
Berapa jam sehari ____ ____?	
Adakah ____ ____ ____.	

Stimulus 25: Pekerjaan

_____ pekerjaan awak?	
_____ pergi ke tempat kerja?	
_____ pulang dari kerja?	
_____ awak bekerja?	
_____ jenis pekerjaan di Malaysia.	
_____ idea dan tenaga untuk memajukan profesion pekerjaan saya.	
_____ seseorang perlu dilaksanakan dengan amanah.	
_____ amanah ketika melaksanakan tugas sebagai seorang pekerja.	
_____ profesion lain.	
_____ aktiviti bersama keluarga boleh dilakukan semasa cuti.	
_____ adalah hari pekerja sedunia.	
_____ pekerjaan saya.	
_____ apakah awak cuti bekerja?	
_____ idaman awak?	
_____ pekerjaan anda?	

Stimulus 26: Rutin Harian

Apakah perkara _____ yang awak lakukan setelah bangun dari tidur?	
Apakah _____ awak?	
Adakah _____ rambut setiap hari?	
Ketuk pintu _____ masuk ke dalam rumah.	
Jangan lupa _____ dan pintu sebelum malam.	
Tolong buang sampah di dalam _____ di luar rumah.	
Sebelum _____ kita haruslah menggosok gigi supaya gigi tidak rosak.	
Jangan _____ untuk menjaga kesihatan.	
Sila bersihkan _____ kali selesai makan.	
Saya akan membaca _____ setiap hari.	
Makan _____ tidur.	
Makan bersama-sama _____ tali persaudaraan.	
Saya mempunyai _____ untuk mengisi masa lapang.	
Cuci _____ hari Sabtu.	
Kemas rumah dan _____ setiap pagi.	

Stimulus 27: Makanan

Saya mempunyai ____ terhadap makanan ____.	
Kita harus mengurangkan penggunaan ____ dalam masakan.	
Sayur-sayuran dan buah-buahan adalah ____ ____ ____.	
____ makan makanan yang manis.	
Apakah ____ ____ awak?	
Siapakah yang ____ ____ ____ ini?	
Di manakah awak membeli kuih ____ pelita ini?	
Bagaimanakah cara untuk ____ ____ ____ ?	
Makanan yang ____ amatlah penting untuk ____ ____ dan nutrien yang cukup.	
Kurangkan makan makanan ____.	
____ makanan adalah ____ terbaik untuk pemakanan yang sihat.	
Sayur-sayuran dan buah-buahan baik untuk ____.	
Saya ____ ____ lagi.	
Makanan yang ____ ____ tidak elok untuk di makan.	
Pastikan makanan yang dibeli masih ____.	

F.8 JENIS-JENIS AYAT

Arahan: Anda akan diperkenalkan dengan watak dan perbuatan yang mungkin berlaku di dalam gambar. Anda akan diminta sama ada

1. mengulangi perkataan dalam ayat yang diben atau menulis semula ayat yang didengar
2. menunjukkan gambar yang berkaitan atau menjawab soalan dengan tepat.

Rajah 1: Keluarga



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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Rajah 2: Restoran



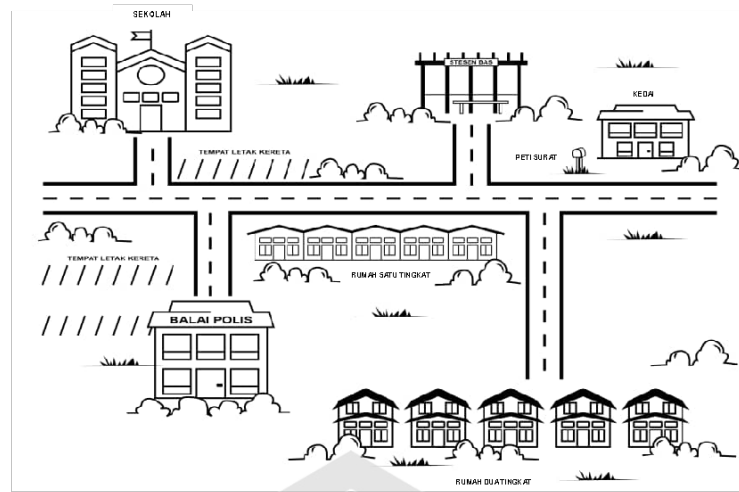
Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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Rajah 3:

Peta

-SALINAN PELATIH-



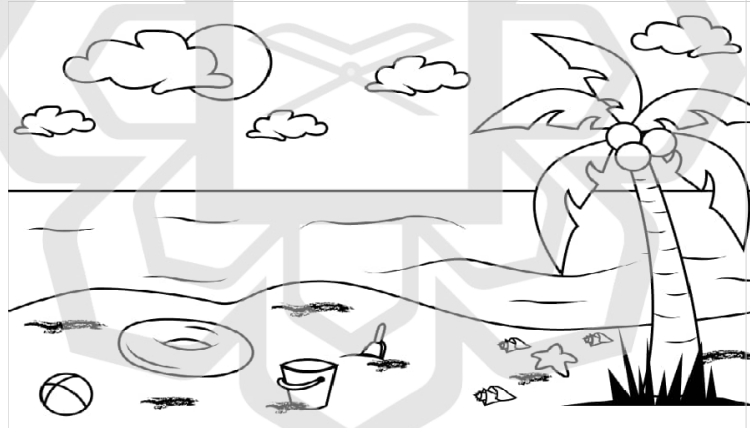
Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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Rajah 4:

Pantai

-SALINAN PELATIH-



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

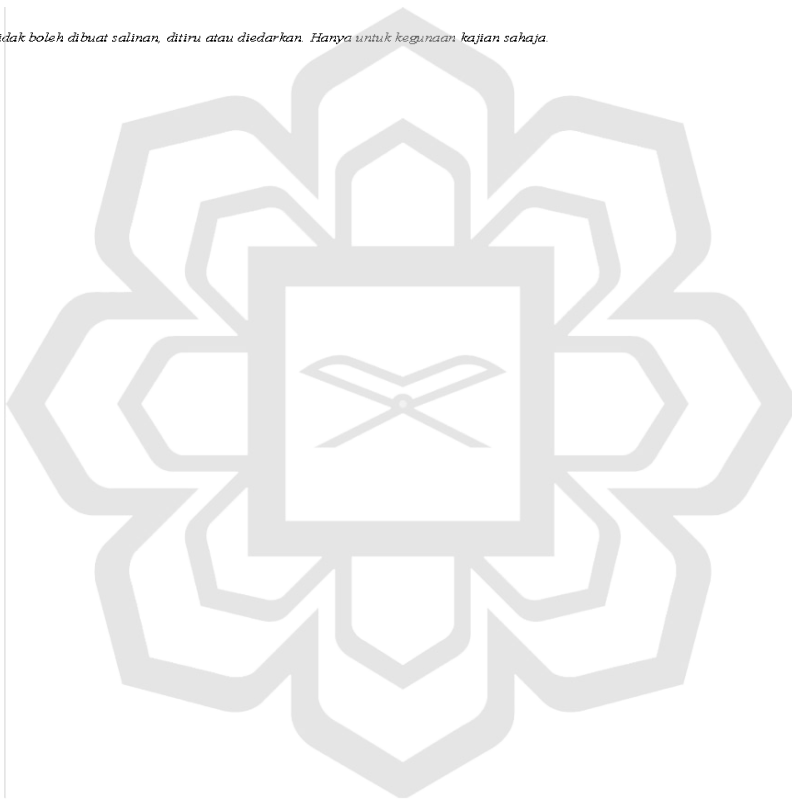
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Rajah 5: Ruang Tamu



Tidak boleh dibuat salinan, ditiru atau diedarkan. Hanya untuk kegunaan kajian sahaja.

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APPENDIX XIII

INVENTORI KETIDAKUPAYAAN MENDENGAR UNTUK DEWASA (HHIA-M)

INVENTORI KETIDAKUPAYAAN MENDENGAR UNTUK DEWASA (HHIA-M)

Nama: _____ Tarikh: _____

ARAHAN:

Tujuan skala/soalselidik ini adalah untuk mengenal pasti masalah yang mungkin anda hadapi apabila anda mempunyai masalah pendengaran. Sila nyatakan sama ada YA, KADANG-KADANG, atau TIDAK untuk setiap soalan yang disediakan. Anda dinasihatkan untuk TIDAK melangkau mana-mana soalan walaupun anda cuba mengelakkan dari situasi tersebut kerana masalah pendengaran anda. Jika anda menggunakan alat bantu pendengaran, sila jawab soalselidik ini berdasarkan keadaan anda mendengar TANPA penggunaan alat tersebut.

No Item	Pernyataan	YA (1)	KADANG-KADANG (2)	TIDAK (0)
S-1	Adakah masalah pendengaran menyebabkan anda kurang menggunakan telefon seperti yang anda inginkan?			
E-2	Adakah masalah pendengaran menyebabkan anda berasa malu apabila berjumpa dengan orang yang anda baru kenal?			
S-3	Adakah masalah pendengaran menyebabkan anda mengelakkan diri dari kumpulan orang ramai?			
E-4	Adakah masalah pendengaran menyebabkan anda cepat marah?			
E-5	Adakah masalah pendengaran menyebabkan anda berasa kecewa apabila berbual dengan ahli keluarga anda sendiri?			
S-6	Adakah masalah pendengaran ini menyebabkan anda mengalami kesukaran apabila menghadiri majlis keramaian?			
S-7	Adakah masalah pendengaran menyebabkan anda sukar untuk mendengar/memahami kehendak rakan sekerja/pelanggan?			
E-8	Adakah anda berasa tidak berupaya disebabkan masalah pendengaran yang dihadapi?			

S-9	Adakah masalah pendengaran anda menyukarkan anda ketika melawat rakan-rakan, keluarga dan jiran-jiran?			
E-10	Adakah masalah pendengaran membuatkan anda kecewa apabila berbual dengan rakan sekerja/pelanggan?			
S-11	Adakah masalah pendengaran menyebabkan anda mengalami kesukaran apabila menonton wayang atau teater?			
E-12	Adakah masalah pendengaran menyebabkan anda gugup?			
S-13	Adakah masalah pendengaran menyebabkan anda kurang berjumpa rakan-rakan, keluarga dan jiran-jiran sekerap yang anda mahukan?			
E-14	Adakah masalah pendengaran menyebabkan anda berbalah dengan ahli keluarga anda?			
S-15	Adakah masalah pendengaran menyebabkan anda sukar untuk mendengar siaran TV atau radio?			
S-16	Adakah masalah pendengaran menyebabkan anda tidak lagi keluar membeli-belah sekerap yang anda mahu?			
E-17	Adakah masalah dan kesukaran berkaitan pendengaran membuatkan anda sangat kecewa?			
E-18	Adakah masalah pendengaran membuatkan anda mahu bersendirian?			
S-19	Adakah masalah pendengaran membuatkan anda kurang berbual dengan ahli keluarga berbanding dari yang anda inginkan?			
E-20	Adakah anda merasakan bahawa kesukaran yang disebabkan masalah pendengaran ini membataskan atau menghamburkan kehidupan peribadi dan sosial anda?			
S-21	Adakah masalah pendengaran menyebabkan anda mengalami kesukaran ketika berada di dalam kedai makan bersama keluarga atau rakan-rakan?			
E-22	Adakah masalah pendengaran ini menyebabkan anda mengalami tekanan perasaan?			

S-23	Adakah masalah pendengaran ini membuatkan anda kurang kerap mendengar siaran TV atau radio berbanding daripada yang anda inginkan?	
E-24	Adakah masalah pendengaran menyebabkan anda tidak selesa apabila berbual dengan rakan-rakan?	
E-25	Adakah masalah pendengaran ini menyebabkan anda merasa terpinggir apabila anda berada bersama sekelompok orang ramai?	

TIDAK = 0

KADANG-KADANG = 2

YA = 4

Keseluruhan #skor untuk SOSIAL (S); ____ / 48 = ____

Keseluruhan #skor untuk EMOSIONAL (E); ____ / 52 = ____

Keseluruhan #skor; ____ / 100

0 (tiada masalah) ke 100 (keseluruhan bermasalah) :

0% hingga 16%	Tidak bermasalah
18% hingga 42%	Bermasalah pada tahap ringan ke sederhana
43% dan ke atas	Menghadapi ketidakupayaan yang ketara

APPENDIX XIV

ENVIRONMENTAL SOUNDS STIMULI CALIBRATION MEASUREMENT AND SOUND LENGTH

Environmental Sounds Stimuli Calibration Measurement and Sounds Length

No.	Sounds	Leq (dBA) (average intensity through frequency)	Amplification (dBA) adjustment	Source	Length (Seconds)	Edited Length (Seconds)
1.	Airplane	75 (Original)	None	soundeffectsfactory	9	9
		60	-15	SoundBible.com	4	4
		65	-7.5	SoundBible.com	7	7
		70 (70.3)	-5	SoundBible.com	9	5
2.	Alarm Clock	76.3 (Original)	None	SoundBible.com	4	4
		60 (60.6)	-18.3	soundeffectsfactory	8	8
		65 (64.8)	-14	soundeffectsfactory	5	5
		70 (70.7)	-7.3	SoundBible.com	5	4
3.	Audience Applause	75 (75.3)	-0.3	soundeffectsfactory	1	1
		75.9 (original)	None	SoundBible.com	2	2
		60 (60.6)	-17	SoundBible.com	4	4
		65	-12	SoundBible.com	7	5
4.	Baby Crying	70 (69.9)	-7	SoundBible.com	5	5
		75 (75.5)	-1.2	SoundBible.com	4	3
		77.3 (Original)	None	SoundBible.com	4	1
		60 (60.3)	-18	SoundBible.com	2	1
5.	Bird Chirping	65 (65.1)	-13	SoundBible.com	8	8
		70 (70.6)	-7.3	Direct recording	4	3
		75 (75.3)	-2.3	SoundBible.com	11	11
		67.4 (Original)	None	soundeffectsfactory	5	5
6.	Blender	60 (59.5)	-7.4	SoundBible.com	5	5
		65 (65.1)	-2.4	SoundBible.com	7	4
		70	None	SoundBible.com	7	7
		75	None	soundeffectsfactory	5	5
7.	Car Start	78.7 (original)	None	SoundBible.com	152	10
		60 (60.3)	-17.7	SoundBible.com	9	9
		65 (64.7)	-12.7	Source	Length (Seconds)	Edited Length (Seconds)
		70 (69.9)	-9.7	soundeffectsfactory	9	9
		75	-3.7	SoundBible.com	4	4
		66.2 (Original)	None	SoundBible.com	7	7

8.	Cat Meow	60 (60.7)	-6.2	SoundBible.com	9	5
		65 (65.2)	-1.2	SoundBible.com	4	4
		70	None	soundeffectsfactory	8	8
		75	None	soundeffectsfactory	5	5
		75.4 (Original)	None	SoundBible.com	5	4
		60	-19	soundeffectsfactory	1	1
		65 (64.8)	-13	SoundBible.com	2	2
		70 (70.8)	-8	SoundBible.com	4	4
		71.4 (Original)	None	SoundBible.com	7	5
		60 (60.6)	-9.3	SoundBible.com	5	5
9.	Clinking Teaspoons	65 (65.7)	-5.3	SoundBible.com	4	3
		70	-0.3	SoundBible.com	4	1
		75	None	SoundBible.com	2	1
		68.3 (Original)	None	SoundBible.com	8	8
		60 (60.1)	-6.8	Direct recording	4	3
		65 (65.1)	-2	SoundBible.com	11	11
		70	None	soundeffectsfactory	5	5
		75	None	SoundBible.com	5	5
		73.6 (Original)	None	SoundBible.com	7	4
		60 (60.3)	-16	SoundBible.com	7	7
11.	Cow Moo	65 (65.8)	-10	soundeffectsfactory	5	5
		70 (70.9)	-4.6	SoundBible.com	152	10
		75	None	SoundBible.com	9	9
		80 (Original)	None	Source	Length (Seconds)	Edited Length (Seconds)
		60 (60.3)	-20.5	soundeffectsfactory	9	9
		65 (65.2)	-15.5	SoundBible.com	4	4
		70 (70.9)	-10	SoundBible.com	7	7
		75 (75.6)	-5	SoundBible.com	9	5
		74.8 (Original)	None	SoundBible.com	4	4
		60 (60.8)	-14	soundeffectsfactory	8	8
12.	Crickets	65 (65.2)	-9	soundeffectsfactory	5	5
		70	-4	SoundBible.com	5	4
		75	None	soundeffectsfactory	1	1
		78.5 (Original)	None	SoundBible.com	2	2
		60 (60.3)	-19.5	SoundBible.com	4	4
		65 (65.6)	-14.5	SoundBible.com	7	5
		70	-4	SoundBible.com	5	4
		75	None	soundeffectsfactory	1	1
		78.5 (Original)	None	SoundBible.com	2	2
		60 (60.3)	-19.5	SoundBible.com	4	4
13.	Crowd	65 (65.2)	-9	soundeffectsfactory	5	5
		70	-4	SoundBible.com	5	4
		75	None	soundeffectsfactory	1	1
		78.5 (Original)	None	SoundBible.com	2	2
		60 (60.3)	-19.5	SoundBible.com	4	4
		65 (65.6)	-14.5	SoundBible.com	7	5
		70	-4	SoundBible.com	5	4
		75	None	soundeffectsfactory	1	1
		78.5 (Original)	None	SoundBible.com	2	2
		60 (60.3)	-19.5	SoundBible.com	4	4
14.	Dog Barking	65 (65.6)	-14.5	SoundBible.com	7	5
		70	-4	SoundBible.com	5	4
		75	None	soundeffectsfactory	1	1
		78.5 (Original)	None	SoundBible.com	2	2
		60 (60.3)	-19.5	SoundBible.com	4	4
		65 (65.6)	-14.5	SoundBible.com	7	5
		70	-4	SoundBible.com	5	4
		75	None	soundeffectsfactory	1	1
		78.5 (Original)	None	SoundBible.com	2	2
		60 (60.3)	-19.5	SoundBible.com	4	4

	60 (60.7)	-6.2	SoundBible.com	9	5	
	65 (65.2)	-1.2	SoundBible.com	4	4	
	70	None	soundeffectsfactory	8	8	
	75	None	soundeffectsfactory	5	5	
8. Cat Meow	75.4 (Original)	None	SoundBible.com	5	4	
	60	-19	soundeffectsfactory	1	1	
	65 (64.8)	-13	SoundBible.com	2	2	
	70 (70.8)	-8	SoundBible.com	4	4	
9. Clinking Teaspoons	71.4 (Original)	None	SoundBible.com	7	5	
	60 (60.6)	-9.3	SoundBible.com	5	5	
	65 (65.7)	-5.3	SoundBible.com	4	3	
	70	-0.3	SoundBible.com	4	1	
10. Coughing	75	None	SoundBible.com	2	1	
	68.3 (Original)	None	SoundBible.com	8	8	
	60 (60.1)	-6.8	Direct recording	4	3	
	65 (65.1)	-2	SoundBible.com	11	11	
	70	None	soundeffectsfactory	5	5	
	75	None	SoundBible.com	5	5	
11. Cow Moo	73.6 (Original)	None	SoundBible.com	7	4	
	60 (60.3)	-16	SoundBible.com	7	7	
	65 (65.8)	-10	soundeffectsfactory	5	5	
	70 (70.9)	-4.6	SoundBible.com	152	10	
	75	None	SoundBible.com	9	9	
12. Crickets	80 (Original)	None	Source	Length (Seconds)	Edited Length (Seconds)	
	60 (60.3)	-20.5	soundeffectsfactory	9	9	
	65 (65.2)	-15.5	SoundBible.com	4	4	
	70 (70.9)	-10	SoundBible.com	7	7	
13. Crowd	75 (75.6)	-5	SoundBible.com	9	5	
	74.8 (Original)	None	SoundBible.com	4	4	
	60 (60.8)	-14	soundeffectsfactory	8	8	
	65 (65.2)	-9	soundeffectsfactory	5	5	
	70	-4	SoundBible.com	5	4	
	75	None	soundeffectsfactory	1	1	
14. Dog Barking	78.5 (Original)	None	SoundBible.com	2	2	
	60 (60.3)	-19.5	SoundBible.com	4	4	
	65 (65.6)	-14.5	SoundBible.com	7	5	

15.	Door Knock	70 (70.3)	-9.5	SoundBible.com	5	5	
		75 (75.9)	-4.5	SoundBible.com	4	3	
		68.5 (Original)	None	SoundBible.com	4	1	
		60 (60.3)	-10	SoundBible.com	2	1	
		65 (65.4)	-2.9	SoundBible.com	8	8	
16.	Duck Quack	70	None	Direct recording	4	3	
		75	None	SoundBible.com	11	11	
		79.3 (Original)	None	soundeffectsfactory	5	5	
		60	-21.5	SoundBible.com	5	5	
		65 (65.8)	-16.5	SoundBible.com	7	4	
		70 (70.2)	-11.5	SoundBible.com	7	7	
		75 (75.2)	-5.5	soundeffectsfactory	5	5	
17.	Kettle Whistling	87.3 (Original)	None	SoundBible.com	152	10	
		60 (60.5)	-29.5	SoundBible.com	9	9	
		65 (65.9)	-25	Source	Length (Seconds)	Edited Length (Seconds)	
		70 (70.5)	-19.7	soundeffectsfactory	9	9	
		75 (75.3)	-15	SoundBible.com	4	4	
18.	Keys	66.5 (Original)	None	SoundBible.com	7	7	
		60 (60.4)	-6.5	SoundBible.com	9	5	
		65 (65.2)	-1.5	SoundBible.com	4	4	
		70	None	soundeffectsfactory	8	8	
		75	None	soundeffectsfactory	5	5	
19.	Ocean	61.9 (Original)	None	SoundBible.com	5	4	
		60	-1.9	soundeffectsfactory	1	1	
		65	None	SoundBible.com	2	2	
		70	None	SoundBible.com	4	4	
		75	None	SoundBible.com	7	5	
20.	Police Siren	67.5 (Original)	None	SoundBible.com	5	5	
		60 (60.3)	-7	SoundBible.com	4	3	
		65 (65.4)	-2.3	SoundBible.com	4	1	
		70	None	SoundBible.com	2	1	
		75	None	SoundBible.com	8	8	
21.	Thunder	70.5 (Original)	None	Direct recording	4	3	
		60 (60.4)	-10	SoundBible.com	11	11	
		65 (65.1)	-5	soundeffectsfactory	5	5	
		70	None	SoundBible.com	5	5	

		75	None	SoundBible.com	7	4	
22.	Traffic	79.2 (Original)	None	SoundBible.com	7	7	
		60 (60.1)	-19.6	soundeffectsfactory	5	5	
		65 (65.3)	-14.4	SoundBible.com	152	10	
		70	-9.4	SoundBible.com	9	9	
		75 (75.2)	-4.2	Source	Length (Seconds)	Edited Length (Seconds)	
23.	Vacuum	78.5 (Original)	None	soundeffectsfactory	9	9	
		60	-18.5	SoundBible.com	4	4	
		65 (65.8)	-14	SoundBible.com	7	7	
		70 (70.2)	-8.5	SoundBible.com	9	5	
		75 (75.4)	-3.5	SoundBible.com	4	4	
24.	Water Dripping	66.1 (Original)	None	soundeffectsfactory	8	8	
		60	-6.1	soundeffectsfactory	5	5	
		65	-1.1	SoundBible.com	5	4	
		70	None	soundeffectsfactory	1	1	
		75	None	SoundBible.com	2	2	
25.	Waterfall	76.4 (Original)	None	SoundBible.com	4	4	
		60 (60.1)	-16.2	SoundBible.com	7	5	
		65 (65.2)	-11.2	SoundBible.com	5	5	
		70	-6.2	SoundBible.com	4	3	
		75	-1.4	SoundBible.com	4	1	
26.	White Noise	88.5 (Original)	None	SoundBible.com	2	1	
		60 (60.4)	-33	SoundBible.com	8	8	
		65 (65.4)	-28	Direct recording	4	3	
		70 (70.3)	-23	SoundBible.com	11	11	
		75 (75.4)	-18	soundeffectsfactory	5	5	

APPENDIX XV

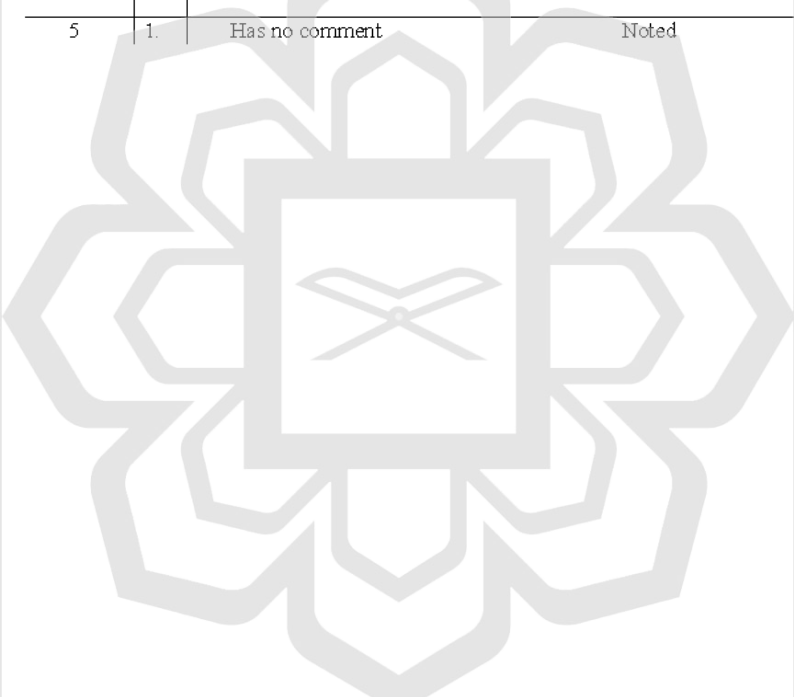
FIRST FOCUS GROUP FINDINGS

First Focus Group Findings

Reviewer 1	No.	Comments	Feedback
	1.	Explain further regarding subjects and overview of the research	Done
	2.	Explain about trainer	Done
	3.	Have you covered all Malay syllables? Because there are more syllables in Malay. (e.g., CVC, VCV)	Need to look further.
	4.	To use IPA writing for subject's copy as well	Noted
	5.	Are you going to test the frequency (hertz) for the result?	No. This is traditional one to one training.
	6.	How about discrimination? Discrimination needs to be in minimal pairs.	Noted. Will pair the c/v between frequency range, placement and manners
	7.	Unvoiced is voiceless	Noted
	8.	Don't forget glottal stop.	Noted
	9.	How are you going to assist the subjects and score the result? E.g., aided visually? Suprasegmental (rate, how long?). What is the mechanism that you have to ensure consistency between trainers (do you allow variability? How?) Suggest to use video as a training.	Noted. Will set the consistency.
	10.	Need to see the phonotactics system (the combinations of certain sound in particular language). Familiarity is important when targeting specific language population.	Noted
	11.	Have you considered affixes?	Noted. Any unit that has meaning should be considered.

2	12.	When you give visual cues and you repeat, that is an overlap between two complexities?	Refer Reviewer 4 comment number 2.
	13.	Distance, how far?	Only to the side and across the room
	14.	Explain further on what is connected discourse tracking	Noted
	15.	How to achieve two ways conversation? How will be the scoring?	To have 2 ways of conversation, 1 is initiated by trainer, 2 is initiated by subject. Scoring: same.
	16.	How to achieve closed-set topic and open-set topics?	Need to look into it again (refer cochlear lmtd program)
	1.	Aided or unaided subjects?	Aided
	2.	Will this research determine the subjects' level of skills?	Yes
	3.	How about the scoring?	Will be produced
	4.	How is the test procedure and time allocation for training?	Will be set after pilot study
	5.	How to score if the patient said "nono" for "nene"? (e.g., correct C but incorrect V). Need to put clearly in instructions.	Depending on what was tested. If test V, incorrect. If at C, correct.
	6.	How do you expect the patient to respond?	Will put in instructions, to check if the patient is able to read/or not. So, for dt (ada/tiada), id (pointing or verbal imitation)
	7.	Visual cue will help the patient (as part of prompt/help). This will show if the patient achieves the skills.	To put visual cue as one of the complexity of trainings. Suggest to put as one of the communication strategies

	3.	To look into localizations rather than distance. Or distance is combined with loudness (different loudness is measured by distant)	Noted
	4.	Need to limit trial, e.g., 3 attempts and move to next level.	Noted
	5.	How long should we train the subject? How about having 2 nd scoring then give strategies (2 nd layer of pass with strategies)	Noted
	6.	In conversation part, we can give different question but in the same topic. So, conversation is meaningful.	Yes. Agreed
5	1.	Has no comment	Noted

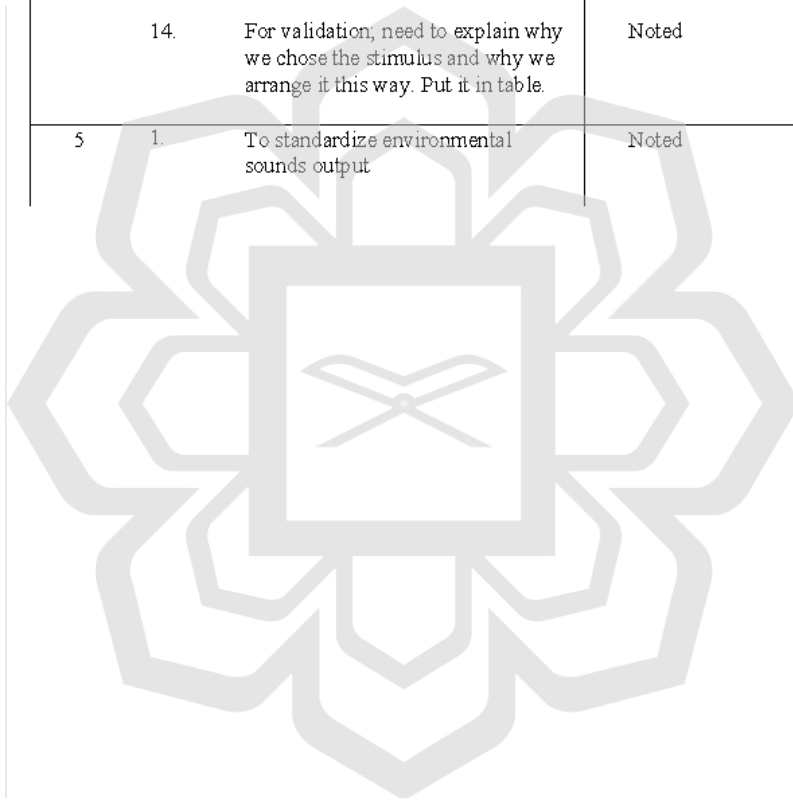


Second Focus Group Findings

Reviewer	No.	Comments	Feedback
3	1.	What is the definition of “kata kunci”? How to define it? What will be the instructions?	Explained
	2.	To hear all sounds is to target morpheme. But if to understands sentence semantically, does not need to hear the whole morpheme.	Noted
4	1.	To add new complexity of stimulus i.e., Visual cue	Noted
	2.	To include new scoring based on new complexity	Noted
	3.	How to determine if the patient understand the sentence or not? Suggest to use interview method. Suggest to have column what the kata kunci listed by trainee. To refine instructions	Noted
	4.	To refine scoring procedure	Noted
	5.	Environmental sounds need to be standardized and calibrated.	Noted
	6.	To define ‘noise’. To standardize noise.	Noted
	7.	To add “understanding” level for sound associated with picture as this need understand to recognize sound and picture	Noted
	8.	Highlight the focus syllable or phoneme	Noted
	9.	Confuse between i. Malay language system or ii. Malay language sounds. To see the targeted goals. Need to divide them.	Explained
	10.	Identify word in sentence: for <i>kenalpasti perbualan</i> . Not	Noted

	8.	If we use the same stimulus for different context, will it affect memory and result?	That is the goal of this training. To encourage the subject to remember auditorily
	9.	Explain each complexity of training.	Done
	10.	Do you consider the syllable system in Malay, where certain C is not available with certain V? If you want familiarity in Malay, you need to consider this	Will look in to it and check on this.
	11.	Have you considered different syllable counting?	Noted
	12.	How about intensity when the stimulus is far away? Would it be better if you look into localizations?	Noted
3	1.	How to move from one goal to another goal?	To suggest patient to move to another level even if there is no progress.
	2.	How to monitor the progress? Is there any targeted score?	Will determine the target score after pilot study.
	3.	Suggestion: it's good to keep a record of the progress. To see factor affecting. To clarify the movement of the goals (from one goal to another goal). To have clear manual and documentation (step by step instructions).	Noted
	4.	How to present the stimulus? Need to limit the visual cue (don't give all list).	Noted
	5.	Will visual cues affect the result?	Depending on auditory level. Will clearly state in instructions (either point/read/imitate). Noted
4	1.	Interested to see the frequency (hertz) of the subjects' respond.	Noted
	2.	To start with repetition to avoid overlapping between complexity of stimulus.	Noted

		<i>kefahaman</i> . Sebab identify the words in sentence.	
	11.	To repeat all morpheme is not understanding level but this is identification.	Noted
	12.	To include cognitive interviewing to check trainee understanding for understanding level.	Noted
	13.	Prepare scoring sheet for auditory skills. To see trainee level of auditory skills.	Noted
	14.	For validation, need to explain why we chose the stimulus and why we arrange it this way. Put it in table.	Noted
5	1.	To standardize environmental sounds output	Noted



APPENDIX XVI

PERCENTAGE SCORE FOR EACH STIMULUS IN PLAM

Percentage Score for Each Stimulus in PLAM

No.	Stimulus	Mean Score (Percentage)
1.1 Bunyi enam ling	S01. pengesanan	100
	S02. kenalpasti	100
1.2 Bunyi persekitaran	S03. pengesanan	100
	S04. kenalpasti	98.7
1.3 Fonem pada Frekuensi	1.3.1 Fonem pada frekuensi <500 hz S05. pengesanan	100
	S06. kenalpasti	99.7
	1.3.2 Fonem pada frekuensi 501 – 2000 hz S07. pengesanan	100
	S08. kenalpasti	100
	1.3.3 Fonem pada frekuensi >2000 hz S09. pengesanan	100
	S10. kenalpasti	99.6
2.1 Fonem pertuturan	S11. pengesanan	100
	S12. kenalpasti	99.7
2.2 Perkataan	2.2.1 Suku kata	
	2.2.1.1 Satu suku kata S13. pengesanan	100
	S14. kenalpasti	99.8
	2.2.1.2 Dua suku kata S15. pengesanan	100
	S16. kenalpasti	99.9
	2.2.1.3 Tiga suku kata S17. pengesanan	100
	S18. kenalpasti	99.9
	2.2.1.4 Empat dan lebih suku kata S19. pengesanan	100
	S20. kenalpasti	100
	2.2.2 Gabungan Konsonan dan Enam Vokal	
	2.2.2.1 Konsonan + vokal /i/	S21. pengesanan 100
	S22. kenalpasti	99.4
	2.2.2.2 Konsonan + vokal /u/	S23. pengesanan 100
	S24. kenalpasti	99.6
	2.2.2.3 Konsonan + vokal /ə/	S25. pengesanan 100
	S26. kenalpasti	99.6
	2.2.2.4 Konsonan + vokal /ə/	S27. pengesanan 100
	S28. kenalpasti	99.5
	2.2.2.5 Konsonan + vokal /o/	S29. pengesanan 100
	S30. kenalpasti	99.6
	2.2.2.6 Konsonan + vokal /a/	S31. pengesanan 100
	S32. kenalpasti	99.7
	2.2.3 Pasangan Perkataan	
	2.2.3.1 Voicing contrast S33. pembedaan antara /b/ dan /p/	100

			S34. pembezaan antara /d/ vs /t/	100
			S35. pembezaan antara /g/ dan /k/	99.8
			S36. pembezaan antara /b, d, g/ dan /p, t, k/	99.8
2.2.3.2 Dental/labial contrast			S37. pembezaan antara /t/ dan /b/	100
			S38. pembezaan antara /d/ dan /p/	100
			S39. pembezaan antara /d/ dan /b/	100
			S40. pembezaan antara /t/ dan /p/	100
2.2.3.3 Fricatives, affricates, stop contrast			S41. pembezaan antara /f/ dan /v/	99.8
			S42. pembezaan antara /s/ dan /z/	100
			S43. pembezaan antara /tʃ/ dan /dʒ/	99.8
			S44. pembezaan antara /h/ dan /ʔ/	99.8
			S45. pembezaan antara /s/ dan /ʃ/	100
			S46. pembezaan antara /s/ dan /dʒ/	100
			S47. pembezaan antara /s/ vs /tʃ/	99.8
2.2.3.4 Nasal/oral contrast			S48. pembezaan antara /m/ dan /p, b/	100
			S49. pembezaan antara /n/ dan /t, d/	100
			S50. pembezaan antara /ŋ/ dan /k, g/	100
			S51. pembezaan antara /ɲ/ dan /k, g/	100
2.2.3.5 Liquids contrast			S52. pembezaan antara /l/ dan /r/	100
			S53. pembezaan antara /l/ dan /j/	99.6
			S54. pembezaan antara /r/ dan /j/	100
			S55. pembezaan antara /l/ dan /j, r/	100
2.3 Ayat	2.3.1 Penjejakan wacana berterusan	S56. kenalpasti		100
	2.3.2 Kata kunci	2.3.2.1 kata kunci di akhir ayat	S57. pembezaan perkataan (rawak) dalam ayat	100

		2.3.2.2 kata kunci di awal ayat	S58. pembezaan perkataan (sama sukukata) dalam ayat	100
			S59. pembezaan perkataan (minimal pairs) dalam ayat	100
			S60. pembezaan perkataan (rawak) dalam ayat	100
			S61. pembezaan perkataan (sama sukukata) dalam ayat	100
			S62. pembezaan perkataan (minimal pairs) dalam ayat	99.8
		2.3.2.3 kata kunci di tengah ayat	S63. pembezaan perkataan (rawak) dalam ayat	100
			S64. pembezaan perkataan (sama sukukata) dalam ayat	100
			S65. pembezaan perkataan (minimal pairs) dalam ayat	100
		2.3.3 Isi Tempat Kosong	2.3.3.1 Akhir Ayat S66. Kenalpasti	99.8
			2.3.3.2 Awal Ayat S67. Kenalpasti	99.6
			2.3.3.3 Tengah Ayat S68. Kenalpasti	98.6
			2.3.3.4 Rawak S69. Kenalpasti	99.3
2.3.4 Jenis-jenis Ayat		2.3.4.1 Ayat penyata	S70. Kenalpasti	98.7
			S71. Kefahaman	100
		2.3.4.2 Ayat tanya	S72. Kenalpasti	99.5
			S73. Kefahaman	99.8
		2.3.4.3 Ayat perintah	S74. Kenalpasti	99.5
			S75. Kefahaman	99.8
		2.3.4.4 Rawak	S76. Kenalpasti	99
			S77. Kefahaman	98.9
		2.3.4.5 Rawak	S78. Kenalpasti	99.1
			S79. Kefahaman	99.9
2.3.5 Menjawab soalan pendek			S80. Topik: Diri Sendiri (Kefahaman)	99.7
			S81. Topik: Informasi Umum (Kefahaman)	99.8

APPENDIX XVII

POST-TRAINING QUESTIONNAIRE FOR TRAINER

Post-Training Survey for Trainer

1. Trainer Background

- i. Name : _____
- ii. Date : _____
- iii. Institution : _____
- iv. Years of experience in managing individual with post-lingual hearing impairment: _____
- v. List all management that you provide for individual with post-lingual hearing impairment (before PLAM training):

2. Purpose of the questionnaire

- ☐ to get feedback regarding training of newly-developed auditory training program for adult called *Program Latihan Auditori Melayu* (PLAM)

3. Instructions for trainer

- ☐ This questionnaire consists of three sections;
 - A. PLAM Training for Trainer Module; Classes, Quiz and Training
 - B. PLAM Documents; Manual, *Jurupulih* copy and *Pelatih* copy
 - C. Knowledge Improvement
- ☐ Kindly please review each section and provide your feedback on the following:
 - i. The sufficiency/performance/agreement of each sections
 - ii. Recommendations for improvement of each section

A. PLAM Training for Trainer Module; Classes, Quiz and Training

This part is to get your feedback regarding the PLAM training for trainer module which contain classes, quiz and training session. The training aims to get trainer ready for conducting PLAM independently after the training. Rate the sufficiency of each of the components of the PLAM training module (1= Not sufficient; 2= Slightly sufficient; 3= Sufficient; 4= Very sufficient)

No.	Component	1 Not sufficient	2 Slightly sufficient	3 Sufficient	4 Very sufficient	Comments and recommendations (if any)
i.	2-hour classes					
	-Duration of classes					
	-Content of classes					
ii.	30-minute quiz					
	-Duration of quiz					
	-Content of quiz					
iii.	Online and face-to-face session in 1-hour per week for six weeks					
	-Duration of training					
	-Content of training					

B. PLAM Documents; Manual, *Jurupulih* copy and *Pelatih* copy

This part is to get your feedback regarding the use of PLAM documents in the training. The manual is for trainer reference, the *Jurupulih* copy is to record patient's findings and the *Pelatih* copy is for patient's stimuli. Rate the performance of each component of the PLAM documents (**1**= Very Poor; **2**= Poor; **3**= Good; **4**=Very Good)

No.	Component	1 Very Poor	2 Poor	3 Good	4 Very Good	Comments and recommendations (if any)
i.	PLAM Manual content					
	Organization of the document					
	The easiness to understand the content					
ii.	Content of <i>Jurupulih</i> copy					
	Organization of the document					
	The easiness to understand the content					
iii.	Content of <i>Pelatih</i> copy					
	Organization of the document					
	The easiness to understand the content					
	Language use in the content					

B. PLAM Documents; Manual, *Jurupulih* copy and *Pelatih* copy

This part is to get your feedback regarding the use of PLAM documents in the training. The manual is for trainer reference, the *Jurupulih* copy is to record patient's findings and the *Pelatih* copy is for patient's stimuli. Rate the performance of each component of the PLAM documents (**1**= Very Poor; **2**= Poor; **3**= Good; **4**=Very Good)

No.	Component	1 Very Poor	2 Poor	3 Good	4 Very Good	Comments and recommendations (if any)
i.	PLAM Manual content					
	Organization of the document					
	The easiness to understand the content					
	Language use in the content					
ii.	Content of <i>Jurupulih</i> copy					
	Organization of the document					
	The easiness to understand the content					
	Language use in the content					
iii.	Content of <i>Pelatih</i> copy					
	Organization of the document					
	The easiness to understand the content					
	Language use in the content					

APPENDIX XVIII

A SET OF CODES GENERATED FROM REVIEWING

A set of codes generated from reviewing

Main Category	Codes 1	Codes 2	Codes 3	Codes 4	Codes 5
Research Background	Objective	Goals			
		Aim			
		Purpose			
	Subjects	Number of Subjects (N)			
		Gender	Male Female		
		Age			
		Hearing Level	Normal Hearing Hearing Loss		
		Hearing Devices	Hearing Aids Cochlear Implant		
	Study Designs	Experimental	Randomized Controlled Trial (RCT)		
		Observational	Cohort Case-Control Cross-Sectional Ecological		
	Background	Hearing Age Other Diseases or Pathological Problems			
		Objectives	Goals Aim Purpose		
		Principles	Methods Approach Mode		
Auditory Training Program	Content	Training Conditions	Sequence		
			Duration		
			Frequency		
			Location	Home Centre	
			Assistive Items	Speaker Video Recorder Video Player Audio Recorder Audio Player	

				Gadget (Handphone, Tablet, Computer, Laptop)	
			Formality	Pen-Paper Formal	
			Standardization	Informal Standardized	
			Trainer	Unstandardized Training by Trained-Trainer	
				Training by Untrained- Trainer	
			Sociality	Self-Training Individual Group Partner	
		Focus Aspects	Auditory Skills	Detection	
				Attention	
				Spotting	
				Discrimination	
				Discernment	
				Patterning	
				Identification	
				Recognition	
				Perception	
				Auditory Memory	
				Comprehension	
				Understanding	
			Speech Stimulus	Sound-Level	Non-Speech
				Syllable-Level	Speech Sounds
				Word	Non-Segmental
					Segmental
					Content
					Function
					Semantics
					Morphology
				Phrase	Carrier
					Chunking
					Clauses
				Sentence	Syntactic
					Complexity
					Pragmatics of Language
				Connected	Conversation
				Discourse Others	Narration
					Explanation
					Directions
					Description
					Question
					Songs
					Rhymes
			Sounds Stimulus	Musical Instruments	

		Content Variables	Complexity of training	Environmental Sounds	
				Silence	
				Noise	
				Background Noise	Absence
					Presence
				Distance	Close Proximity
					Increased Distance
				Repetition	Repetition Required
					Spoken Message Presented Only Once
				Length of Utterance	Short
				Complexity of Utterances	Long
				Rate of Utterances	Simple
				Suprasegmental	Complex
					Slow Rates
					Individual Rates
				Segmental	Speech with Emphasis on Specific Pitch, Intensity, and/or Duration Cues
					Little or No Specific Acoustic Emphasis Provided
					Specific Contrasting of Acoustic Features (Place, Manner, and/or Voicing Cues)
					Little or No Specific Acoustic Emphasis Provided
					Target Position
					End of Word, Phrase, (Middle) Sentence, Or Whole Message
					Beginning of Word, Phrase, Sentence, Or Whole Message
					Set
					Closed
					Open
					Familiar Voice

				Speaker Familiarity	Unfamiliar Voice
				Authenticity of Sounds	Degraded
				Quality of Sound	Undegraded Sounds
					Live Sounds
					Recorded Sounds
			Communication Strategies	Modelling	
				Auditory Sandwich	
				Expansion	
				Extension	
Outcomes Measurement	Test	Observation			
		Formal Test			
		Informal Test			
		Objective Test			
		Subjective Test			
	Counselling	Formal Counselling			
		No Counselling			
		By Meeting			
		By Call			
	Feedback	During Training			
		After Every Training			
		By Post (Completed Training)			
		By Meeting (Completed Training)			
		By Call (Completed Training)			
		No Feedback			
	Compliance	Compliant			
		Not Compliant			
	Follow-Up	Follow-Up			
		No Follow-Up			
	Findings/ Results	Positive			
		Negative			
		No Outcome			
	Significance	Statistically Significant			
		Clinically Significant			