CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Method and Research Design

3.1.1 Research Method

This study used descriptive method. According to Fraenkel (2011), descriptive research involves summarizing certain features (skills, preferences, behaviors) of people or groups of physical environments such as schools.. Descriptive research is linked to a condition that has influenced or affected a current condition or event (Cohen, Manion, & Morrison, 2002).

This study focus to ask about something which described in natural setting. Descriptive research does not require variables manipulation and pays close attention to the nature of topics and instruments (McMillan & Schumacher, 1984). This research generally described and investigate the students' learning process, scientific literacy, and communication skill of junior high school learners. The research also aims to investigate the correlation between students' scientific literacy and students' communication skill after learning environmental pollution by using digital scrapbook via canva website.

3.1.2 Research Design

The design of this research is non-experimental with natural descriptive design as purposed to provide a description of educational phenomena. The research variables are elaborated descriptively and quantitative data also supports the data of the research.

3.2 Research Subject

The location of this research was conducted at Ar-Rafi Drajat junior high school in Bandung. The population were the 7th grade students of junior high school from Ar-Rafi Drajat. The school chosen because they use 2013 national curriculum and have a great digital based learning facilities including wi-fi, laptop for each student, and projector in every classes. Ar-Rafi Drajat junior high school also use English as the second language to communicate in the learning process. The research subject of this study is the 7th grade students from one class at Ar-Rafi Drajat junior high school.

3.3 Operational Definition

In order to summarize and avoid misconception about this research, the operational definitions are explained in this research. Those research variables are explained as follow:

1) Digital Scrapbook

In this study, the digital scrapbook is a design produced using Canva. Canva has been established as a graphic design website. It uses a drag-and-drop format and allows access to more than 1,000,000 photos, graphics and fonts. Canva is also a design instrument that can be designed and published anywhere (Canva, 2018). Digital scrapbook's concept is to generate a personal data that helps creators determine the looks of characters designers want to draw. In this case, creating a learning material makes interpreting the learning material easier and more understandable for the creators. In this research, the presentation design product that produced by canva website will be assessed by using a rubric.

2) Students' Scientific Literacy

Scientific literacy has been described as the use of science in everyday life, not knowing much about science as a body of knowledge, but knowing science as a manner of thinking, discovering, organizing and using data for decision making (Rennie, 2005). PISA described scientific literacy as the ability understanding science, recognize issues and draw evidence-based conclusions to comprehend and assist create choices about the natural world and its modifications through human activity (OECD, 1999). In education, competency-based curriculum is a systems of instruction, assessment, grading, and academic reporting that emphasizes the complex results of a learning process (i.e. knowledge (concept), skills (competencies) and attitudes to be applied by learners) rather than focusing on what learners should learn from traditionally defined subjects (UNESCO, 2018). In this study, students' scientific literacy will be assessed by using an objective test focusing on concept, competencies, and attitude indicators.

3) Students' Communication

Communication is the massage act with words, symbols and phrases that are understood by all parties engaged in the process of communication. Communication is the basis of education ; it is not the method of academia. The

flexibility to reflect and argue is understood from a comparative purpose of reading as a personal ability, but rather to add to a typical teaching, to find out how to differentiate completely between different values and findings by listening to others, etc. (Wahlström, 2010). Obviously, content knowledge promotes science - based communication. Content knowledge is the fundamental reason why communication is meaningful in the most commonly used concepts of scientific communication (Bucchi & Trench, 2008). In this research, students' communication skill will be assessed by using a rubric.

3.4 Research Instrument

In this study, it is necessary to use the instrument to gather data. There are 4 types of instruments that will be used in this research, which are observation sheet, objectives test, rubric and questionnaire. These instruments are explained as follows:

3.4.1 Observation Sheet

Observation sheet is the analysis of the students' activities and teacher's observation. It was arranged by the teacher to determine the implementation of the lesson plan. The observation sheet contains all teaching activities in the classroom in order to obtain data. Traditionally, classroom observations were conducted by administrators and senior teachers mainly for teacher evaluation purposes (Sheal, 1989). In this research, the observation sheet will be carried out through a lesson activities in a class made by the teacher as shown in Table 3.1.

Table 3.1
Observation Sheet

Activities	Time	Learning Experiences	Observation	
			Yes	No
Introduction	10'	1. Students greet teacher 2. Qur'an reading (Surah Ar-Rum;41) 3. Students recall their memory by watching video of environmental pollution 4. Students received the teacher's instruction and mini tutorial in using Canva as a design tool		

Activities	Time	Learning Experiences	Observation	
			Yes	No
Main Activities	5’	1. Students divided into 3 groups with a laptop and internet connection for each group 2. Students given the project assignment titled “Pollution isn’t Pretty” and given the instruction by the teacher		
	40’	3. Students made a design and content of presentation using Canva in a given topic; Air pollution, Soil pollution, and Water pollution 4. Students searching about the information from the internet include; environmental pollution definition, 3 examples of “certain” pollution, 1 related issue that happened in Bandung city regarding the pollution, and 2 solution of the problem		
	50’	5. Each group should do the presentation about their own topic		
Closure	15’	1. Students got their materials reviewed by the teacher 2. Daily evaluation (essay, 3 questions) 3. Students close the meeting by praying 4. The class is dismissed		

3.4.2 Objectives Test

Objective test was used to measure students' scientific literacy after implementing digital based learning using digital scrapbook via canva. It consist of post-test only and the topic is environmental pollution. The indicators of scientific literacy measured in this objective test are concept, competencies, and attitude. The blue print of the objective test shown in Table 3.2.

Table 3.2
Blue Print of Environmental Pollution Objective Test

No	Sub-topic	Concept	Competencies	Attitude	Total
1	Soil Pollution	14, 15, 17	-	-	20
2	Water Pollution	12,	1, 2, 11, 18, 20	-	
3	Air Pollution	3, 4, 5,	-	-	
4	The effect of pollution towards environment	6, 7, 13, 16	8, 10	9, 19	

3.4.2.1. Validity

Validity is the extent to which a test measures the quality it purposes to measure. It also can be defined as the agreement between a test score and the quality it is believed to measured (Kaplan & Saccuzzo, 2017). In this research, the validity is used to check whether the instrument can measure or cannot measure students' scientific literacy in the topic of environmental pollution. The formula to calculate the validity is:

$$r_{xy} = \frac{n \sum xt - \{(\sum x)(\sum y)\}}{\sqrt{\{n \sum x^2 - (\sum x)^2\}\{n \sum y - (\sum y)^2\}}}$$

(Saccuzzo & Kaplan, 2004)

Where:

r_{xy} = items correlation coefficient

x = items scores

y = total score of each student

n = amount of subject

$\sum x$ = sum of total score of all students for each question's item

$\sum y$ = sum of total score of all students for whole test

For the validity interpretation is represented in table below.

Table 3.3
Validity interpretation

The amount of r value	Interpretation
0,80 < r ≤ 1,00	Very High
0,60 < r ≤ 0,80	High
0,40 < r ≤ 0,60	Enough
0,20 < r ≤ 0,40	Low
0,00 < r ≤ 0,20	Very Low

(Source: Saccuzo & Kaplan, 2004)

3.4.2.2. Reliability

Reliability can be defined as the stability, dependability or consistency of a test result. Therefore, the reliability may be calculated using the following formula:

$$a = \frac{K}{K-1} 1 - \frac{\sum_{t=1}^{K} \sigma_{Yi}^2}{\sigma_x^2}$$

Where:

K = number of items

σ_x^2 = the variance (square of standard deviation)

σ_{Yi}^2 = observed variance from item i

(Source: Cronbach, 1951)

Table 3.4
Reliability Interpretation

Gained r value	Interpretation
0,80 -1,00	Very High
0,60 - 0,79	High
0,40 - 0,59	Prosperous
0,20 - 0,39	Low
0,00 - 0,19	Very Low

3.4.2.3. Difficulty Level

Difficulty level in this research refers to the degree of difficulty for students to answer the question which is not from teacher's perspective. In order to obtain the difficulty level on a item, the number of students or respondents with correct answer are divided by the total number of students or respondents. This is the formula that will be used to find the difficulty level:

$$\frac{A}{N}$$

Where:

A = Number of students who answered the item correctly

N = Total number of students who attempted the item

Table 3.5
Category of Difficulty Level

Value of Difficulty Index	Interpretation
0,00 – 0,30	Difficult
0,30 – 0,70	Moderate
0,70 – 1,00	Easy

(Source: Arikunto, 2010)

3.4.2.4. Discriminating Power

Discriminating Power is to identify items for which high-scoring examinees have a high probability of answering correctly and low-scoring examinees have a low probability of answering correctly. The formula to be used in order to obtain the discriminating power is:

$$D = p_{u-} p_i$$

Where:

p_u = Proportion in the upper group who answered the item correctly

p_i = Proportion in the lower group who answered the item correctly

(Source: Crocker, 1986)

3.4.2.5. Distractor

Distractor is the incorrect option in a multiple-choice question. The formula to be used in order to obtain the distractor is:

$$Corrected\ Score = R - \frac{W}{n-1}$$

Where:

R = Number of right answers

W = Number of wrong answers

N = Number of choices in each item

(Source: Kaplan & Saccuzzo, 2017)

3.4.3 Rubric

Rubric was used to evaluate students' communication skill. This rubric adapted from Dunbar, Brooks, and Miller, 2006; Hoban and Nielsen, 2011; Adams, 2005. It is utilized to assess students' verbal and visual communication while presenting their presentation in the end of the learning activities in class. The rubric is shown in Table 3.6.

Table 3.6
Rubric of Students' Communication Skill

Competency Area	Indicators	Activities	Scale		
			Good (3,00 - 2,34)	Fair (2,33 - 1,67)	Need Improvement (1,66 - 1,00)
Verbal Communi-cation	Knowledge	Communica tes specific purpose	Students mention and explain briefly about the given topic in presentation introduction	Students only mention the given topic in presentation introduction	Students did not mention the given topic in presentation introduction
		Mastery of presentation	All of the concepts of	Some of the concepts of	Few of the concepts of

Competency Area	Indicators	Activities	Scale		
			Good (3,00 - 2,34)	Fair (2,33 - 1,67)	Need Improvement (1,66 - 1,00)
		materials	the given	the given	the given
			topic is stated in presentation and explained by the students	topic stated in presentation and explained by the students	topic stated in presentation and only explained briefly by the students
		Skills to answer questions	Students able to answer all of the questions asked by other group members	Students able to answer half of the questions asked by other group members	Students able to answer less than a half of the questions asked by other group members
	Attitude	Uses appropriate languange	Students used a formal languange during presentation	Students used a formal languange mixed with informal languange during presentation	Students used an informal languange during presentation
		Uses vocal variety in rate, pitch, and intensity	Students' voice is clear and loud	Students' voice is clear, but not loud	Students' voice is not clear and not loud
		Uses appropriate pronun-ciation, grammar, and articulation.	Students did not mumbling during presentation and english pronunciation is good	Students mumbling during presentation, but english pronunciation is good	Students mumbling during presentation and english pronunciation is not good

Competency Area	Indicators	Activities	Scale		
			Good (3,00 - 2,34)	Fair (2,33 - 1,67)	Need Improvement (1,66 - 1,00)
		Uses physical behaviors that support the verbal message.	Students used appropriate body languange throughout the presentation to support the content	Students used appropriate body languange half of the time of presentation to support the content	Student did not used body languange during the presentation to support the content
	Motivation	Every student matches themselves to role of the presentation session	Every members in students' group get to explain the materials during presentation	Half of the members in students' group get to explain the materials during presentation, the other half	Less then a half of the members in students' group get to explain the materials during presentation, the rest of the members doesn't
		Students excitement during presentation and discussion session	Every members in students' group are very active and responsive during presentation and discussion session	Half of the members in students' group are active and responsive during presentation and discussion session, the other half doesn't	Less than half of members in students' group are active and responsive during presentation and discussion session, the rest of the members doesn't

Competency Area	Indicators	Activities	Scale		
			Good (3,00 - 2,34)	Fair (2,33 - 1,67)	Need Improvement (1,66 - 1,00)
Visual Communi-cation	Knowledge	The presentation is organize in coherent sequence	The presentation slides is according to the presentation's outline	The presentation slides is according to the presentation's outline but not consistent	The presentation slides is not according to the presentation's outline and also not consistent
		Legibility of presentation materials	The presentation narration used appropriate font size and did not have too much content	The presentation narration used appropriate font size, but the content is quite much	The presentation narration used inconsistent font size (too big or too small) and difficult to read because the content is too much
		Provides some new facts/ context in daily life phenomeno n related to the topic	Facts and context about the recent news is provided in the presentation and also relevant to the given topic	Facts and context about the recent news is provided in the presentation but not really relevant to the given topic	Facts and context about the recent news is not provided in the presentation

Competency Area	Indicators	Activities	Scale		
			Good (3,00 - 2,34)	Fair (2,33 - 1,67)	Need Improvement (1,66 - 1,00)
	Creative Thinking	Students combine and combust every idea in an interesting way of making presentation	Design template and content is used in an appropriate way and help foster retention of the materials	Design template and content is used in an appropriate way but only a few figures included	Design template is not creative (used one in Canva) and content is lacking of information and figures
		Students recognize to creative work of adding figures/symbols into presentation	Figures/symbols are exist and used to facilitate retention, also appropriate with the concepts written.	Figures/symbols are exist and used to facilitate retention, but not quite appropriate with the concepts written	Figures/symbols are not exist, narration olny

(Source: Dunbar, Brooks, and Miller, 2006; Hoban and Nielsen, 2011; Adams, 2005)

3.4.4 Questionnaire

Questionnaire was used to gather data of learner satisfaction after the usage of Canva website. This questionnaire is adapted from Wang, 2003 and it is shown in Table 3.7.

Table 3.7
Questionnaire of Learner Satisfaction

Indicators	Yes	No
The website is easy to use		
The website is user-friendly		

Indicators	Yes	No
The content provided by the website is easy to understand		
The operation of the website is stable		
The website makes it easy for you to find the design content you need		
The website makes it easy for you to access the shared content from other learning source		
The website makes it easy for you to share what you have design with others internet users		
The website provides up-to-date design content		
The website provides design content that exactly fits your needs		
The website provides sufficient design content		
The website provides useful design content		
The website enables you to choose what you want to design		
The website enables you to control your designing progress		
The website records your designing progress		
The website can make it easier for you to share designs when designing with others		

(Source: Wang, 2003)

3.5 Instrument Analysis Result

There are three instruments used by researcher in conducting this research. The instruments have different way to collect and process the data. The data collection techniques are explained as follows:

3.5.1 Data of Students' Scientific Literacy

Students scientific literacy is the quantitative data of this research. The data has been collected through objective test in form of 20 multiple choice questions. The result was collected and analyzed by using Ms. Excel software to

find the average score of the test. The specification of test item is shown in Table 3.8.

Table 3.8
Test Item Specification

Indicator	Test Item
Concept	3, 4, 5, 6, 7, 12, 13, 14, 15, 16, 17
Competencies	1,2, 8, 10, 11, 18, 20
Attitude	9, 19

Before the test item was distributed to students, the test item was analyzed to decide whether it is appropriate or not. The test item was analyzed based on its validity, difficulty level, and discriminating power by using ANATES software. The recapitulation of test item analysis is shown in Table 3.9.

Table 3.9
The Recapitulation of Test Items' Analysis

Number of Test Item	Validity	Difficulty Level	Discriminating Power	Acceptance
1	0,247 (Low)	Very Easy	0,25 (Satisfactory)	Used
2	0,236 (Low)	Difficult	0,375 (Satisfactory)	Used
3	0,464 (Enough)	Medium	0,50 (Good)	Used
4	0,033 (Very Low)	Difficult	0,00 (Poor)	Rejected
5	0,147 (Very Low)	Very Easy	0,25 (Satisfactory)	Used
6	0,342 (Low)	Easy	0,375 (Satisfactory)	Used
7	0,168 (Very Low)	Medium	0,25 (Satisfactory)	Used

Number of Test Item	Validity	Difficulty Level	Discriminating Power	Acceptance
8	0,464 (Enough)	Easy	0,50 (High)	Used
9	0,512 (Enough)	Easy	0,500 (High)	Used
10	0,432 (Enough)	Medium	0,500 (High)	Used
11	0,080 (Very Low)	Medium	0,125 (Poor)	Used
12	0,150 (Very Low)	Very Easy	0,125 (Poor)	Rejected
13	0,265 (Low)	Medium	0,375 (Satisfactory)	Used
14	0,125 (Very Low)	Medium	0,125 (Poor)	Used
15	0,144 (Very Low)	Medium	0,125 (Poor)	Used
16	-0,094 (Very Low)	Very Easy	-0,125 (Poor)	Rejected
17	0,609 (High)	Medium	0,625 (Good)	Used
18	0,239 (Low)	Very Easy	0,125 (Poor)	Rejected
19	0,268 (Low)	Very Easy	0,250 (Satisfactory)	Used
20	-	Very Easy	0,000 (Poor)	Rejected
21	0,356 (Low)	Medium	0,375 (Satisfactory)	Used
22	0,538 (Enough)	Very Easy	0,250 (Satisfactory)	Used

Number of Test Item	Validity	Difficulty Level	Discriminating Power	Acceptance
23	-0,226 (Very Low)	Medium	-0,375 (Poor)	Rejected
24	0,306 (Low)	Very Easy	0,125 (Poor)	Rejected
25	0,102 (Very Low)	Very Easy	0,125 (Poor)	Rejected
26	0,005 (Very Low)	Very Easy	0,000 (Poor)	Rejected
27	0,382 (Low)	Easy	0,375 (Satisfactory)	Used
28	0,366 (Low)	Medium	0,375 (Satisfactory)	Used
29	0,510 (Enough)	Very Easy	0,250 (Satisfactory)	Used
30	0,172 (Very Low)	Very Easy	0,125 (Poor)	Rejected

There were 30 multiple choice questions in the test. It was applied in the class. After the test item was analyzed, the researcher used 20 questions in the post-test.

3.5.2 Data of Students' Communication Skill

Rubric of Students' Communication Skill was used to measure students' verbal and visual communication skill in learning environmental pollution by using canva. The result of the impelementation of using canva website is the presentation design. The data were collected through the teaching-learning activities observation on students' presentation about the learning subject, which is environmental pollution. The teacher gave the score based on the presentation performance and the presentation design. The score is based on the scoring criteria in Table 3.6.

3.5.3 Data of Students' Satisfaction in Using Canva

The questionnaire was used to capture students' satisfaction in using canva website. After learning activity by using canva, teacher gave the questionnaire to students via google form. The result data are in the form of percentages of students' answers by choosing answer 'yes' and answer 'no'. The total result is counted and used to capture the students' satisfaction in using canva.

3.6 Data Analysis

The data was obtained from both quantitative and qualitative way. Quantitative data was obtained from post-test to investigate students' scientific literacy. Qualitative data was obtained from rubric to measure students' communication skill and a questionnaire to capture students' satisfaction in using canva website. The explanation of data analysis that was obtained is as follows:

3.6.1 Students' Scientific Literacy Data Analysis

Students' scientific literacy data analysis which measured by an objective test was done by using Microsoft Excel software in order to determine the score of post test. The first step to process data was scoring the test item. Test item consists of 20 multiple choice questions. The test was taken by students in one class and the data was analyzed by using microsoft excel software to find out the average score of the class. The average score is used to capture the knowledge of learners in the environmental pollution topic.

After the average score of the class was gained, the average score of each indicator in students' scientific literacy was calculated as well to determine which score is the highest and the lowest. The indicators are concept, competencies, and attitude.

3.6.2 Students' Communication Skill Data Analysis

Students' communication data analysis was done by using a rubric in order to determine the average score. The rubric has two competencies areas that are being measured, verbal and visual communication. Each competency area has its own indicators and they have activities that are shown in Table 3.6. After the data were gained, all of the activities were calculated to find the average score. The scoring criteria is according to Dunbar, Brooks, and Miller, 2006; Hoban and Nielsen, 2011; Adams, 2005 as shown in Table 3.10.

Table 3.10
Students' Communication Skill Scoring Criteria

Scale	Criteria
3,00 – 2,34	Good
2,33 – 1,67	Fair
1,66 – 1,00	Need Improvement

(Dunbar, Brooks, and Miller, 2006; Hoban and Nielsen, 2011; Adams, 2015)

3.6.3 Students' Scientific Literacy and Students' Communication Skill Correlation Data Analysis

After the data of students' scientific literacy and students' communication skill were gained, the correlation between both variable was calculated by using SPSS software. The data were measured through correlation bivariate test to determine the correlation between the variables. After the coefficient correlation is gained, it is classified into correlation test criteria in Table 3.11 to determine whether both variables have any correlation.

Table 3. 11
Correlation Test Criteria

Correlation Test Criteria	
0,00 – 0,20	no correlation
0,21 – 0,40	low correlation
0,41 – 0,60	medium correlation
0,61 – 0,80	strong correlation
0,81 – 1,00	perfect correlation

3.6.4 Students' Satisfaction Data Analysis

Students' satisfaction data analysis was done by using a questionnaire in order to capture students' satisfaction in using canva website. The questionnaire consists of 15 questions with yes or no answers as shown in Table 3.7. The result data are in the form of percentages of students' answers by choosing answer 'yes' and answer 'no'. After the data was gained, the result of the questionnaire percentages was used to capture students' satisfaction in using canva website.

3.7 Research procedure

In order to make the research arranged systematically, there are 3 main stages in the research that consist of preparation stage, implementation stage, and completion stage.

1) Preparation Stage

a) Identifying research problem

b) Formulating research objective

c) Reviewing literature on Digital Scrapbook, Canva, Students' Scientific Literacy, Students' Communication Skill, and Environmental Pollution topic

d) Making research instruments. There are three instruments; objective test, rubric, and a questionnaire.

e) Validating research instrument by expert

f) Revising research instrument

2) Implementation Stage

a) Determining the research subject

b) Implementing digital scrapbook learning by using canva website to the class. Students make a presentation design and present it in the front of the class.

c) Assessing students' communication skill

d) Giving post-test to the class for collecting students' scientific literacy data

e) Giving questionnaire of students' satisfaction in using canva website to the class

3) Completion Stage

a) Analyzing the data gained from the research

b) Discussing findings resulted from the data

c) Making conclusions from the data analysis results

In order to make the research systematically arranged, the author made the stages into the flowchart. The flowchart is shown in figure 3.1.

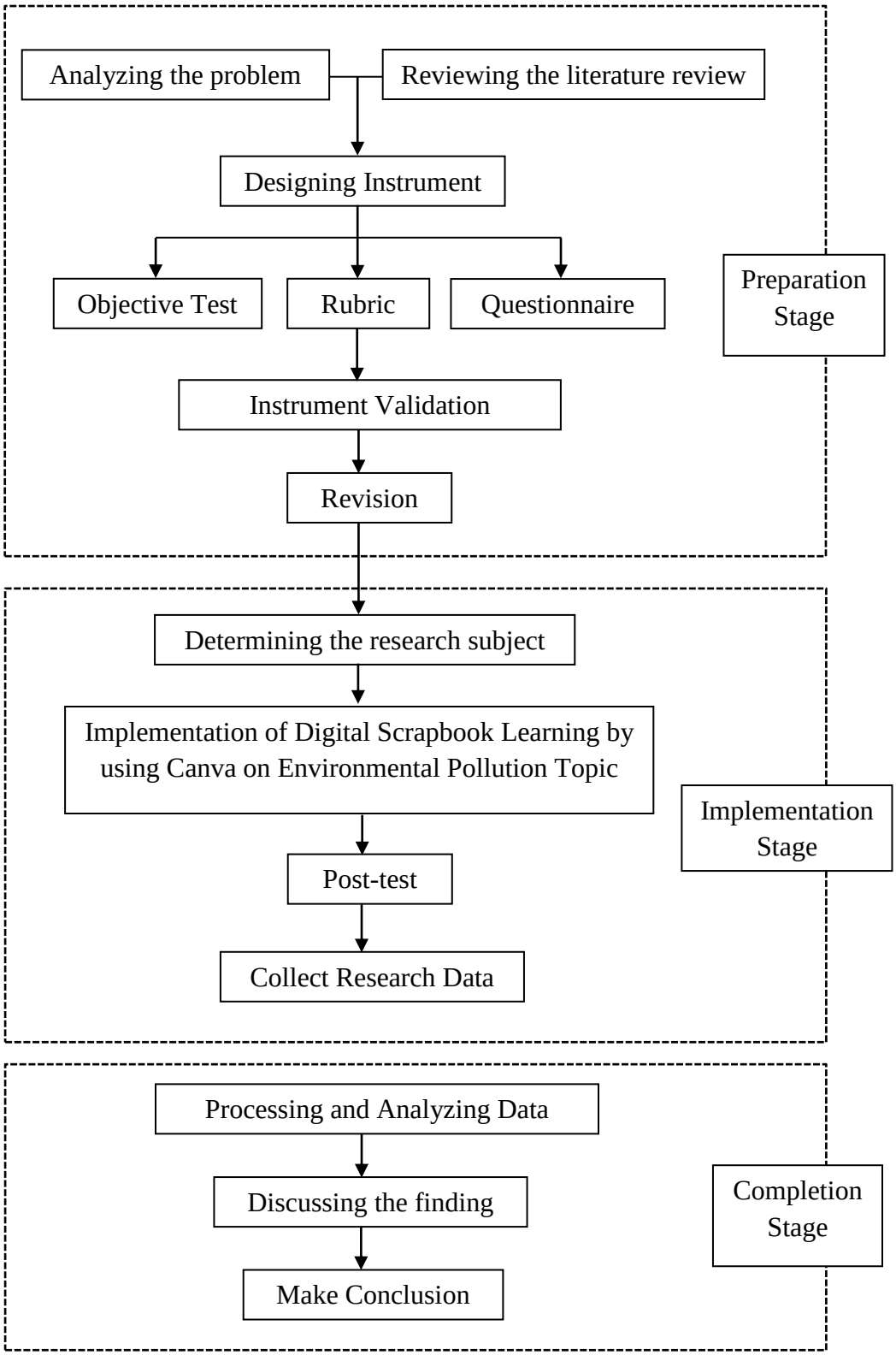

Figure 3.1 Flowchart of Research Procedure