CHAPTER III
METHODS

3.1 Place and Time Research

This research was conducted in SMA Negeri 1 Perbaungan. The research was conducted in March to May 2018.

3.2 Population and Research Sample

Population is the whole object of study (Silitonga., 2013). The population in this study consisted of (1) Books guiding lab that is used in schools se - North Sumatra (2) All of the teachers who taught chemistry at SMA Negeri 1 Perbaungan and, (3) chemistry professor who is categorized as a lecturer expert teach Chemistry at UNIMED, (4) All students of class XI SMA Negeri 1 Perbaungan.

Samples that portion of the population that elected representatives or truly representative of the population (Silitonga, 2013). The sample in this study were(1)handbook chemistry lab SMA for class XI publisher,(2) Two chemistry teacher with the criteria of minimum education S1, has a learning experience at least 5 years in high school / MA and was actively teaching in the classroom, (3) Two of chemistry lecturer UNIMED categorized as expert lecturers who teach basic chemistry selected purposively sampling in accordance with the criteria of a minimum education S2, has a teaching experience of at least 5 years, is being actively teaching and expert in analyzing the learning materials chemistry at the high school / MA , (4) students of class XI SMA Negeri 1 Perbaungan.

3.3 Research Instruments

3.3.1 Instrument Test

Instrument test used for data that is objective tests. This test consists of 20 questions with 5 options (a, b, c, d, e) given at the beginning and end of the practicum is a pretest posttest. Previous instrument matter objectively compiled and validated prior to the professor in the chemistry department with educational criteria S3. Active teaching and expert validate the test questions. Validation

matter is also made to the class XII students. This test is used to look at improving student learning outcomes to guide the use of chemical lab SMA / MA once developed.

In determining whether or not a test instrument which has been drawn up, there are some components that must be analyzed by using the formula: (1) The level of difficulty, (2) Power Beda, (3) Effectiveness of distractors, (4) Validity, (5) Reliability (Sugiharti, 2015).

3.3.2 Instruments Non Test

Instrument Non test used in the form of a questionnaire. Aspects contained in guiding practical assessment questionnaire created for lecturers, teachers and students include the feasibility of content, appropriateness of language, and the feasibility of a modified presentation of BSNP. Aspects contained in the questionnaire responses of students to design teaching materials integrated chemical problem based learning models include a display, materials, and benefits of the teaching materials developed. Scoring grading scale used is the attitude Likert scoring scale where a score that was used had four score (1 to 4) (Sugiharti, 2015).

3.4 Types of Research

The research is a research& development *(Research &* Development) developed by Thagarajan, Semmel (1974). The development of these devices produces a final product in the form of practical guides (Muhajir, 2015). Sugiyono (2013) also suggested that the methods of research and development is a method used to produce a specific product and test the effectiveness of the product. This study aims to produce a product in the field of education, in this study the resulting product is a guiding practicum. Guidance developed lab chemistry lab in the form of a guide on the subject of acid and base.

Method of guiding research and development chemistry lab module conducted following the procedure described by Haya (2014), the *Research and Development* (R & D) with the ADDIE models. ADDIE Model consists of

analysis (analysis), *design* (design), *development* (development), *implementation* (implementation), and *evaluation* (evaluation).

This study used a study design *One Group Pretest-Posttest* Design, which means at the beginning of the study given the initial test*(pretest)*followed by dosing of treatment and end with the provision of the final test*(post-test)*was conducted to develop .Research guiding chemistry lab in Class XI SMA / MA and test the effectiveness of these products as well as see the results of student learning as measured by the test questions.

Thus this study design can be seen in Table 3.1 below:

Table 3.1 Research Design

Class	Pre Test	Treatment	Post Test
Experiment	**T_1**	**X_1**	**T_2**

Description:

T 1: Value / results of the study before being given treatment (pre-test)

T 2: Value / results of the study after being given treatment (post-test)

X: The treatment with the use of practical guides in Class XI SMA / MA.

3.5 Research Procedure

Guiding Development lab used in this study refers to three general stages. Where the procedural steps of this research consists of:

1. **Phase 1,** Practicum guide analysis

   Determination of practicum guide which is analyzed and conducts practical guide analysis based on KTSP curriculum.

2. **Phase 2,** Development practical guidance senior high school chemistry

   Developing one lab guides that serve as a benchmark for developed using BSNP research.

3. **Phase 3,** The high school chemistry practical guiding Validation

   Validation is done by providing high school chemistry lab guides that have been developed and questionnaire sheet. (i) the feasibility of content, (ii) the feasibility of the language, (iii) the feasibility of the presentation. Then do the practical guidance improvement is to adjust to

the suggestions and feedback lecturers and teachers that are expected to be obtained guiding high school chemistry lab / MA decent suit BSNP assessment.

4. **Phase 4,** Trials using practical guiding

   Trials guiding the use of chemical lab conducted to obtain data and student learning outcomes. Previously conducted a pretest, then proceed with the lab using chemical lab guides that have been developed. Data learning outcome chemistry lab guiding the use of SMA / MA obtained through the final evaluation (post-test).

RESEARCH SCHEME FLOW

Overall research procedures presented in figure 3.1 below:

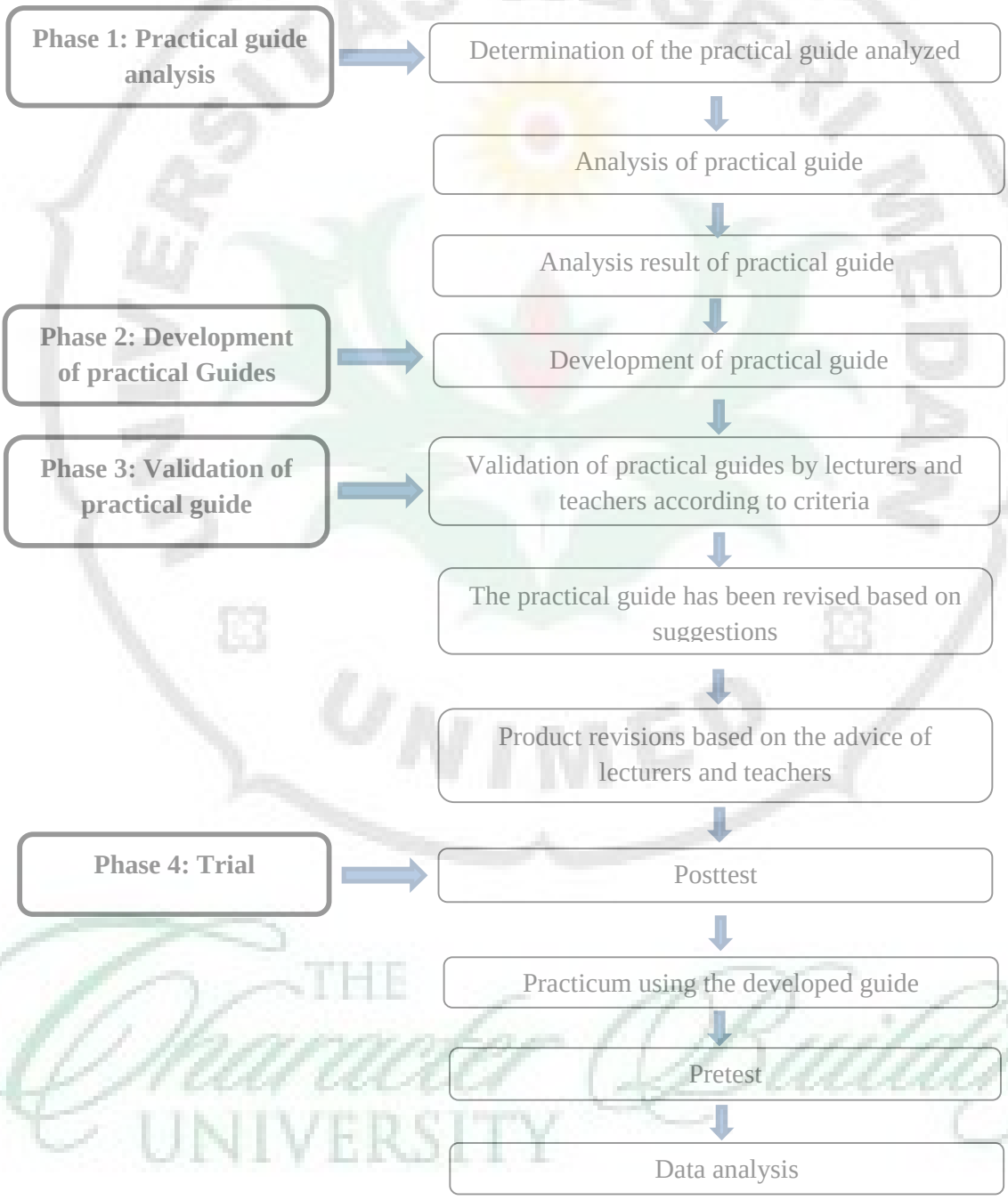

Figure 3.1. Analysis procedures and stages of research and development, validation and testing of practical guidance on the matter acid and base.

3.5.1 Development of High School Chemistry Practical Guidance

This phase consists of guiding practical needs analysis phase, the election materials, the analysis of K13 curriculum content standards, the development of practical guidance. Developed practical hand book which elected practical guide books for class XI High School chemistry publisher.

Important components that will be developed in guiding chemical lab, namely, (1) sub subject will be prepared in accordance with the curriculum of K13, (2) establish, alter or remodel the parts of the component lab which previously had been in analysis is the title trial , writing KI and KD, the purpose of the experiment, the theoretical basis in accordance with the experiments, tools and materials to be used in the experiment, the working procedure to be performed in the experiment, the table of observations, and questions in accordance with the trial, (3) to include images tool and its functions and symbols of the prohibition contained in the laboratory, and (4) complements other components.

3.5.2 Practical Guidance Developed validation

steps are carried out at this stage is to prepare a questionnaire on practical guidance based BSNP assessment, then provide practical guidance and guiding assessment questionnaire to professors, chemistry teachers and students. The type of data obtained at this stage is data in the form of feedback and suggestions for improvement of lecturers and teachers.

3.5.3 Trial Guidance Developed Practical

A step to be taken at this stage is to prepare the instrument in the form of pre-test and post-test questions that are valid. Furthermore, carrying out preliminary tests (pretest). Lessons will be held during the two-hour lesson for a repetition of material. Once the lab is complete, a test carried out late (post-test), tabulate and process data based on data analysis techniques in order to obtain the result of learning the use of practical guides that have been developed.

3.6 Data Collection Techniques

Data obtained from this study are: (1) the results of analysis guiding chemistry lab SMA is used in schools, (2) in the form of feedback and improvement suggestions from professors and teachers and students to guide lab obtained from answers to a questionnaire containing BSNP assessment standards are modified. Ratings (response) obtained were collected and tabulated and calculated the average assessment of the appropriateness of content, appropriateness of language, and the feasibility of the presentation. (3) the trial results that students use lab guide. This data is the data of the pretest and posttest students.

3.7 Data Analysis Techniques

Data analysis in this research is descriptive, that explains a problem, symptom, or as it is, and not examine the hypothesis. The data obtained are quantitative data, such as comments and suggestions for improvement of lecturers and teachers and students to the guidance that has been developed, derived from answers to the questionnaire. As well as the tests are given to students to see the effectiveness of practical guidance before and after the practicum.

Analyzing the chemistry lab guide uses ratings from BSNP. Questionnaire used by teachers and lecturers also use ratings from BSNP. Analysis score using the calculation of average (Arikunto, 2006) are:

$$\overline{X} = \frac{\Sigma X}{n}$$

By:

$\overline{X}$ = average value

ΣX = Sum of answers ratings validator

n = Sum of validator

Answer questionnaires obtained using a Likert scale with category selection as follows:

1. Number 4 means very good / very interesting / clear / very precise.
2. Figures 3 good / valid / interesting / easy / obvious / right.

3. Number 2 means poor / less attractive / less easy / less obvious / less precise.
4. Number 1 means very poor / very unattractive / very less clear / very less precise.

In this study, the grading scale used is 1 to 4, where 1 being the lowest score and 4 is the highest score. Determination of the range can be seen through the high scores range minus the lowest score is divided by a high score. Based on the determination of such range is obtained 0.75 range. The criteria for the validity of the analysis used the average in table can be seen below:

Table 3.2. Validity Criteria Analysis of the Average Value Guidance Practical Chemistry.

Interval of Value	Criteria Validation
From 3.26 to 4.00	Very valid and do not need to be revised
From 2.51 to 3.25	Valid and does not need revision
From 1.76 to 2.50	Less valid, some of the content modules need revision
From 1.00 to 1.75	Not valid and necessary revision of the matter

(Sugiyono, 2014)

To obtain data on learning outcomes used in the form of objective tests performed at the beginning (pretest) and late (post-test). Each question has four possible answers and each correct answer was given a score of 1 and a wrong answer is given a score of 0. Score learning outcomes converted to values using the formula:

$$Value = \frac{Obtained\ Score}{Maximum\ Score} \times 100\ \%$$

The data generated from the pretest and posttest values were then analyzed with the provisions of the KKM, meaning that if ≥85% students in the classical scored ≥75 (KKM), the practical guidance that has been developed eligible for use in chemical lab activities SMA / MA.

To view the learning outcome is calculated by the formula N-*Gain* (Meltzer, 2002).

$$N - Gain = \frac{Skor\ postest - Skor\ pretest}{Skor\ maksimum - Skor\ pretest}$$

Table 3.3. Score N-*Gain* criteria

Limitation	Category
g>0.7	High
0.3 <g ≤ 0.7	Medium
≤ 0.3 g	Low

Furthermore, to test the effectiveness of guiding practical use Gain Normalization Test (N Gain) with the calculated gain value Gain N interpreted criteria. N-Gain criteria presented in Table 3.4 (Rochayati and Suprapto, 2014).

Table 3.4. Table N Gain Interpretation

No.	Score (%)	Interpretation
1.	< 20	Highly Ineffective
2.	21 – 40	Ineffective
3.	41 – 60	Effective Enough
4.	61 – 80	Effective
5.	81 – 100	Very Effective