CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Method

Development method is a method that was used in this research. This method focuses on a given instructional product, program, process, or tools (Richey & Klein, 2005). It involves constructing and validating design models and processes, and identifying the conditions that facilitate the successful use (Richey & Klein, 2005). This method is suitable for this research, where the objective is to develop water pollution science comic as the product of this research. The development model of this research will use ADDIE model (analyze, design, development, implementation, and evaluation) is development model adapted from (Dick & Carey, 1996). There are five stages in development a media; Analyze, design, development, implementation and evaluation. The five stages from ADDIE model are described on the Appendix A.1

3.2 Participant of Research

In this research, three experts were chosen for three aspects: artwork, language, and science content for comic including critical thinking for validation. Those experts come from various backgrounds based on what they expertise of. Teachers and students also chosen as research subject and for comic impression, the subjects were 40 students and 3 science teachers. The permission letter for taking a data in a school attached in Appendix A.2

The sampling techniques that used in this research to evaluate the water pollution science comic was a purposive sampling. Purposive sampling is a non random technique which is deliberately involve population of people with certain background or specific characteristics to help the research (Etikan, Musa, & Alkassim, 2016). In this research, the sample is the one who has any devices it can be handphone or laptop and have not learned water pollution topic. The population of this study is 7th grade students from private junior high school. These respondents are consist of forty students and three science teachers of private junior high school in Bandung, West Java, Indonesia.

3.3 Research Instrument

In order to make the data gain is arranged well, the research instrument is necessary. The data was collected in the form of rubrics from experts and questionnaire from the teachers and students. The expert judgement rubrics are included rating, scale, and space for review or comments. The rubrics use a scale from 1-4 with each criteria for each scale. Same as the experts rubrics, the questionnaire also uses a scale 1-4, but with no criteria for each scale. Those instruments are described as follow:

3.3.1 Expert Judgment Rubric

The rating scale was used in this study for expert judgment rubric. The rubric was including three big aspects: the content of the comics including the critical thinking, the language of the comic, and the design. The critical thinking was adapted from Facione P.A (2015), The rubrics use a scale of 1 to 4 with a criteria for each scale. The rubric also provide a space for feedback like suggestions and comments. Experts can rate and comment about the comic, researcher will then modify and evaluate the content. The rubrics are attached on Appendix A.3

3.3.2 Teacher Questionnaire

This questionnaire for teachers use a rating scale 1-4. This questionnaire was used to validate the science comic of water pollution. Teachers given a chance to try out reading the comic by themselves and there was a 4-rating scale (Strongly agree – strongly disagree) to determine the quality of each aspect. The aspects included in the comic is the critical thinking, the language and design, and the experience in learning water pollution through comic. The questionnaire also provide a space for suggestion and comments. The table is shown on Appendix A.4.

3.3.3 Students Questionnaire

This questionnaire for students also use a rating scale 1-4. This questionnaire was used to validate the science comic of water pollution. Students will be given chance to try out reading the comic by themselves and there was a 4-rating scale (Strongly agree – strongly disagree) to determine the quality of each aspect. The aspects included in the comic is the critical thinking, the language and design of the comic and the experience in learning water pollution through comic. The questionnaire also provide a space for suggestion and comments as shown on the Appendix A.5

3.4 Data Processing Technique

There are two data processing technique for this data analysis. The rubric for expert judgment are counted by Aiken validity meanwhile teacher and student questionnaire are counted by percentage.

3.4.1 Data Processing techniques for expert judgments

After the science comic was developed, and the instruments are ready, the researcher distributes the rubric to three experts judgment, the expert then tests the application and fills the rubric. After the researcher got the results from expert, the researcher started processing the data by Aiken validity (Aiken, 1985)

$$V = \frac{\Sigma s}{n\,(c-1)}$$

The media can be interpreted by this category as follow:

Table 3.1 Validity Category

Validity Index	Interpretation
$0 \leq V \leq 0.4$	Low Validity
$0.4 \leq V \leq 0.8$	Medium Validity
$0.8 \leq V \leq 1$	High Validity

(Retnawati, 2015)

3.4.2 Data Processing Technique for Teacher and Students Questionnaire

The data analysis process carried out will go through an indexing process using a Likert scale. Likert scale is a systematic questions that are aim to collect respondents answers toward questions given (Priyono, 2008). Likert scale have a scale from agree scale to disagree scale (Hardani, et al., 2020) Likert scale has criteria with different score for each criteria. The criteria Is described on the Table 3.6
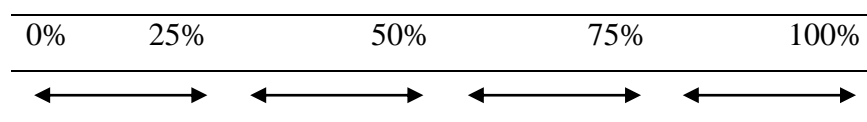
Table 3.2 Likert Scale Criteria

Criteria	Score
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

After the science comic was developed, the researcher distributed the science comic to the science teachers and students to test and fill the questionnaire, after the researcher got the result from teachers and students, the researcher started processing the data by count its percentage.

$$P = \frac{f}{n} \ X \ 100\%$$

After counting the score based on the result, the researcher found the percentage result to determine the advisability or the result of the media. The total score from the result compare to the scale category on the Table 3.7

Table 3.3 Scale

0%	25%	50%	75%	100%
←→	←→	←→	←→	

(Sugiyono, 2015)

The scale will be the benchmark from the percentage result based on the likert scale. Assesment percentage criteria described on the Table 3.8

Table 3.4 Precentage Criteria

Assesment Criteria	Percentage
Very Good	75%-100%
Good	50%-74%
Fair	25%-49%
Poor	0%-24%

3.5 Research Procedure

There are three stages in research procedure in order to make the research well organized. Namely, preparation stage, implementation stage, and completion stage. The procedure of this research:

3.6.1 Preparation Stage

 a) Problem identification

 b) Formulating objective

 c) Literature review on learning media, comic based media, critical thinking, and water pollution topic

 d) Constructing instrument

 e) Revision of instrument

 f) Designing flowchart, storyline, and storyboard

 g) Designing science comic

 h) Revision of science comic

3.6.2 Implementation Stage

 a) Collecting expert responses

 b) Revision of science comic

 c) Collecting teachers responses

 d) Collecting students responses

3.6.3 Completion Stage

 a) Analyzing data

 b) Discuss ad conclude the analysis of data

 c) Research report arrangement

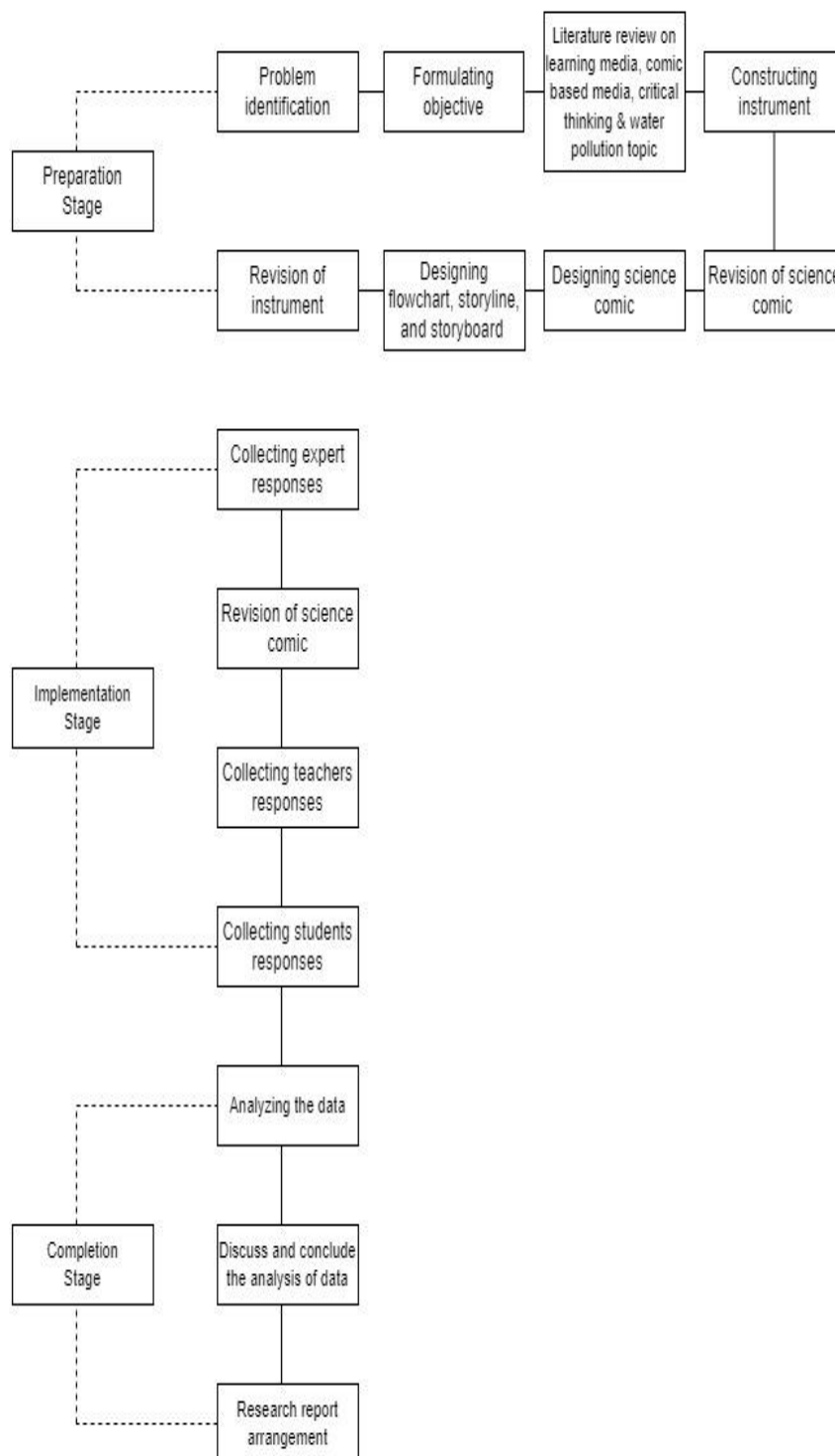The scheme of research procedure stages is shown in Figure 3.2

Figure 3.1 Research Procedure