CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Method

This research aims to analyze students' critical thinking skill and environmental awareness as well as their learning satisfaction in learning environmental pollution using Instagram-mediated SAMR model. Based on the purpose of this research, this research is a descriptive study. Descriptive studies describe a given state of affairs as fully and carefully as possible (Fraenkel, Wallen, & Hyun, 2011). Such research examine people, organizations, organizations, techniques and equipment to describe, compare, contrast, classify, analyze and interpret the entities and occurrences that make up their different fields of investigation (Cohen, Manion, & Morrison, 2002). It does not answer questions about how / when / why the features happened, but addresses the question of "what" (what are the features of the population or situation being studied?) (Shields & Rangarajan, 2013). The description is used for frequencies, averages and other calculations of statistics.

3.2 Research Design

The design of this study is non-experimental to provide a description of instructional events with a natural descriptive design. There is no independent variable manipulation. Researchers conducting non-experimental studies merely measure variables as they happen naturally, rather than manipulating an independent variable. Experimental study is suitable if the investigator has a particular study query or hypothesis on the causal connection between two variables— and the autonomous variable can be manipulated, viable and ethical. Therefore, it stands to reason that if these circumstances are not met, non-experimental study is appropriate— even necessary (Price, Jhangiani, & Chiang, 2015). The group members are not allocated randomly and the experimenter does not manipulate an independent variable, so no conclusions can be drawn about causal relationships between variables in the study (Salkind, 2010). Current situation of the research variables are elaborated descriptively and classified based

on its type, characteristics or condition, then draw into conlcusion. Primarily descriptive in nature are the findings drawn from nonexperimental studies. Any efforts to draw conclusions about non-experimental research-based causal relationships are made after hoc (Salkind, 2010).

3.3 Population and Sample

This research was done in a private junior high school in West Bandung sub-district. The school has 3 classes for each grade and the number of the student for each class cannot be more than 30. For teaching and learning activity, the teachers and students use Indonesian as the language of instruction. 2013 curriculum is implemented in this school using modified curriculum which means the teacher may arrange the topics adjusting with the school's needs.

The population of this research is 7th grade students in the second semester who are familiar with social media especially Instagram. Thus, the sampling technique that will be used is cluster random sampling. Cluster random sampling is selecting subject groups or clusters, not individuals. Cluster random sampling is similar to simple random sampling, other than that groups are randomly selected rather than individuals (i.e. The unit of sampling is a group rather than an individual). This sampling technique is considered suitable for this research because it is more efficient with larger cluster numbers (Fraenkel et al., 2011).

During the second semester in the academic year of 2018-2019, an Instagram account of the school's science course and an Instagram direct message group has been created, in which 83 students of 7th grade had the opportunity to communicate in various ways with the teacher who were using the science course Instagram and acted as the admin as well as their fellow students for the science course.

At the end of the course, the students who participated in the group were asked to upload a vlog regarding environmental pollution around them in which their critical thinking skills were measured. This research also utilize two online questionnaires that were posted to the Instagram direct message group. The total of 76 students completed both the vlog project and online questionnaires voluntarily, which consists of 91,6 % of the sample.

3.4 Operational Definition

To prevent misconceptions in this study, some operational definitions are clarified. The terms are described as follows.

1. Instagram

   In this study, Instagram was used as a learning tool utilizing one of its features to create a business profile. The utilization of Instagram in the learning process was based on the stage in SAMR model; substitution, augmentation, modification, and redefinition. Learning materials of the environmental pollution topic will be designed and uploaded in the Instagram profile as well as other pictures that support the content. Students can also interact with each other and the teacher through the direct message group and comment feature. Students will be asked to follow the Instagram learning account so that they will be able to stay updated with the content from the account. Later on, students will be asked to create a post on their personal Instagram account regarding environmental pollution cases around them as a final assignment.

2. Critical Thinking Skill

   In this study, students' critical thinking skill is collected from a science project in which the students make a vlog regarding environmental pollution cases around them. The vlogs are uploaded to their personal Instagram account tagging the main Instagram account used by the teacher so the teacher gets notified when the students upload their vlogs. In the project, there are several requirements to be fulfilled by the students in order to get an optimal score. The requirements are constructed based on the eight elements of critical thinking. Critical thinking grid is used to assess the vlog project of the students. At the end, their critical thinking skill is categorized into exemplary, satisfactory, below satisfactory, or unsatisfactory based on the critical thinking grid.

3. Environmental Awareness

   Environmental awareness in this study is students' awareness towards the environmental pollution issues around them. The awareness is assessed

through an online questionnaire using negative prompts adapted from the Environmental Consciousness in Daily Activities Measured by Negative Prompts after the students experience the learning activity constructed in this research which includes learning environmental pollution using Instagram and making the vlog project. The awareness is based on several factors that include personal responsibility, interest in attitude, awareness in daily life, judgment of others, and environmental information.

4. Learning Satisfaction

   Student learning satisfaction is measured after the students experience the learning activity constructed in this research which includes learning environmental pollution using Instagram and making the vlog project. The students are asked to fill an online questionnaire regarding their experience in using Instagram as a learning tool. The learning activity being assessed includes includes the learning system, multimedia instruction, interactive learning activities, and learners' self-efficacy.

4.5 Research Instrument

In this research, it is necessary to use an instrument to collect data. In this research, there are two types of instruments that are rubric and questionnaire. These instruments are described below.

4.5.1 Critical Thinking Grid

A vlog science project regarding environmental pollution was utilized to measure students' critical thinking skill. The project was arranged based on Inch's critical thinking elements. Students' critical thinking skills were measured individually using a rubric adapted from the Foundation for Critical Thinking with some modification adjusting with the use of Instagram. The rubric was judged by the experts for its readibility since the rubric was going to be used by the researcher and two other science teachers to measure the students' critical thinking skills. The rubric can be seen in Table 3.1.

Table 3.1

Critical Thinking Grid

No.	Element	4 – Exemplary	3 – Satisfactory	2- Below Satisfactory	1 – Unsatisfactory
		If applicable, consistently does all or almost all of the following	If applicable, consistently does most or many of the following	If applicable, consistently does most or many of the following	If applicable, consistently does all or almost all of the following
1.	Purpose	- Instagram post demonstrates student's clear understanding of the assignment's purpose	- Instagram post demonstrates student's understanding of the assignment's purpose	- Instagram post does not completely demonstrate student's clear understanding about the purpose of the assignment	- Instagram post does not demonstrate student's understanding about the purpose of the assignment at all
2.	Key Question, Problem, or Issue	- In Instagram video and caption, student clearly defines the issue or problem; accurately identifies the core issues - In Instagram caption,	- In Instagram video and caption, student defines the issue; identifies the core issues, but may not fully explore their depth and breadth	- In Instagram video and caption, student defines the issue, but poorly (superficially, narrowly); may overlook some core issues	- In Instagram video and caption, student fails to clearly define the issue or problem; does not recognize the core issues

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No.	Element	4 – Exemplary	3 – Satisfactory	2- Below Satisfactory	1 – Unsatisfactory
		If applicable, consistently does all or almost all of the following	If applicable, consistently does most or many of the following	If applicable, consistently does most or many of the following	If applicable, consistently does all or almost all of the following
		student appreciates depth and breadth of problem - In Instagram caption, student demonstrates fair-mindedness toward problem	- In Instagram caption, student demonstrates fair-mindedness	- In Instagram caption, student has trouble maintaining a fair-minded approach toward the problem	- In Instagram caption, student fails to maintain a fair-minded approach toward the problem
3.	Point of View	- In Instagram video and caption, student identifies and evaluates relevant significant points of view - In Instagram caption, student is empathetic, fair in examining all relevant	- In Instagram video and caption, student identifies and evaluates relevant points of view - In Instagram caption, student is fair in	- In Instagram video and caption, student may identify other points of view but struggles with maintaining fair-mindedness; may focus on irrelevant or insignificant	- In Instagram video and caption, student ignores or superficially evaluates alternate points of view - In Instagram video and caption, student

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No.	Element	4 – Exemplary	3 – Satisfactory	2- Below Satisfactory	1 – Unsatisfactory
		If applicable, consistently does all or almost all of the following	If applicable, consistently does most or many of the following	If applicable, consistently does most or many of the following	If applicable, consistently does all or almost all of the following
		points of view	examining those views	points of view	cannot separate own vested interests and feelings when evaluating other points of view
4.	Information	- Student gathers sufficient, credible, relevant information: observations, statements, logic, data, facts, questions, graphs, themes, assertions, descriptions, etc. in their Instagram post	- Student gathers sufficient, credible, and relevant information in their Instagram post - In Instagram caption, student includes some information from opposing views	- In Instagram post, student gathers some credible information, but not enough; some information may be irrelevant - In Instagram caption, student omits significant	- In Instagram post, student relies on insufficient, irrelevant, or unreliable information - In Instagram caption, student Fails to identify or hastily dismisses

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No.	Element	4 – Exemplary	3 – Satisfactory	2- Below Satisfactory	1 – Unsatisfactory
		If applicable, consistently does all or almost all of the following	If applicable, consistently does most or many of the following	If applicable, consistently does most or many of the following	If applicable, consistently does all or almost all of the following
		- In Instagram caption, student includes information that opposes as well as supports the argued position - In Instagram caption, student distinguishes between information and inferences drawn from that information	- In Instagram caption, student distinguishes between information and inferences drawn from it	information, including some strong counter-arguments - In Instagram caption, student sometimes confuses information and the inferences drawn from it	strong, relevant counter-arguments - In Instagram caption, student confuses information and inferences drawn from that information
5.	Concepts	- In Instagram caption, student identifies and	- In Instagram caption, student identifies and	- In Instagram caption, student identifies some	- In Instagram caption, student misunderstands

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No.	Element	4 – Exemplary	3 – Satisfactory	2- Below Satisfactory	1 – Unsatisfactory
		If applicable, consistently does all or almost all of the following	If applicable, consistently does most or many of the following	If applicable, consistently does most or many of the following	If applicable, consistently does all or almost all of the following
		accurately explains/uses the relevant key concepts	accurately explains and uses the key concepts, but not with the depth and precision of a "4"	(not all) key concepts, but use of concepts is superficial and inaccurate at times	key concepts or ignores relevant key concepts altogether
6.	Assumptions	- In Instagram caption, student accurately identifies assumptions (things taken for granted) - In Instagram video and caption, student makes assumptions that are consistent, reasonable, valid	- In Instagram caption, student in Instagram caption, student - In Instagram video and caption, student makes valid assumptions	- In Instagram video and caption, student fails to identify assumptions, or fails to explain them, or the assumptions identified are irrelevant, not clearly stated, and/or invalid	- In Instagram caption, student fails to identify assumptions - In Instagram video and caption, student makes invalid assumptions

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No.	Element	4 – Exemplary	3 – Satisfactory	2- Below Satisfactory	1 – Unsatisfactory
		If applicable, consistently does all or almost all of the following	If applicable, consistently does most or many of the following	If applicable, consistently does most or many of the following	If applicable, consistently does all or almost all of the following
7.	Interpretations, Inferences	- In Instagram caption, student follows where evidence and reason lead in order to obtain defensible, thoughtful, logical conclusions or solutions - In Instagram caption, student makes deep rather than superficial inferences - In Instagram post, student makes inferences that are consistent with	- In Instagram caption, student follows where evidence and reason lead to obtain justifiable, logical conclusions - In Instagram caption, student makes valid inferences, but not with the same depth and as a "4"	- In Instagram caption, student does follow some evidence to conclusions, but inferences are more often than not unclear, illogical, inconsistent, and/or superficial	- In Instagram caption, student uses superficial, simplistic, or irrelevant reasons and unjustifiable claims - In Instagram caption, student makes illogical, inconsistent inferences - In Instagram post, student exhibits closed-mindedness or hostility to reason; regardless of the evidence, maintains

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No.	Element	4 – Exemplary	3 – Satisfactory	2- Below Satisfactory	1 – Unsatisfactory
		If applicable, consistently does all or almost all of the following	If applicable, consistently does most or many of the following	If applicable, consistently does most or many of the following	If applicable, consistently does all or almost all of the following
		one another			or defends views based on self-interest
8.	Implications, Consequences	- In Instagram caption, student identifies the most significant implications and consequences of the reasoning (whether positive and/or negative) - In Instagram caption, student distinguishes probable from improbable implications	- In Instagram caption, student identifies significant implications and consequences and distinguishes probable from improbable implications, but not with the same insight and precision as a "4"	- In Instagram caption, student has trouble identifying significant implications and consequences; identifies improbable implications	- In Instagram caption, student ignores significant implications and consequences of reasoning

(Critical Thinking Testing and Assessment, 2015)

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4.5.2 Observation Sheet

Observation sheet was used to check whether the learning process using the SAMR model was implemented correctly. It is used to gain the qualitative data in this research. The observation sheet of this research is available at appendix B5.

4.5.3 Student Environmental Awareness Questionnaire

This questionnaire was used to gather data of students' environmental awareness after the learning process using Instagram especially after the vlog project. This questionnaire consists of 23 prompts that are derived from 5 factors of environmental awareness; personal responsibility, interest in attitude, awareness in daily life, judgment of others, and environmental information. The prompts are arranged randomly. This questionnaire uses 4-point Likert type items since no attempts were done by the researcher to combine the responses from the items into a composite scale (Boone & Boone, 2012). The questionnaire can be seen in Table 3.2.

Table 3.2

Environmental Awareness in Daily Activity Questionnaire

Statement	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
My Pro-Environment Behaviors (PEBs) are based on custom rather than environmental consciousness				
My concern for environmental issues is not particularly high				
I do not know how much media information on the environment is reliable (TV, newspaper, internet, etc.)				

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Environmental issues are important problems to be solved				
In reality, I do not particularly care about the environment				
I cannot understand a person who is enthusiastic about environmental activities				
Companies and industries should take more efforts than individuals to improve the environment				
Individual action will not improve the environment				
I do not think my behavior is responsible for global warming				
I do not have enough time to actively change the environment				
When purchasing (e.g., energy, resources, waste), I do not particularly care about the environment				
PEBs should be adopted even if they are bothersome				
I will not display PEBs when I do not have the attention of others or society				

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Even if they are good for the environment, I avoid PEBs because I do not want to be inconvenienced				
I display PEBs to save money				
Individual action is important to solve environmental problems				
There is not enough useful information on adopting PEBs				
Honestly, I do not know what behaviors are good or bad for the environment				
An individual inaction will not significantly influence the environment				
For me, there are more important things than environmental issues				
I display PEBs depending on whether others are paying attention to my behaviors				
I became fed up with being told to display PEBs				
I do not care about environmental issues even if they were to destroy the earth in the future				

(adapted from Hiramatsu, Kurisu, & Hanaki, 2016)

4.5.4 Student Learning Satisfaction Questionnaire

Students' satisfaction in using Instagram as a learning tool was assessed using a questionnaire adapted from the previous research done by Shu-Sheng Liaw in 2008. The questionnaire was used to assess students' attitudes toward e-learning, in this case Instagram, and students were asked to indicate their attitudes towards the e-learning (Liaw, 2008). Students identified each item in the questionnaire and they were asked to give each item a score from a 1-4 rating scale with 1 being the smallest score and 4 being the highest score based on their experience with learning using Instagram. Table 3.3 shows the blueprint of the questionnaire.

Table 3.3

Student Learning Satisfaction Questionnaire

Statement	4	3	2	1
1. I feel confident using Instagram learning as a learning tool				
2. I feel confident operating learning features via Instagram				
3. I feel confident learning the material provided by the teacher in Instagram learning				
4. I am satisfied using Instagram learning as a learning tool				
5. I am satisfied using learning features via Instagram				
6. I am satisfied with the material provided by the teacher in Instagram learning				
7. I am satisfied with the instructions given by the teacher in Instagram				

Statement	4	3	2	1
learning				
8. I am satisfied with the interactions gained from Instagram learning				
9. I am sure the material provided by the teacher in Instagram learning is informative				
10. I am sure Instagram learning is a useful learning tool				
11. I am sure the material provided by the teacher in Instagram learning is useful				
12. I intend to use Instagram learning to help me learn				
13. I intend to use the material in Instagram learning to help me learn				
14. I intend to use Instagram learning as a self-learning tool				
15. I will share my experiences in learning through Instagram				
16. I am sure Instagram learning can facilitate my interaction with the teacher				
17. I am sure Instagram learning can facilitate my interaction with my friends				
18. I am sure Instagram learning can increase my learning motivation				

(adapted from Liaw, 2008)

4.6 Instrument Development and Analysis

The questionnaires were tested before the implementation. Before the implementation, the Instagram account was tested to 8th graders in the same school who had learned the environmental pollution topic in 7th grade. They were asked to follow the Instagram account and answer the questionnaires voluntarily. From the total of 56 students in 8th grade who were asked to follow the Instagram, 35 students filled the environmental awareness questionnaire and 31 students answered the learning satisfaction questionnaire. The reliability of each questionnaires was tested accordingly. Before the reliability test, the questionnaires were also judged by experts to test its readibility.

4.6.1 Reliability of Questionnaire

Statistical and psychometric reliability is a measure's overall consistency (Trochim, 1993). A measure is said to be highly reliable if, under coherent circumstances, it generates comparable outcomes. It is the characteristic of a set of test scores that is related to the amount of the measurement process random error that could be embedded in the scores. Highly credible scores are precise, reproducible, and consistent from time to time. That is, if the testing process was repeated with a group of test takers, the results would be obtained essentially the same (*Standards for educational and psychological testing*, 1999). Cronbach's alpha test was used to measure the intruments' reliability. A rule of thumb for interpreting alpha questions on dichotomy (i.e. questions with two possible responses) or questions on the Likert scale is seen on Table 3.4.

Table 3.4

A Rule of Thumb for Interpreting Alpha

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable

Cronbach's Alpha	Internal Consistency
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

(Tavakol & Dennick, 2011)

4.7 Instrument Analysis Result

The instruments consist of Environmental Awareness in Daily Activity Questionnaire and Student Learning Satisfaction Questionnaire. Both questionnaires were tested for its reliability before the execution using SPSS. Based on the rule of thumb for interpreting alpha, the internal consistency of the Environmental Awareness in Daily Activity Questionnaire is in the "excellent" category. The same category applies for the internal consistency of the Student Learning Satisfaction Questionnaire. The results of the reliability test of both questionnaires are shown in Table 3.5 and 3.6.

Table 3.5

Reliability Statistics of Environmental Awareness in Daily Activity Questionnaire

Cronbach's Alpha	N of Items
.90	23

Table 3.6

Reliability Statistics of Student Learning Satisfaction Questionnaire

Cronbach's Alpha	N of Items
.92	18

4.8 Data Processing Technique

4.8.1 Score of Critical Thinking Skill

The vlog project regarding environmental pollution issues is used to measure students' critical thinking skill. The scoring is based on the Critical Thinking Grid and was done by the researcher and 2 (two) other science teachers in a discussion for each student. The Critical Thinking Grid can be seen in Table 3.1 and Appendix B.1. The scores of 76 students were then analyzed using descriptive statistics to find the mean score of each critical thinking element. The interpretation criteria of the score is shown in Table 3.7.

Table 3.7
Interpretation Criteria of Critical Thinking Skill Mean Score

Mean Score	Category
3.5 – 4	Exemplary
2.5 – 3.4	Satisfactory
1.5 – 2.4	Below Satisfactory
1 – 1.4	Unsatisfactory

4.8.2 Analysis of Environmental Awareness in Daily Life Questionnaire

The questionnaire consists of 20 negative prompts and 3 positive prompts that are costructed by 5 factors of environmental awareness. There are 9 prompts for the personal responsibility factor, 2 prompts for the interest in attitude factor, 4 prompts for the awareness in daily life factor, 4 prompts for the judgment of others factor, and 4 prompts for the environmental information factor. This questionnaire uses Likert type items with the scale ranging from 4 (Strongly Agree), 3 (Agree), 2 (Disagree), 1 (Strongly Disagree). The answer for each item will be made into percentage and will be analyzed descriptively.

4.8.3 Score Calculation of Student Learning Satisfaction Questionnaire

The questionnaire consists of 18 positive items that represent the student's impression towards Instagram learning. Rating scale is used in this questionnaire with the range from 4 being the highest rate and 1 being the smallest rate. The overall rating score from 76 students were then calculated by multiplying each rate with the amount of student giving the rate. The equation for this calculation is shown in equation 3.1 below.

$$Score = n\ .\ rate \tag{3.1}$$

The percentage of the total gained score from the highest score possible was then calculated to interpret the impression. The equation to get the percentage is shown in equation 3.2 below and the interpretation of the total percentage is shown in Table 3.8.

$$Rating\ Percentage = \frac{Total\ Gained\ Score}{Total\ Highest\ Score\ Possible}\ .\ 100\% \tag{3.2}$$

Table 3.8
Interpretation Criteria of Rating Percentage

Rating Percentage	Impression
75% - 100%	Very Satisfied
50% - 74.99%	Satisfied
25% - 49.99%	Unsatisfied
0% - 24.99%	Very Unsatisfied

4.9 Research Procedure

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

In the preparation stage, the researcher analyzed the 2013 curriculum, identified the research problem, formulated the research objectives, and reviewed the literature on SAMR model, Instagram, critical thinking skill, environmental awareness and environmental pollution topic. The research instruments were also developed in this stage. The research instruments were then judged by the experts and for the questionnaires, its reliability was also tested. After that, the researcher revised the instruments before going to the implementation stage.

After everything was ready from the preparation stage, the researcher did the implementation stage. In this stage, the researcher determined the sample and applied the Instagram learning to the sample. After the learning activity, the researcher scored the critical thinking skill of the students with 2 (two) other teachers and delivered the questionnaires to the sample.

The last stage of the research is the completion stage. In this stage, the researcher analyzed the data, discussed the findings and made conlusions. The flowchart of this research is shown in Figure 3.1 below.

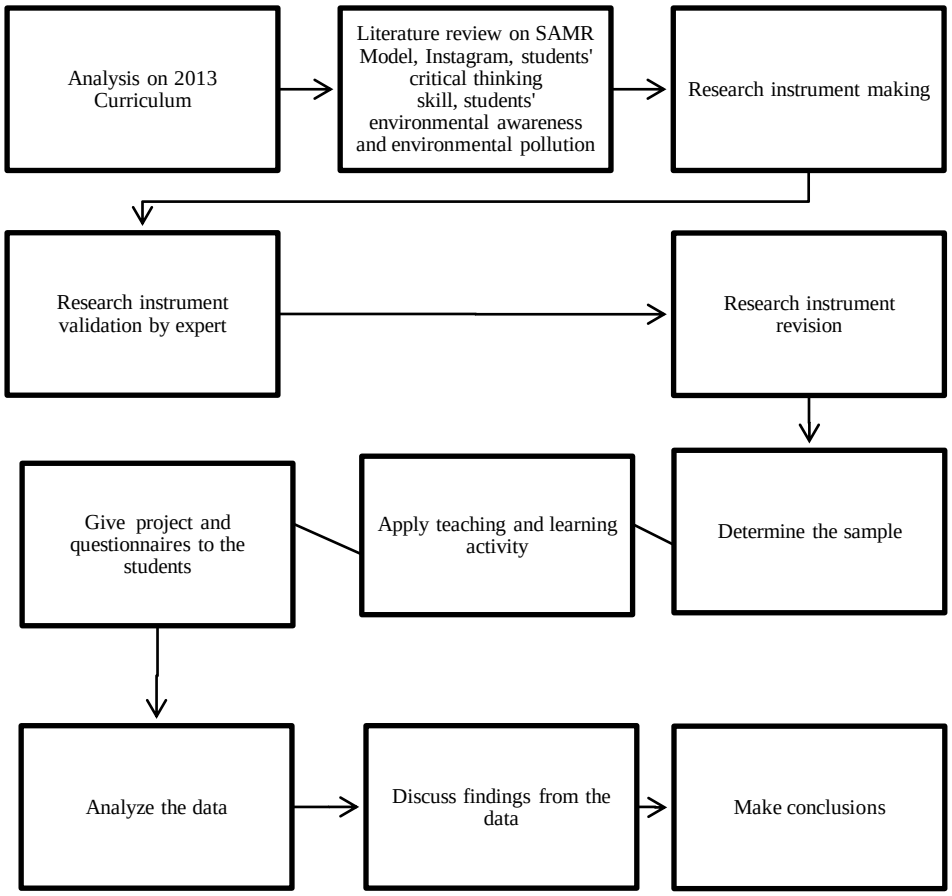

Figure 3.1 The flowchart of reseach procedure in stages