

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research method

This study used descriptive method. According to Fraenkel (2012) descriptive research is when researchers make summarize some characteristics (abilities, preferences, behaviors) of individuals or groups physical environments (such as schools). According to Best in Cohen (2007) said that descriptive research is concerned with what is or what condition in present is related to some previous event that has influenced or affected a present condition or event.

In this research concern in present, future and past status of something that have correlation with this focus of study. This study was taken from Junior high school students to measure the profile of science virtual test to the students' critical thinking and the other variables. So, in this research it just focuses of the relation between the Science Virtual test in assessing students' critical thinking skill with some other variables.

3.2 Population and sample

The location for taken this research data was conducted two private school in Tasikmalaya. The population of this research were the 8th grade of Junior high school student from two private school in Tasikmalaya, which are school A, and School B. Those school choosen because they use 2013 national curriculum, have good multimedia facilities and a boarding school that group student according to gender different.

To take sample, researcher used purposive sampling. According to Fraenkel (2012) purposive sampling is one in which the researcher can make judgment to select a sample that they believe, based on their prior information about a sample, the sample also would support provide the data they need.

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) Students' critical thinking is measured by Science Virtual Test. This research is focus in digestive system topic in 8th grade at Junior High School. The science virtual test is consisting of 30 multiple choice questions with four option that characterized by eight elements of Inch's Critical thinking. This science virtual test is developed by Macromedia Flash. In this science virtual test there are several types of information such as figure, table, video, and article.
- 2) Logical thinking is one independent variable that investigated in this research. Logical thinking is a process of observing and analyze phenomenon, reactions, and feedback, and draw conclusions based on that input. It obtained by TOLT test.
- 3) Students' learning style is one of independent variable that investigated in this research in critical thinking profile difference. Learning style is the way of student to learn about some materials and how student prefers to learn. The learning style of students' data obtained by VARK learning style questionnaire.
- 4) Students' gender becomes variable that investigated in this research in critical thinking profile difference. Student gender is taken from the questioner and data from their teacher.

3.4 Research Instrument

The data gathering is using Science Virtual Test, TOLT and Learning style questionnaire (VARK)

3.4.1 Science Virtual test

Science virtual test is a standardized virtual critical thinking test that has been developed by Firman and Rusyati (2017). According to Valantika (2017), the definition of virtual test is a form of testing by using technology information

or multimedia computer and the test is consist of images, text, graphics, diagrams, animations, and video that can be operated with students. The virtual test that researcher use for this research are consists of 30 multiple choice question with four option that characterized by eight elements of Inch's Critical thinking (2006), which are: generates purposes, raises question at issue, make assumption, point of view, uses information, utilizes concept, makes interpretation and inference and generate implication and consequences. This science virtual test is developed by Macromedia Flash. The topic that tested in this science virtual test is about digestive system that as mentioned in the 2013 national curriculum. In this science virtual test there are several types of information such as figure, table, video, and article. The question that distributed is consist of 30 question in digestive system topic with a different element of critical thinking, Table 3.1 presents the descriptive on every element of this test.

Table 1.1
Blue Print of Science Virtual Test Digestive System Topic

Critical Thinking Elements	Sub Element of Critical Thinking	Digestive System disease	Lifestyle in Digestive System	Food and its importance	Human digestive System	Total Item per elements
Purpose	Stating the purpose clearly	(1)				4
	Distinguish primary purpose with related purposes		(2)			
	Stating purpose on target				(3)	
	Stating a significant and realistic purposes		(4)			
Question at issue	Stating the problem question clearly			(5)		5
	Asking the question in several ways to explain the meaning and scope of the problem	(6)			(7)	

Critical Thinking Elements	Sub Element of Critical Thinking	Digestive System disease	Lifestyle in Digestive System	Food and its importance	Human digestive System	Total Item per elements
	Stating sub question		(8)			
	Identifying question of problem					
	(1) Single Answer					
	(2) Multi discipline Answer					
Assumption	Identifying assumption and determine whether the assumption is justifiable.	(10)				2
	Considering assumption that might forms point of view	(11)				
Point of view	Identifying point of view		(12)			4
	Identifying the strength and weakness of the point of view	(13), (14)				
	Striving to be fair in evaluating all point of view			(15)		
Information	Expressing support based on the data	(16), (17)				6
	Searching for information that opposes and support argument		(18)			
	Using the information that is clear, accurate and relevant with the question at issue		(19)			
	Gathering the	(20)		(21)		

Critical Thinking Elements	Sub Element of Critical Thinking	Digestive System disease	Lifestyle in Digestive System	Food and its importance	Human digestive System	Total Item per elements
	information					
Concepts	Identifying key concept and states clearly		(22)			3
	Stating alternatives concepts or alternative definition of concepts			(23)		
	Using the concept precisely and carefully				(24)	
Interpretation and inference	Inferring based on evidence			(25)		3
	Checking the consistency of inferences	(26)				
	Identifying assumption can lead to inferences			(27)		
Implication and consequences	Finding the implication and consequences that follow the argument				(28)	3
	Stating positive and negative implication		(29)			
	Consider all the possible consequences				(30)	
Total item per topic		11	8	6	5	

3.4.2 Test of Logical Thinking (TOLT)

Test of Logical Thinking (TOLT) used for determining students' formal reasoning modes that has been develop with Tobin and Capie (1981). The test

Febby Ayu Fitriani, 2018

THE PROFILE OF STUDENTS' CRITICAL THINKING BASED ON LOGICAL THINKING, LEARNING STYLE, AND GENDER MEASURED THROUGH SCIENCE VIRTUAL TEST

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

item consists of 10 question, with two different style of question. The first question until eight number of question is multiple choice answer question which have multiple choice and multiple reason. The correct answers were calculated by the correct choice in the multiple question and plus the reason in multiple reason, if in multiple question student have wrong but have right answer in the reason it count zero and it vice versa. The ninth and tenth question is answer by alphabet combination, student are ask to do some different combination in each number.

The TOLT scores ranged from 0 to 10. Test scores from 0-1 grouped in concrete level, 2-3 I transitional level, and 4-10 were in formal level used as a basis for categorizing the subjects according to their formal thought as concrete-level, transitional-level and formal-level (Sadi & Çakıroğlu, 2014).

3.4.3 VARK Questioner for learning style

The student learning style is described through VARK questioner. This questioner has varied of types which differ regarding to the age of level. The instrument is consisting of 16 items with 4 multiple option which each option represents the one who have visual, aural, read/write and kinesthetic learning style. The calculation for getting this propensity is, each option that student choose must be noted than the researcher can conclude which is the high point in each learning style.

The reliability for score of VARK subscales were .85, .82, .84 and .77 for visual, aural, read/write and kinesthetic subscales representatively, which are adequate (Leite, Svnicki, & Shi, 2010).

3.5 Data Analysis

There are several ways in analysis data to answer research question, there are:

3.5.1 Scoring and Analyzing Students' Critical Thinking Attainment

Students' critical thinking that has been measured using Science Virtual Test (SVT) which consists of eight elements from Inch. Each element of critical thinking consists of 3-6 question with the total number of whole questions is 30

multiple questions. Different amount of question for each element, so the result was converted into proper scale (0-100 as maximum).

The main data for analyzing critical thinking skill is mean and standard deviation that we get from the raw data. The data categorized into three level of students' critical thinking attainment was present through the Table 3.2.

Table 3.2
Students' Critical Thinking Grouping Formula

Interval	Category
$X \geq x + SD$	High
$X - SD \leq X \leq x + SD$	Moderate
$X < x - SD$	Low

(Source: Arikunto, 2013)

Known,

X = Students' score

x = Overall students' mean score (47.55)

SD = Standard Deviation (14.16)

Based on the Table 3.2 about grouping formula for students' critical thinking, we can make categorize in those intervals. By measuring the standard deviation and mean score, the interval of each category is shows Table 3.3. The category for students' critical thinking is following below.

Table 3.3
Students' Critical Thinking Grouping

Interval	Category
$X \geq 61.71$	High
$33.39 \leq X \leq 61.71$	Moderate
$X < 33.39$	Low

3.5.2 Examine The Critical Thinking Difference on Defined Variable

Students' logical thinking level and learning style different were divided into three and four category levels. For logical thinking are concrete level,

transitional level and formal level. While learning style is divided into visual, aural, read, kinesthetic.

The analysis statistic was using SPSS for processing data. The first step is checking whether the data is normal distributed or not. After that, checked the homogeneity of the data.

Both data of logical thinking and learning style is normally distributed. So, ANOVA test is conducting to find the significant different for each variable. For make clear investigation of the data in significant differences, Post Hoc LDS were conducted to find the clear result and comparison.

3.5.3 Examine The Critical Thinking Between Two Variable

The other objective of this research is to investigate the significant different based on gender. Different gender of student is divided into male and female group. The male group is consisting of 42 students while female group is consisting of 44 students.

Before we state the significant different between critical thinking and gender, the first step is check normality and homogeneity of the data by using SPSS. The data measured through t-test if normally distributed but, if the data is not normal distributed it use Mann Whitney test. In this study, data in the critical thinking element based on gender shows normally distributed, hence the significant difference is test using t-test.

3.6 Research Procedure

For doing this research, there are procedure that consist of preparation stage, implementation stage, and completion stage

- 1) Preparing stage
 - a) Interpreting variables of research
 - b) Literature review about computer-based test, critical thinking, learning style of student, logical thinking, and gender
 - c) Determining the research instrument
 - d) Determining sample and population
 - e) Conducting and revising research paper

2) Implementation stage

In this stage, researcher conducting in school and collecting data as follows:

- a) Profiling student critical thinking skill from three school
- b) Collecting students' learning style from two school
- c) Collecting students' logical thinking from two school
- d) Collecting gender from two school

3) Completion stage

- a) Computing data that has been collected
- b) Analysis the data
- c) Discussing the finding
- d) Make a conclusion

The procedure for doing this research is already mentioning above, to make it easier to read and could explain the details, Figure 3.1 is visualization diagram shows of flow chart of research.

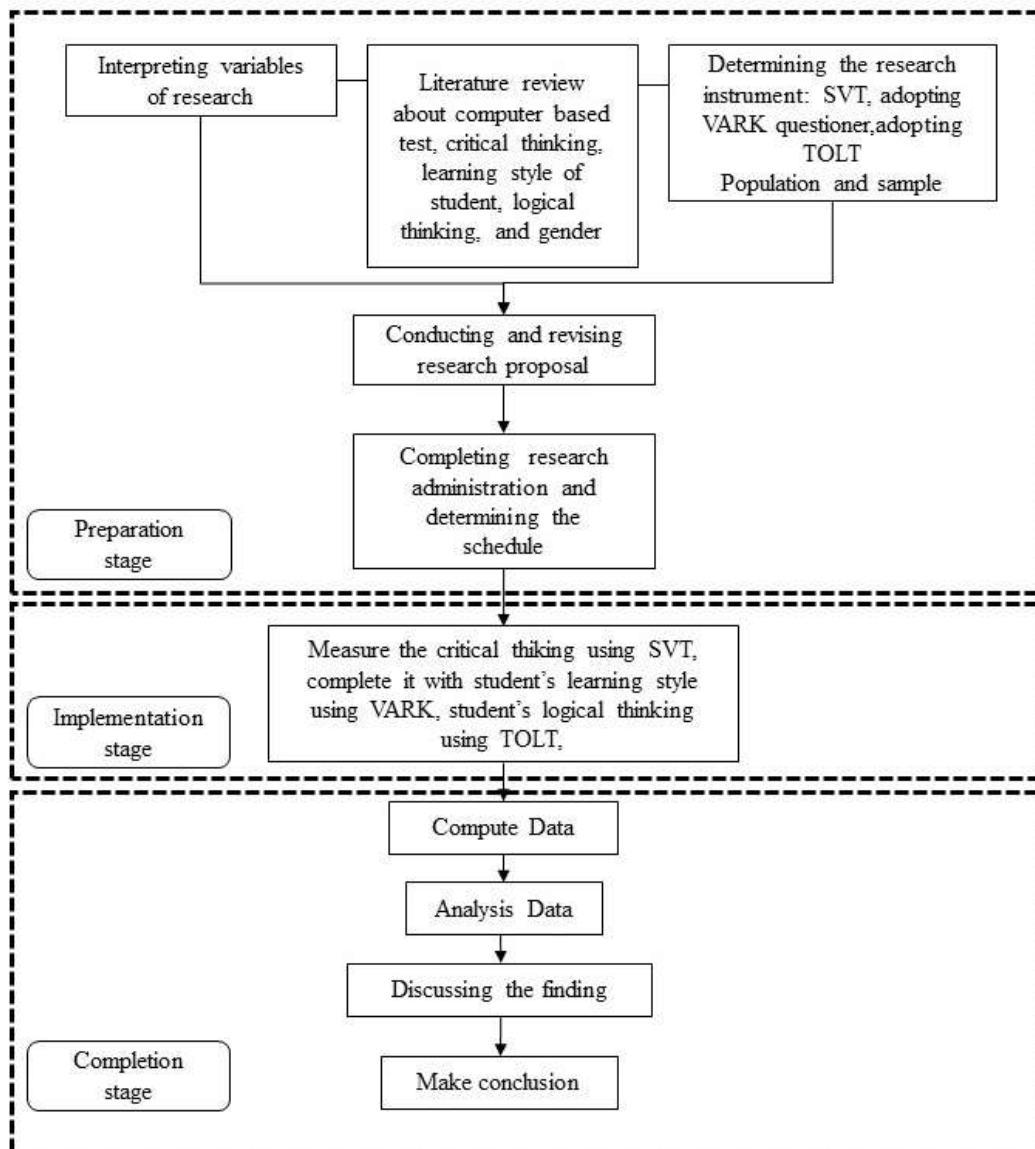


Figure 3.1 Flow Chart of Research Procedure