

CHAPTER III

RESEARCH METHODOLOGY

A. Research Methods

The research method used in this study is meta-analysis group contrast, which is a method used to present data from research that has been carried out by researchers to summarize, integrate, combine, and also present the results of previous studies using systematic reviews and statistical techniques. so that accurate results are collected.¹ The design of the research used is a retrospective observational study which means that the researchers only recapitulate secondary data without experimental manipulation.² This research refers more to library research because the data sources used come from journal articles, dissertations, or previous research that has been conducted by previous researchers. However, not only journals or research can be used as data sources, there are certain categories that must be met for each data source to be used. The analysis presented in this study is related to the *Audio-Lingual Method* (ALM) for students' speaking learning.

B. Research Population and Sample

The population is a generalized area consisting of subjects or objects that have certain qualities and characteristics that have been determined by the researcher to be studied in detail and then conclusions drawn.³ A sample is part of the population that is taken representatively, represents the population concerned, or is a small part of the observed population. Research on samples is called a sampling study.⁴

The population in this research is published articles about the study of English language education in the form of journals, dissertations, or theses that have been published about the use of the *Audio-Lingual Method* learning model from 2012-2022. The samples studied were journals, dissertations, or theses on learning using the

¹ Heri Ratnawati et al, *Introduction Meta Analysis*, (Yogyakarta: Parama Publishing, 2018) 6

² Rosdiana, *Meta-Analysis Study of the Use of Cooperative Learning Models on Students' Mathematical Communication Ability*, Skripsi Universitas Islam Negeri Mataram, 2021, 35

³ Sugiono, *Educational Research Methods: Quantitative, Qualitative and R&D Approaches*, (Bandung: Alfabeta, 2017), Cet. 26, 117.

⁴ Manapiah Anadiroh, *Meta-Analysis Study of Problem Based Learning (PBL) Learning Models*, (Skripsi UIN Syarif Hidayatullah, 2019), 29-30

Audio Lingual Method for the results of English speaking with the following types of research categories, namely: (1) articles, dissertations, or theses are made by researchers or students; (2) articles use experimental research methods; (3) articles are quantitative research and meet statistical effect size data; (4) journals published in the last 10 years, namely 2012-2022; (5) articles with the theme of *Audio Lingual Method* learning in English speaking skills; (6) the sample education levels in the journals are junior high school, high school, and tertiary level; (7) the coverage of journal research areas is carried out throughout the world.

C. Inclusion and Exclusion Criteria

The results of article collection by researchers who meet the *Audio-Lingual Method* criteria for students' speaking abilities will be divided into inclusion and exclusion groups including the following:⁵

1. Inclusion Criteria

Inclusion articles are articles that comply with predetermined criteria to collect research data to be analyzed. The following are the inclusion criteria that have been set by the authors: the number of samples in articles or journals is known; there is a control class and an experimental class where there is an average score (mean) from the posttest, a standard deviation, and the same variables, namely the *Audio-Lingual Method* or *Drill Method* as the independent variable and speaking ability as the dependent variable.

2. Exclusion criteria

Articles included in the exclusion criteria are all published research such as: journals; thesis; proceedings or theses related to the *Audio-Lingual Method* and improving students' speaking from various aspects in the 2012-2022 period.

D. Instruments and Data Collection Technique

Instrument is a tool use to collect the desire data and information. The instrument use in this research is coding data sheet. Identification of the process of searching and collecting data according to the criteria that meet the requirements explicitly, checking each study on the appropriate criteria and recording

⁵ Yuan Septia Handayani, *Meta Analysis of the Influence of the Think Pair Share (TPS) Cooperative Learning Model on Critical Thinking Skills and Student Learning Outcomes* (skripsi UIN Mataram, 2019), 31

information on the screening form or database is something that must be considered in the scientific publication of a research synthesis.⁶ With information about the data to be examined, the coding system can report the number of studies and reasons for specialization. This data does not only function as an internal audit but is useful for answering why certain studies are not included in the research synthesis.

The coding procedure for the meta-analysis around the coding protocol determines which information will be extracted from each study that meets the requirements. A person who coded the data would read the study report and fill out a coding protocol with the appropriate responses to the study. When coding there are some general issues that researchers should be aware of before moving on to the core data of various studies. First, one must distinguish between two slightly different parts of protocol coding: the part that encodes information about the study characteristics (study descriptor) and the part that encodes information about the empirical findings of the study (*effect size*).

These two differences are similar to the concepts of dependent variable and independent variable. Study findings, represented in the form of *effect size* values, are the dependent variable of the meta-analysis research, while study characteristics represent the phenomena studied, such as the type of treatment whose impact the construct has on a particular population and the people who represent the research methods used, for example, research design, size, procedure, researcher research context and others.⁷

To capture information regarding the *effect size* of the research on *Audio-Lingual Method* for speaking meta-analysis study, the following are the variables used by the researcher to code the data:

1. Name of researcher
2. Year of research
3. Subject of Education
4. Dependent and independent variables
5. Research design
6. Sample size

⁶ Manapiah Anadhiroh, *Meta-Analysis Study of Problem Based Learning (PBL) Learning Models*, 30

⁷ Mark W. Lipsey dan David B. Wilson, *Practical meta-analysis*, (California: Sage Publication, 2001), 73-74

E. Data collection

The research results that have been collected will be grouped based on the research data which has been grouped according to the experimental group and the control group as well as recording statistical data that will be used in calculating the *effect size* obtained from each scientific research that has been published.

Sources of research data that have been carried out by researchers obtained eighteen journal articles from seventy journal articles which can be meta-analyzed with the theme of *Audio-Lingual Method (ALM)* learning on speaking results with the criteria of quantitative and experimental research types, period 2012-2022 journals that have been published.

The data generate in the form of coding contains information about the identity of scientific publication articles, the year of publication of the journal articles, the level of education and the dependent and independent variables in the scientific research that has been obtained, and statistic table of the studies consisting of population size, mean and standard deviation. Then all articles that meet the criteria in the meta-analysis can be followed up by calculating the *effect size* of each article.

Table 3.1 All Data of Thesis, Journal and Articles

Data Collection Criteria	Data Grouping	Number of Articles Finding
Publication Year	2012	2
	2013	5
	2014	6
	2015	2
	2016	4
	2017	6
	2018	10
	2019	11
	2020	6
	2021	6
	2022	12
Educational Level	Elementary School	12
	Junior High School	24
	Senior High School	23
	College	11
Region (Country)	Asia	68
	Europe	1
	America	1

	Australia	-
	Africa	-

F. Data Analysis Techniques

In meta-analysis research, there are five stages to get good research, namely: (1) identifying problems; (2) collecting existing research or articles; (3) converting and correcting statistical information; (4) determine the average value of the data that has been obtained; (5) takes into account the variations in the effects that have been observed.⁸

The stages that will be carried out in this research are: first, determine the topic of the problem to be studied which is related to *Audio-Lingual Method* on students' speaking abilities. Second, seek and collect research reports in the form of national journals related to the problem to be studied and determine the period of research findings that will be used as a source, namely to be published in 2012-2022. Third, reading research reports to see the suitability of the content with the problems that have been determined, focusing research on problems in the form of aspects of research methodology and categorizing each study. Fourth, determine the *effect size* in each research report from each of the data obtained. Fifth, analyze research reports that have been published based on the methods and data analysis used by the data source, so that the conclusions of the meta-analysis research can be drawn.

The basic thing that is done by the meta-analysis study is to calculate the *effect size* of each study, so to answer the formulation of the research problem, calculations are using *effect size* analysis techniques.

Effect size is a number that indicates the magnitude of the relationship between two variables in a study. So to assess the consistency of the effect in all studies and calculate the summary effect, an *effect size* test was carried out in each study.⁹

The *effect size* is divided based on the average (*standardized mean difference*), binary data (*correlation coefficient*), and correlation (*log odds ratio*).¹⁰ *Standardized mean difference* is the most common form of effect size making it easier for researchers to

⁸ Mike Allen et al, *Interpersonal Communication Research Advances Through Meta-Analysis*, London: *Lawrence Erlbaum Associates Publisher*, 2012, 7.

⁹ Michael Borenstein, ed., *Introduction to Meta-Analysis* (Chichester, U.K: John Wiley & Sons, 2009), 222.

¹⁰ Heri Ratnawati et al, *Introduction Meta Analysis*, 20-21

include different outcome measures in the same synthesis.¹¹ The *correlation coefficient* is usually used when synthesizing observational studies, when the research question is concerned with estimating the strength of the relationship between two measures.¹² The *log odds ratio* can use to compare the assumptions between the two groups, the effect size comes from the correlation coefficient of the data.¹³

In this study, researcher will calculate the average effect size value for each article that has been obtained. With the various journal article results that researcher have obtained based on data filtering criteria it shows that the formula used to obtain the effect size and summary effect values uses *Standardized Mean Difference* (d and g). By using the *Standardized Mean Different* formula, various journal articles that have different calculation techniques will be used as a general matrix so that researcher can include different outcome measures in the same synthesis.¹⁴

To calculate the d and g values, researcher used a formula

$$d = \frac{\bar{x}_1 - \bar{x}_2}{S_{within}}$$

\bar{x}_1 and \bar{x}_2 are the sample means of two groups, while is S_{within} the combined standard deviation obtained from the formula

$$S_{within} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

The values n_1 and n_2 are the sample sizes of the two groups, while S_1 and S_2 are the standard deviations of the two groups. The sample estimate of the *Standardized Mean Difference* is called Cohen's d in research. To describe the size of statistical analysis, Cohen proposed the d index. The symbol for the *effect size* parameter is δ and the parameter for sample estimation is d . To get the variance value d using the formula

$$V_d = \frac{n_1 + n_2}{n_1 n_2} + \frac{d^2}{2(n_1 + n_2)}$$

The first equation next to the $=$ (*equal*) sign shows the uncertainty in the estimate of the mean difference, while the second equation shows the uncertainty in the estimate of S_{within} . The equation used to calculate the standard error of the d value is

¹¹ Heri Ratnawati et al, *Introduction Meta Analysis*, 23

¹² Heri Ratnawati et al, *Introduction Meta Analysis*, 27

¹³ Heri Ratnawati et al, *Introduction Meta Analysis*, 29

¹⁴ Heri Ratnawati et al, *Introduction Meta Analysis*, 23-24

$$SE_d = \sqrt{V_d}$$

If there is a bias in the d value, researcher can use Hedges' g to make corrections. The procedure for changing d to Hedges' g uses a correction factor, namely J . The following is the formula for getting the correction factor (J)

$$J = 1 - \frac{3}{4df - 1}$$

df is the degrees of freedom used to estimate S_{within} for two independent groups, namely with $n_1 + n_2 - 2$ which produces an error of less than 0.007 and less than 0.035 percent. When $df \geq 10$, then

$$g = J \times d$$

$$V_g = J^2 \times V_d$$

Also

$$SE_g = \sqrt{V_g}$$

The correction factor (J) is always smaller than 1.0 and g will always be smaller than the value of d in absolute value, and the variance of g will always be smaller than the variance of d .

The criteria used to form the interpretation of the effect size results use references from Classification Glass, namely:¹⁵

Effect Size (ES) Category

$0.00 \leq ES < 0.20$	Very Small
$0.20 \leq ES < 0.50$	Small
$0.50 \leq ES < 0.80$	Middle
$0.80 \leq ES < 1.30$	High
$1.30 \leq ES$	Very High

¹⁵ Muhamad Amin et al, *Meta Analysis: Effectiveness of Stem on Students' Creative Thinking Abilities*, (Mataram: Journal of Authentic Research on Mathematics Education (JARME)), Vol. 4, 2022, 253.