CHAPTER III
RESEARCH METHODOLOGY

This chapter elaborates the procedures needed to be conducted to answer the research questions. Specifically, there are four sections which are discussed in this chapter comprising the research method, the participants involved in the research, data collection and data analysis. Each of them is briefly discussed below.

3.1 The Research Method

To answer the research questions, this study used mixed-methods research design. Mixed-methods research involves "the use of both quantitative and qualitative methods in a single study" (Fraenkel & Wallen, 2009, p. 557). It was chosen as the research design because it allowed the researcher to investigate the use of debate in the inquiry-based teaching to develop the students' higher-order thinking skills and figure out if the incorporation of debate into the inquiry-based teaching can help the students develop their higher-order thinking skills significantly. Because the research needed to collect both qualitative and quantitative data to answer the research questions, mixed-methods research design was employed.

Particularly, this research employed the embedded design of mixed-methods research. The purpose of employing this design is "to have one form of data play a supportive role to the other form of data" (Creswell, 2012, p. 544). It is believed to be particularly useful if the researcher wants to embed a qualitative component within a quantitative design or vice versa (Creswell & Plano Clark, 2007). In employing the embedded design of mixed-methods research, the researcher used the secondary form of data "to provide additional sources of information not provided by the primary source of data" (Creswell, 2012, p. 544). In this case, the primary data were collected from observation to see how the incorporation of

debate into the inquiry-based teaching was used to develop the students' higher-order thinking skills while the secondary data were obtained from conducting pre-test and post-test to see if the incorporation of debate into the inquiry-based teaching can develop the students' higher-order thinking skills significantly.

3.2 The Research Site

3.2.1 Setting

The research took place in one of public senior high schools in Bandung, West Java. The school is chosen since it implements inquiry-based teaching however research on higher-order thinking skill has never been conducted. For that reason, the result of this research is expected to share contribution for the development of the school.

3.2.2 Participant

There were 30 participants involved in the research. All of the participants were eleventh graders. They were chosen due to the consideration that they have sufficient English competence to be involved in a debate activity. The names of students which are used in this research are pseudonyms.

3.3 Data Collection Techniques

The research employed two techniques in collecting the data. The two techniques are test and observation. Each of them is explained below.

3.3.1 Classroom Observation

The second technique that was conducted in the research was classroom observation. This technique is believed to have the potential to gain "unique sources of insight and introspection" (Axinn & Pearce, 2006, p.31). Therefore, the technique was employed to collect primary data to see how the incorporation of debate was used to develop the students' higher-order thinking skills. By conducting the observation, the researcher was able to see the process of the

development of the students' higher-order thinking skills. The observation examined the students' worksheets and interaction when engaged in debate activity and related them to the development of higher-order thinking skills based on several criteria. The criteria were taken from an observation checklist suggested by Depka (2017). The criteria are presented in a table in the data analysis section.

3.3.2 Pre-test and Post-test

Since the research involved experimentation, it is just natural that pre-test and post-test were employed to see if the incorporation of debate in inquiry-based teaching had potentials to improve the students' higher order thinking skills. The questions in both tests were specially made to measure their ability to analyze, evaluate and create. The questions were made based on the framework suggested by Brookhart (2010). According to the framework, each ability of higher order thinking skills can be measured by certain types of questions. Analysis can be measured by asking students to identify a main idea, evaluation can be measured by having students evaluate certain works and to measure creation, students can be assigned to provide solutions to problems.

As for the details of how the tests were employed, a passage was given. The passage consisted of arguments and main idea of the writer, just like what is delivered by a speaker in a debate. The students then were told to find the main idea of the passage. In addition, they also had to provide evidence that supported their answers in clear and sound reasoning and elaboration. Next, they were asked to provide evaluation to the writer's view by answering questions like why the arguments were good or why not and what they could suggest. Just like the previous questions, they needed to give evidence and good reasoning and elaboration. As for the last set of questions, a problem was presented. The

students then needed to give solutions to the problem and of course they had to be supported by evidence and delivered in a good elaboration.

3.4 Data Analysis

After the results of the test were collected, they were analyzed using rubrics proposed by Brookhart (2010). The rubrics are presented in the following table.

Table 3.1 An Analytic Rubric for Identifying the Main Idea

	2	1	0
Thesis (statement of the main point)	Thesis is clear, is complete, and accurately reflects the main point.	Thesis is clear and at least partially reflects the main point.	Thesis is not clear and/or does not reflect the main point.
Evidence	Evidence is accurate, relevant, and complete.	Evidence is mostly clear, relevant, and complete.	Evidence is not clear, relevant, or complete.
Reasoning & Clarity	The way in which the evidence supports the thesis is clear, logical, and well explained.	The way in which the evidence supports the thesis is mostly clear and logical. Some explanation is given.	The way in which the evidence supports the thesis is not clear, is illogical, and/or is not explained.

Table 3.2 An Analytic Rubric for Identifying Evaluation

	2	1	0
Thesis (evaluation)	Thesis is clear, is complete, and evaluates the writer's opinion.	Thesis is clear and at least partially evaluates the writer's opinion.	Thesis is not clear and/or does not evaluate the writer's opinion.
Evidence	Evidence is accurate, relevant, and complete.	Evidence is mostly clear, relevant, and complete.	Evidence is not clear, relevant, or complete.
Reasoning & Clarity	The way in which the evidence supports the thesis is clear, logical, and well explained.	The way in which the evidence supports the thesis is mostly clear and logical. Some explanation is given.	The way in which the evidence supports the thesis is not clear, is illogical, and/or is not explained.

Table 3.3 An Analytic Rubric for Identifying Problem Solving

	2	1	0
Thesis (problem solving)	Identification and prioritization of reasonable methods are accurate and available to private citizens/government.	Identification and prioritization of reasonable methods are accurate but not available to private citizens/government	Identification and prioritization of reasonable methods are not accurate nor available to private citizens/government
Evidence	Evidence is accurate, relevant, and complete.	Evidence is mostly clear, relevant, and complete.	Evidence is not clear, relevant, or complete.
Reasoning & Clarity	The way in which the evidence supports the thesis is clear, logical, and well explained.	The way in which the evidence supports the thesis is mostly clear and logical. Some explanation is given.	The way in which the evidence supports the thesis is not clear, is illogical, and/or is not explained.

After all the results were analyzed, they were then graded based on the rubrics. The grades were then compared between those of the pre-test and post-test to see if there were some improvements. Firstly, Kolmogorov-Smirnov was run on each thinking level to find out if the data were normally distributed. The results of the test indicated that the data distribution was not normal, consequently, sign test was used to answer the first research question. Sign test is a non-parametric test that does not "require the data to follow a particular distribution" (Shier, 2004, p. 1). It can be used as an alternative to one-sample t-test and paired t-test (Shier, 2004).

Meanwhile, for analyzing the classroom observation, checklists adapted from Depka (2017) were utilized in each meeting. The checklist used a rating scale ranging from 1 (No evidence of criterion) to 4 (Regularly demonstrates criterion). There was a total of eight criteria included in the checklist and then they were

divided in accordance with the thinking levels. The students' scores from the first to the last meeting were compared in attempts to observe their thinking development. The criteria are presented in the following table.

Table 3.4 Higher-Order Thinking Skills Criteria Checklist

	Analyze			Evaluate		Create		
Students' names	Student organizes information successfully	Student supports thinking with evidence	Student clearly communicates thinking	Student sees the problems from various perspectives	Student listens to the perspectives of others	Student identifies multiple ways to solve problems or complete tasks	Student develops and follows a plan to find a solution	Student clearly communicates solutions
1 = No evidence of criterion 2 = Occasionally shows evidence 3 = Often shows evidence 4 = Regularly demonstrates criterion								

3.5 Concluding Remark

This chapter has presented the methodology of the research which consists of the design of the research, the research site, data collection techniques and data analysis. The discussion and analysis of the data are presented in the next chapter.