CHAPTER III

RESEARCH METHOD

A. Research Subject

1. Research Location and Period

The research was conducted in one of Private International School in Bandung which applied Cambridge Curriculum in the learning process. The data collection was done in April up to May 2013.

2. Population and Sample

Population of this research is all of students' ability in cognitive achievement and problem solving skill that belongs to all secondary one level students in the school. The sample is all of students' ability in cognitive achievement and problem solving skill on people and the planet chapter and consists of 24 students in kinetic class. The sampling technique of this research is purposive sampling, the consideration of the sample is based on the preliminary test where the class has lower result of achievement and problem solving skill compare to another class.

B. Type of Research Design

The design which is used in this research is the one group pretest and post-test design. In this design there is a test to know student's prior knowledge or pretest (O_1), treatment (X) where the Project-based Learning method applied in the teaching learning process, and after the concept given the treatment the final test will be conducted or post-test (O_2). The detail explanation is shown in Table 3.1 below:

Tabel 3.1 The one group pretest and post-test

Pretest	Treatment	Post-test
O_1	X	O_2

Note:

O_1 = Pretest

X = Treatment

O_2 = Post-test

C. Research Method

The research method which is applied in this research is weak experimental method. This research only use one group research without any classroom control (Arikunto, 2006). Determination of the research method is considered by the sampling technique which is not taken randomly and by analyzing the interrelationship within the variables. Those variables are project-based learning as independent variable and student's achievement and problem solving skill as dependent variables.

D. Operational Definition

In order to conduct the research in accordance with the expected aims and avoid misunderstanding, therefore an operational definition need to be elaborated as follows:

1. Project-based learning is an instructional model that built upon authentic learning activities that engage student interest and motivation. The learning activities are designed to solve a problem relevant to everyday world outside the classroom and facilitate students to have some higher order thinking skills. This learning model is categorized as hands-on learning with five stages of syntax (assign collaborative working groups, present a real-world problem that pupils can connect, set the parameters for completing the project, teacher consultation input/feedback, final project shared with larger group).

2. The learning achievement that mentioned in this research is something that can be achieved which is displayed in form of cognitive knowledge on people and

the planet chapter after doing learning efforts through project-based learning model which is measured by objective test through pretest and post-test.

3. The problem solving skill in this research is ability to solve a problem with the basic knowledge of concepts in people and the planet chapter that have been studied previously. This skill is measured by doing essay question with seven problem solving process stage; identifying, exploring, set goals, look alternative, select best solution, implementation, and evaluation in pretest and post-test and assess with specific rubrics and will be leveled with some criteria.

E. Research Instrument

The research instrument which is adapted to collect the data in this research consist of:

1. Objective test in a form of multiple choice question is used to measure students' achievement before and after treated Project-based Learning in chaper of people and the planet.

2. Essay test is used to measure students' problem solving skill achievement. Teacher will mark the rubrics based on students' answer and calculate it as final result. The rubrics will determine the stage of problem solving skill that students have based on each essay question given.

3. Rubrics form for assessing the final product of the project-based learning. The final product is in a form of poster, the poster will be analyzed based on rubrics criteria regarding to some important of component; product of knowledge and product of visual organization.

4. Unstructured questionnare form, this instrument also used for analyzing the students' response towards implementation of project-based learning model in people and the planet chapter.

F. Instrument Development

The process of instrument development begins with analysis of the applicable curriculum at the involved school. The researcher then formulate the

questions to be used as an instrument of pretest and post-test. The tests used in this research are writing tests consist of 22 multiple choice questions and three essay questions (Appendix B.1 and B.2).

The instrument needs to be consulted (judgment) by the concerned lecturer and some experts in related fields. After being judged, the instrument which is not appropriate enough should be revised. After the instrument revised, it should be tried out on another class which has the same level of research sample. Based on the test results, the instrument questions will be analyzed with the following requirements:

1. Instrument Test Requirements

a. Validity

Validity is the ability of an instrument to measure what it is designed to measure (Kumar, 2005) Anderson (Arikunto, 2010 : 65) revealed that "A test is valid if it measure what it purpose to measure". An instrument categorized as valid if it can measure something that will be measured and interpret data from variable of research exactly. The result of instrument validity indicates that the collected data is not deviating from the idea of the validity itself.

To measure the validity of each test item, the researcher use the Coefficient of Product Moment Karl Pearson, there is:

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

(Sudjana, 2005)

With, r_{xy} : correlation coefficient between x and y variable

n : amount of student

x : total score in test item

y : total score of student

Interpretation about r_{xy} will be divided into different categories based on Guilford (Arikunto,2010).

Table 3.2 Classification validity coefficient

Value r_{xy}	Interpretation
$0,90 \leq r_{xy} \leq 1,00$	Very high validity
$0,70 \leq r_{xy} < 0,90$	High validity
$0,40 \leq r_{xy} < 0,70$	Medium validity
$0,20 \leq r_{xy} < 0,40$	Low validity
$0,00 \leq r_{xy} < 0,20$	Very low validity
$r_{xy} < 0,00$	Invalid

b. Reliability

Anderson (Arikunto, 2010) state that validity and reliability are important, "A reliable measure in one that provides consistent and stable indication of the characteristic being investigated". The concept of reliability related with research instrument means if a research instrument is consistent and stable, and, hence, predictable and accurate, it is said to be reliable. The greater the degree of consistency and stability in a research instrument, the greater its reliability. Reliability of an evaluation instrument is intended as a tool that gives the same results if the measurement is given on the same subject although done by different people, at different times, and different places (Arikunto, 2006).

The value of reliability is determined based on coefficient value which is gained by Alpha formula, as follows:

$$r_{11} = \left(\frac{n}{n-1} \right) \left(1 - \frac{\sum s_i^2}{s_t^2} \right)$$

(Arikunto, 2006)

Explanation:

r_{11} : reliability coefficient

s_i^2 : score variant each test item

n : amount of test item

s_t^2 : total score variant

Table 3.3 Classification of Reliability Coefficient

Value r_{11}	Interpretation
$0,90 \leq r_{11} \leq 1,00$	Very high reliability degree
$0,70 \leq r_{11} < 0,90$	High reliability degree
$0,40 \leq r_{11} < 0,70$	Medium reliability degree
$0,20 \leq r_{11} < 0,40$	low reliability degree
$r_{11} < 0,20$	Very low reliability degree

c. Discriminating Power

Another important procedure in item analysis is calculating the item discrimination power (DP) which can be defined as the degree to which an item test discriminates between students with high and low achiever. Discriminating power of test item is the ability of test item to distinguish between a high achiever and low achiever student (Arikunto, 2006). So, to obtain the discrimination power of the items, the following formula has been used:

$$DP = \frac{RU - RL}{\frac{1}{2} T}$$

Explanation:

DP = Discriminatory power.

RU = The number of tests in the upper group who got the item right.

RL = The number of tests in the lower group who got the item right.

T = The total of tests included in item analysis.

Classification of discriminating power interpretation used is (Arikunto,2006):

Table 3.4 Discriminating Power Classification

Value DP	Interpretation
$DP \leq 0{,}00$	Very poor
$0{,}00 < DP \leq 0{,}20$	Poor
$0{,}20 < DP \leq 0{,}40$	Fair
$0{,}40 < DP \leq 0{,}70$	Good
$0{,}70 < DP \leq 1{,}00$	Very good

d. Difficulty Level

After scoring the test papers, the researcher has arranged the scored test in order of scores, from the highest to the lowest score. The researcher, then, separated two subgroups of test papers; an upper group consisting of the top (27%) of the total group who received the highest scores, and a lower group including an equal number of papers (27%) who received the lowest scores. The researcher also counted the number of times each response to each item is chosen correctly on the papers of the upper group and does the same separately for the papers of the lower group. In doing so, she intended to calculate the difficulty level (henceforth DL) or (facility value) of each item. It means as Gronlund (1976:211) remarks "the percentage of students who got the item right"; so, in order to find out the level of difficulty for each item in the test, the following formula has been used:

$$DL = \frac{HC + LC}{Total\ Number\ of\ the\ Sample}$$

Where:

DL = Difficulty level

HC = High correct

LC = Low correct

(Madsen, 1983)

Classification of difficulty level in each test item that used is based on Arikunto,2010:

Table 3.5 Coefficient classification of difficulty level

Value DL	Interpretation
IK = 0,00	Very difficult
0,00 < IK ≤ 0,30	Difficult
0,30< IK ≤0,70	Medium
0,70< IK <1,00	Easy
IK = 1,00	Very easy

e. Readability

Readability will be used to analyze essay questions. Readability has two common meanings, one applying to document design, the other to language. Readability as it is applied to document design is concerned with such matters as line length, leading, white space, font type and the like (Marnell, 2009).

f. Instrument Analysis Result

1) Recapitulation of Students' Cognitive Achievement Instrument

The instrument for measuring students' cognitive achievement is by giving an objective test in a form of 22 questions. The instrument should be tested in terms of validity, reliability, discriminating power, and difficulty level as explained before. The test was given to 20 students which have learned about the chapter that will be learned for the research. The recapitulation of test item analysis is shown in the following table.

Test item recapitulation:

Reliability test   : 0.66 (Medium degree)

Table 3.6 Recapitulation of test item for students' cognitive achievement

Question Number	Discriminating Power	Difficulty Level	Validity	Status
1	Fair	Easy	Very Low	Revised
2	Fair	Easy	Low	Revised
3	Poor	Difficult	Low	Revised
4	Very Good	Medium	High	Used
5	Good	Medium	Medium	Used
6	Poor	Very Difficult	Low	Revised
7	Poor	Easy	Low	Revised
8	Poor	Medium	Very Low	Revised
9	Good	Easy	High	Used
10	Poor	Very Easy	Medium	Revised
11	Very Good	Medium	Medium	Used
12	Good	Easy	Medium	Used
13	Good	Easy	High	Used
14	Good	Medium	Medium	Used
15	Fair	Medium	Medium	Used
16	Poor	Difficult	Very Low	Revised
17	Fair	Very Easy	Medium	Used
18	Poor	Difficult	Low	Revised
19	Fair	Easy	Medium	Used
20	Fair	Easy	Low	Revised
21	Good	Medium	Medium	Used
22	Very Poor	Very Difficult	Very Low	Revised

2) Recapitulation of Students' Problem Solving Skill Instrument

The instrument for measuring students' cognitive achievement is by giving an essay test in a form of three questions. The instrument should be tested in terms of validity, reliability, discriminating power, difficulty level, and readability as explained before. The test was given to 10 students which have learned about

the chapter that will be learned for the research. The recapitulation of test item analysis is shown in the following table.

Essay test recapitulation:

Reliability   : 0.73 (High degree)

Table 3.7 Recapitulation of test item for students' problem solving skill

Question Number	Discriminating Power	Difficulty Level	Validity	Status
1	Poor	Medium	Fair	Removed
2	Fair	Medium	High	Revised
3	Poor	Medium	High	Revised

2. Instrument Non-Test Requirements

a. Rubrics

The rubrics will be used to observe the final result of students' project in people and the planet chapter. The final result of students' project is in form of poster. The poster will be assessed into some criteria which is available in the rubrics. It will be used in the last meeting of the chapter as additional mark. The rubrics made by the observer after being judged with certain scale to measure the result, the rubrics will be fulfilled by the researcher as well as the observer.

b. Questionnaire

Unstructured questionnaire is used to know the response of the students towards the implementation of Project-Based Learning model in people and the planet chapter during the lesson. This data obtained from students' answer from 10 questions given in the end of the lesson.

G. Data Collection Technique

In this research, there are four different data which is collected, those data has different instrument to measure. The data collection techniques are explained as follow:

1. Data of Student Cognitive Achievement

The students' cognitive achievement is the main data of the research. This data will be collected through objective test in form of multiple choice consist of 20 questions. The cognitive achievement that will be measured is only in people and the planet chapter. The result will be collected then analyzed using the normalized gain formula.

Table 3.8 Test Item Specification (Blue Print)

No	Subtopics	Learning Objective	Specification				
			C1	C2	C3	C4	C5
1.	People Today	State the positive and negative influence of human activity to the environment		1, 22	2, 7	18	
		Investigate the relationship between human population and their impact to the environment			13	12	
2.	Transportation	Identify the development of human transportation		5, 6			
3.	Changes in Environment	Analyze the changes in environment that caused by human activities e.g. global warming, pollution, ozone depletion, etc	10, 14	17, 20	9, 19, 21	3, 4, 8, 11, 15, 16	
Total			2	6	6	8	-

2. Data of Problem Solving Skill

The second main data of this research is the result of problem solving skill. the problem solving skill result will be gained from three essay question. The answer of students in the test will be analyzed in specific rubrics. The rubrics will show whether the students have already mastering the skill or not. The rubrics display the leveling of each student who answering the essay test.

Table 3.9 Essay Test Item Specification (Blue Print)

No	Learning Objective	Problem solving skill process specification						
		identify	explore	set goal	Alter-native	select best	implement	evaluate
1	Identify some natural problems based on world's issues	1a, 1b, 2a	1c, 2b					
2	Give some solutions to solve the daily life problems in environment			1d, 2c	1e, 2d	1f, 2e		
3	Evaluate the solutions given with certain ways						1g, 2f	1h, 2g
	Total	3	2	2	2	2	2	2

The data that has been gained from research instrument, further it is analyzed by giving certain score for problem solving skill. The score given is already determined in specific rubrics. The rubric for analyzing students' answer is shown in table 3.10 below.

Table 3.10 Scoring Guidance of Problem Solving Skill

No.	Problem Solving Skill Process	Score
1.	Identifying problem:	
	a. Does not clearly identify the problem.	1
	b. Defines the problem but not too detail	2
	c. States the problem clearly and identifies underlying issues.	3
2.	Exploring problem:	
	a. Not mention the cause as well as the effect of the problem.	1
	b. Catches up effect of a problem but not get down to the real cause.	2
	c. Analyze the problem to see what the root case is and state the effect of the problem clearly.	3
3.	Set goals:	
	a. Does not develop a coherent plan to solve the problem.	1
	b. Develops an adequate plan, but does not follow it to conclusion.	2
	c. Clarify the direction to take into solving a problem, gives them something definite to focus on, follow the plan to conclusion.	3
4.	Look at alternatives:	
	a. Cannot collect inadequate information and cannot give any solution.	1
	b. Collects adequate information and performs basic analyses and gives at least 2 alternative solutions.	2
	c. Collects information from multiple sources and analyzes the information in-depth and gives at least 3 alternative solutions.	3
5.	Select best solutions:	
	a. Does not interpret the findings or reach a conclusion	1
	b. Provides an adequate interpretation of the findings and solves the problem, but fails to choose the best solution.	2
	c. Provides a logical interpretation of findings and clearly solves the problem, offering alternatives solutions, and chooses one best solution based on several reasons.	3
6.	Implementation:	
	a. Cannot mention the plan.	1
	b. Can give an action plan but cannot explain the way to communicate and does not state any further information about the plan.	2
	c. Can give action plan and communicates it to those directly affected and clearly state the time of implementation as well as the way to implement it.	3

7.	Evaluation:	
	a. Cannot give any explanation how the solution will be tested.	1
	b. Gives explanation how the solutions will be tested and occurred continuously.	2
	c. Review the effectiveness of the solution against desire outcomes and state the continuous solution.	3

<div align="right">Adapted from Kelley (2006)</div>

The final score of each student then calculated through gain and normalized gain formula to see the improvement. The next step is processing result of students' answer will be leveled into certain criteria. The prerequisite of each level and its specification is presented in Table 3.11 as follows:

<div align="center">Table 3.11 Leveling Guidance of Problem Solving Skill</div>

Level	Prerequisite	Specification
1	Concrete and limited tasks (applying content-related)	States the problem clearly and identifies underlying issues.
	Practical reasoning, use specific content-related scheme to solve problems.	Does not develop a coherent plan to solve the problem but give explanation on how the problem will be solved.
2	Rudimentary systematic reasoning.	Catches up effect of a problem but not get down to the real cause.
	Well-defined, one-dimensional goals	Develops an adequate plan to solve, but does not follow it to conclusion.
	Ask for the evaluation	Gives explanation how the solutions will be tested and occurred continuously.
	Certain alternatives with regard to transparent,	Collects adequate information, performs basic analyses, give at least 2 alternative solutions.
	Use concrete logical operations.	Can give an action plan but cannot explain the way to communicate and does not state any further information about the plan
3	Use formal operations (e.g. ordering)	Can give action plan, communicates it to those directly affected, clearly state the time of implementation and the way to implement it.
	Integrate multidimensional goals,	Clarify the direction to take into solving a problem, gives them something definite to focus on, follow the plan to conclusion
	Cope with multiple dependent constraints.	Provides adequate interpretation of the finding to solve problem, fails to choose best solution.

4	Grasping a system of problem	Analyze the problem to see what the root case is and state the effect of the problem clearly.
	Possible solutions as a whole and explain how and why they arrived at certain solution.	Collects information from multiple sources and analyzes the information in-depth and gives at least 3 alternative solutions.
	Consistency of certain criteria	Clarify the direction to take into solving a problem, gives them something definite to focus on, follow the plan to conclusion.
	The dependency among multiple sequences of actions and other "meta-features" of a problem situation may be considered systematically.	Can give action plan and communicates it to those directly affected and clearly state the time of implementation as well as the way to implement it.
	Requires a kind of critical thinking and a certain amount of meta-cognition.	Review the effectiveness of the solution against desire outcomes and state the continuous solution.

Adapted from Reeff et al.(2006)

3. Data of Final Product

The final product from project based learning implementation is necessary to be assessed. The poster is chosen as the final product of this learning model implementation. The assessment for the product will be measured by a rubric with specific criteria. The scoring guidance for poster assessment is shown below:

Table 3.12 Poster Assessment Criteria

Poster Product	Criteria
Knowledge	a. Completeness (existence of author, title, aims, problems, effects, solutions, conclusion, sources, and message)
	b. Fluency (content accuracy)
	c. Elaboration (steps to analyze)
	d. Relevancy (Correlation among poster aspects)
Visual Organization	a. Flexibility (Labels organization)
	b. Originality (Attractiveness)
	c. Legibility (readability)
	d. Proportionality (proportion of text and graph)

Source: O'Neill (2012)

4. Data of Students' Response

Non-test data collection through questionnaire was used to determine the response of the students towards students' learning in people and the planet chapter using Project Based Learning Model. The data obtained from the questionnaire is a secondary instrument, and it is processed by a percentage calculation. The blue print of students' response questionnaire is shown in table 3.13 as follows:

Table 3.13 Table of Specification (Blue Print) Students' Response Questionnaire

Indicators	Category and Number
Students' response toward team work ability as a group	Positive statement: 1, 3
	Negative statement: 2, 4
Students' response toward project based learning implementation in people and the planet chapter	Positive statement: 5, 7, 9, 11, 13
	Negative statement: 6, 8, 10, 12, 14
Students' response in problem solving skill on people and the planet chapter	Positive statement: 15, 17, 19
	Negative statement: 16, 18, 20
Students' response toward making a poster as final product of project	Positive statement: 21, 23
	Negative statement: 22, 24

H. Processing Data

Data obtained from both quantitative data and qualitative. Quantitative data obtained from the pretest and data of students' cognitive achievement (post-test), while the qualitative data obtained from the poster rubrics and questionnaire. Explanation of data processing techniques are obtained as follows:

1. Quantitative Data Processing

The quantitative data processing is done using Microsoft Excel for pretest score data and post-test. The value of quantitative data will be gained by the result of normalized gain. The process of calculating data will be explained as follow:

a. Data of Test Score

In this research, the data of test scores is used to measure the improvement of students' achievement and problem solving skill. The data processing, carried out in the following way:

1) Score of Test Item

The tests used in this research are writing tests consist of 22 multiple choice questions and two essay questions. Each multiple choice correct answers are given 1 score and each incorrect answer was given a score of 0, while the essay score has a range of 1-3 depending on the answers that given by students. The criteria of scoring will be determined by specific rubrics as shown in table 3.10.

2) Calculation of Gain Score and Normalized Gain

Gain score (actual gain) was obtained from the difference of pretest score and post-test score. The difference in pretest scores and the post-test is assumed as the effect of the treatment. Normalized gain calculations are intended to determine the categories of students' achievement improvement. According to Hake (1999) gain is calculated by using this following formula:

$$G = S_f - S_i$$

Description :

G = Gain

S_f = Post-test score

S_i = Pretest score

The effectiveness of Project-Based Learning model in increasing students' achievement of the people and the planet chapter will be seen from the result of the normalized gain that achieved by students during the learning process. For the calculation of the normalized gain value and its classification will use equations (Hake, 1999) as follows:

Normalized gain of each student <g> defined as following formula:

$$\langle g \rangle = \frac{\%G}{\%G\ max} = \frac{(\%Sf - \%Si)}{(100 - \%Si)}$$

Description:
$\langle g \rangle$ = Normalized gain
G = Actual gain
G_{max} = Maximum gain possible
S_f = Post-test score
S_i = Pretest score

Average of normalized gain ($\langle g \rangle$) which is formulated as:

$$\langle g \rangle = \frac{\% \langle G \rangle}{\% \langle G \rangle\ maks} = \frac{(\% \langle S_f \rangle - \% \langle S_i \rangle)}{(100 - \% \langle S_i \rangle)}$$

Description:
$\langle g \rangle$ = Normalized gain
$\langle G \rangle$ = Actual gain
$\langle G \rangle_{max}$ = Maximum gain possible
$\langle S_f \rangle$ = Average of post-test score
$\langle S_i \rangle$ = Average of pretest score

The value of normalized gain $\langle g \rangle$ which is already gained is interpreted with the classification of Table 3.14

Table 3.14 Interpretation of Normalized Gain Value

Value $\langle g \rangle$	Classification
$\langle g \rangle \geq 0,7$	High
$0,7 > \langle g \rangle \geq 0,3$	Medium
$\langle g \rangle < 0,3$	Low

(Hake, 1999)

2. Qualitative Data Processing

The qualitative data obtained from both rubrics of final product and unstructured questionnaire. The rubrics will be created into several raw score criteria, the rubrics will be assess the poster as the final product. The analysis of rubrics is conducted by converting the raw score into percentage form. Further, the result of percentage can be classified into several categories. The technique of converting score into precentage is used formula as follows (Firman, 2000):

$$\text{Score} = \frac{Raw\ Score}{Maximum\ Score} \times 100\%$$

The interpretation of score percentage is categorized into certain criteria according to Kunjaraningrat (Suherman, 2001:6) as follows.

Tabel 3.15 Percentage Interpretation

Percentage (%)	Criteria
0%	None
0 %- 25%	A few of criteria
26%-40%	Almost half of
41%-50%	Half of
51% - 75%	Mostly
76% - 99%	Generally
100%	All of them

The other data that will be analyzed qualitatively is from questionnaire result. The qualitative analysis will describe the real situation of the research result and also the result of students' response in learning people and the planet using Project Based Learning Model.

Processing is done by calculating Likert scale will be calculated into score and then converted into percentage, the percentage of answers observer to then be evaluated for the next lesson. The scoring guideline will be shown in the following table:

Table 3.16 Scoring Guideline of Students' Response

	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
Positive Statement	5	4	3	2	1
Negative Statement	1	2	3	4	5

The percentage data will be gained by calculating through the following formula:

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

Explanation :

P : Percentage

f : score from frequency of the answer

n : score from total response

The interpretation of the result is similar with the rubrics analysis, it will be interpreted by using similar criteria according to Kunjaraningrat (Suherman, 2001:6) in table 3.14

I. Research Procedures

In order to arrange the sequence of research systematically, the procedure of research is arranged based on the syntax of project-based learning implemented. There are three stages of procedure consists of preparation stage, implementation stage, and analysis and conclusion stage. Those three stages will be explained as follows:

1. Preparation stage

In this stage, the researcher conduct several steps that support the research, there are:

a. Formulate problem that will be investigated

b. Determine the focus of variable research

c. Conduct literature review of project-based learning, learning achievement, problem solving skill, and curriculum

d. Arrange the research proposal which is presented in proposal seminar

e. Revised of research proposal after having suggestions and critics from lecturers.

f. Arrange the research instrument and being judged by expert or lecturer.

g. Revised of research instrument after having suggestions.

h. Try out of research instrument

i. Revised of research instrument based on instrument try out analysis result

2. Implementation Stage

This stage explain the step of research implementation, it consists of:

a. Determination of experimental class

b. Give pretest to the sample class to recognize the initial condition of students.

c. Processing pretest result.

d. Conduct research activity by implementing project-based learning model in experimental class with following scenarios:

1) First meeting, there are two stages of project-based learning which applied in this meeting they are assign collaborative working group and present a real-world problem that pupils can connect. In the beginning teacher inform that in the end of the chapter students should make a project in a group related with the video shown, then teacher assign collaborative working group for finishing the project based on high and low ability achievement of pupils each group consist of 3-5 pupils with male and female composition. After the students gathered in their own group then the learning continued to the next syntax.

Afterwards, the teacher gave one sample of a case of human activity that can cause real environmental world problem. Then teacher asked other daily facts about real environmental world problem to all students that they can connect, after that the teacher wrote down students' opinion on the board clearly so all students can see. The next step is determining the topic that will be done by the project based on students' answer and finally determines the topics for each group.

2) Second meeting, here the learning activity was applying the third stage of project-based learning syntax; set the parameters for completing the project. In this meeting the teacher explained that project will be assessed based on some criteria. Both teacher and student discuss the parameters for project completion, the teacher also asked students opinion about additional aspects that should be assessed

3) Third meeting, this meeting is the time for teacher consultation to give input or feedback. The students in their own group create the project all together (poster). Teacher asked students to find solutions for the problem raised depend on the theme that they got and how to evaluate their solution. Teacher keep moving around and ask groups difficulties in completing the project one by one, teacher gave some suggestion for all groups depend on their own difficulties. In the end of the meeting teacher discuss the whole problem in a larger group to avoid misunderstanding.

4) Fourth meeting, this is the last meeting of research implementation the project-based learning syntax that include in this stage is project shared with the larger group. In this meeting all groups have chance to perform their project in front of the class. The teacher mentioned the rule for presentation clearly and led the whole discussion. In the end, the teacher concludes the whole learning and clarifies all the concepts.

e. Give post-test in the sample class to recognize the improvement of achievement in the sample class.

f. Give questionnaire to know the student's response towards implementation of project-based learning in the whole learning.

3. Analysis and Conclusion Stages

   This is the final stage of research design, the step that will be conducted in this stage will be explained as the following steps:

a. Analyze the result of the whole research from based on the instrument result.

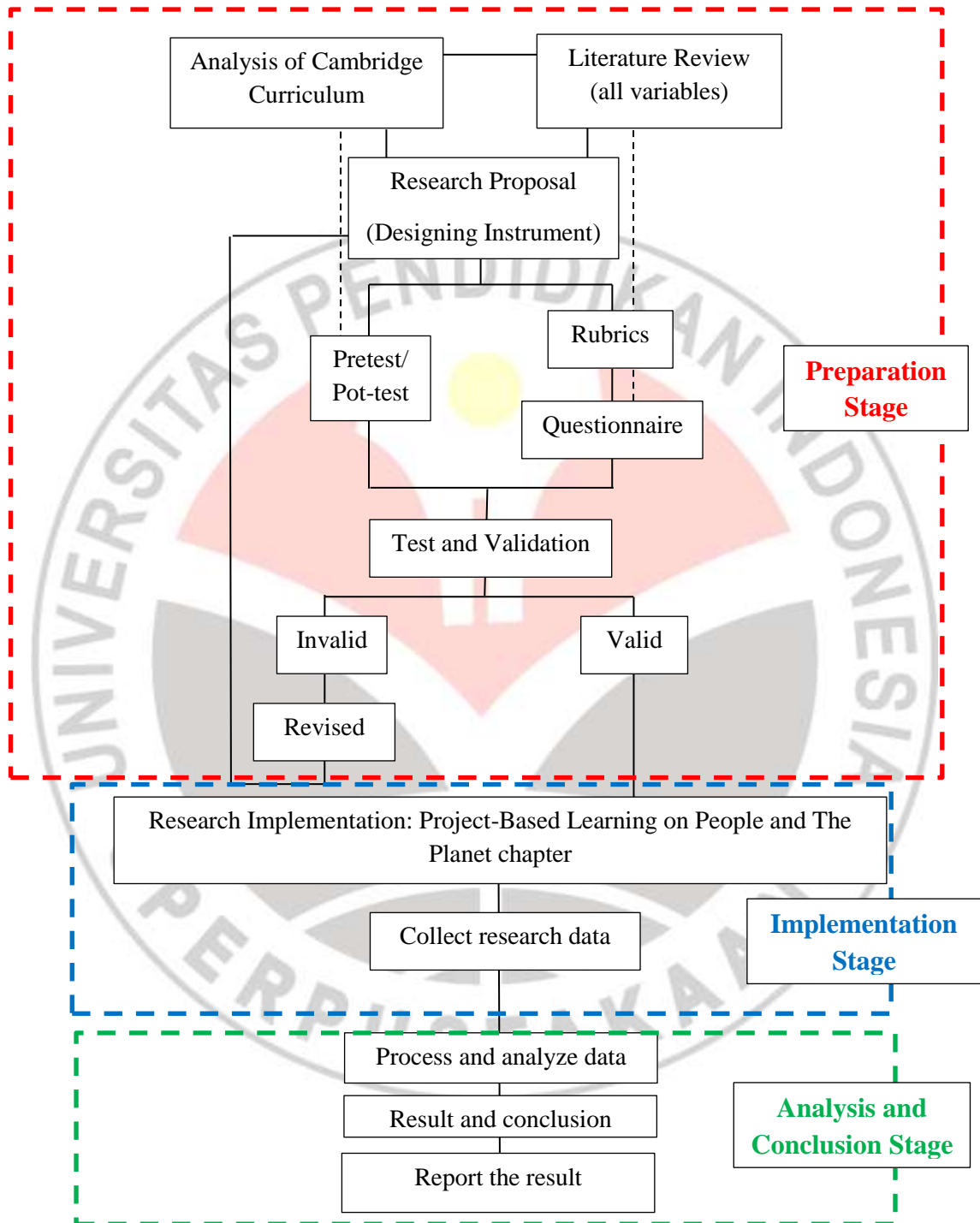b. Discuss and conclude for the data analysis result.

c. Arrange the report of the research

J. Reaearch Plot

Figure 3.1 Diagram of Research Plot