CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

This research uses weak experimental the one group pre-test and post-test. Use one group and there is no control class that will affect the internal validity (Frankel, Wallen, & Hyun, 2011). The dependent variable in this research is students concept mastery and information literacy. The independent variable is the guided notes. One-Group pre-test, post-test design was chosen as a research design for this research. It will explain the difference in the pre-test and post-test score affected by treatment. A pre-test is a score with no treatment and pos- test after treatment. (Cohen, Manion, Lecturer, Morrison, & Lecturer, n.d. 2007). The pre-test post-test design was used to investigate students concept mastery, as it is presented in the Table 3.1

Table 3.1 One-Group-Pretest-Posttest Design

O	X	O
Pre Test	Treatment	Post Test

(Source : Cohen, Manion, Lecturer, Morrison, & Lecturer, n.d. 2007)

The information literacy was profiled on using a questionnaire after the learning process. The questionnaire consists of 15 questions, with different indicators. The indicator consists of three aspects there are determine the resource that more suitable to access information, evaluate the reliability of the information, and use information accurate for the problem. It is developed from the definition of information literacy by ALA, it is located, use and evaluate the information.

3.2 Population and Sample

This research was conducted in a private school in West Bandung. This school uses a 2013 curriculum. The school organizes its own sequence and the amount of material to be delivered. Not too fixated on the curriculum. Then this research was carried out in the 8th grade, which numbered 23 people. The sample for this study used purposive sampling, by interviewing and discussing it with 8th grade science teacher as judgment. Purposive sampling believes in judgment to choose classes (Frankle, Wallen, & Hyun 2012). The judge to choose the class is science teacher that teach all of 8th grade the school. Based judge opinion, A class is recommended for this research. The reason from judgment recommends this class because it has a more comfortable learning atmosphere when using worksheets as teaching media. The students prefer to read and write rather than move when learning in class. Other class is not prefer to read and write and prefer active to learn by doing, such as doing experiment and doing activity out of the class.

3.3 Assumption

The assumption as the foundation of this study as follow :

a. According to Blom (2017), guided note could be useful to use the worksheet for learners learning in the classroom, particularly students who have little previous understanding or prior knowledge of some course. Also, the worksheet enables learners to pay more attention during the class debate session and the notes assist learners review the material for preparing for the test.
b. Guided note can also foster high-order thinking, the teacher can get learners to reflect the content by placing the primary concept in the guided note. Also use the guided note as a material evaluation to ask a query or relate the student experience information (Konrad, Joseph, Itoi 2011)
c. According to Thorley (2016), the person that takes a note or we can call note taker can recall more correct trial information than a non-note taker. And if the note is to review it is will increase the memory of the content.
d. According to Strange (2013), guided notes can be an efficient way for learners to take note, and can generate precise notes. The perception of teaching and the

beneficial impact of student accomplishment also have a beneficial effect for students achievement.

e. Students have a positive perception in learning with the guided note and have a positive effect on the cognitive aspect. Most students agree with the items that include in the guided note, like graphic, the hierarchy of content, tracking lectures and help them recall the main idea (Tanamatayarat et al., 2017)

3.4 Operational Definition

a. Learning activities for students is conducted using guided notes. Students will read the article in the guided notes and rewrite the keyword in the blank space. Then some parts students must search the information on the internet and rewrite the key point in guided notes
b. Students concept mastery in this research is students competences that include the cognitive level start from C1 until C3. C1 (remembering), C2 (understanding), C3 (applying). It is appropriate with basic competence in 2013 curriculum that the standard of curriculum is applying. It is measured by objective test and conduct in pre test and post test to see the score increase
c. Information literacy in this research is students can find, evaluate and use information. Students should find the information on the internet based on appropriate sources and evaluate it, if the information trusted students can rewrite the keyword in the guided note. Information literacy in this research measured by questionnaire. That can profile the competence of students to find, evaluate and use information itself.
d. Biotechnology in 2013 curriculum is include four concepts. There are basic principles of biotechnology, conventional biotechnology, modern biotechnology, positive and negative impact about biotechnology.

3.5 Hypothesis

The hypothesis that is tested in this study are as follow :

H_0 : There is no difference on students concept mastery and information literacy in biotechnology using guided note

H_1 : There is significant difference on students concept mastery and information literacy in learning biotechnology using guided note

H_0 : There is no relation between students' concept mastery and information literacy in biotechnology using guided note

H_1 : There is relation between students' concept mastery and information literacy in biotechnology using guided note

3.6 Research Instrument

In this research, the instrument is necessary to be used for gaining data. There are two types of instruments that are used in this research which are objective test and questionnaire. The objective test is used to evaluate students concept mastery and questionnaire for information literacy. These instruments are described below:

1) Objective test

Objective test use in pre-test and post-test. The question is 20 number and every number have 4 choices. Students will get 1 point for each right answer number, then get 0 if the answer is wrong. The topic of the question is about biotechnology and divided into 4 subtopic. The subtopic will explain in blue print. The cognitive level of question is C1 (remembering), C2 (understanding), C3 (applying). The maximum cognitive level is C3 inline with Basic competence of 2013 Curriculum. It applies the concept of biotechnology and its role in human life. The blueprint of the material will show in Table 3.2

Table 3.2

Blue Print of Objective Test

No	Sub Topic	Indicator	C1	C2	C3
1.	Basic principle of biotechnology	Explain and Applying basic principle of biotechnology, remember the hemia reaction of fermentation	3,	1,2	4,
2	Conventional biotechnology	Identifying, applying, differentiate the product of conventional	5,8,9,	7,	6,14

		biotechnology, remember the organism in fermentation			
3	Modern biotechnology	Applying synthetic hormone, identifying tissue culture, mention & implementation the product modern biotechnology	12, 13,	15,	10, 11,
4	The positive and negative impact of biotechnology	The impact of GMO, Negative impact of transgenic plant, positive impact of invitro fertilization, Impact of the cloning	17,20	16,18,19	
	Total item		8	7	5

a) Validity

Validity refers to the suitability of the inferences made by the researcher also refers to the meaningfulness, truth, and usefulness (Fraenkel, Wallen, & Hyun, 2012). The validity can be measured with the formula based on Fraenkel, Wallen, & Hyun (2012). The interpretation of validity is based on Minimum, King, & Rosepa (1993)

b) Reliability

Reliability refers to the consistency of answers from one administration of an instrument to another (Fraenkel, Wallen, & Hyun (2012). The most method to determine internal consistency is the Kuder-Richardson Approach. The letter formula consists of three pieces of information, that are the number of item on the test, standard deviation, and the mean. The completed formula based on Fraenkel, Wallen, & Hyun (2012). The value interpretation based on Minium,King, & Rosopa, (1993)

c) Difficulty level

The difficulty level is the difficulty of an item that the proportion of the person who answers correctly of the test item. The lower of the difficulty is characterized by a higher proportion. The formula is based on Backhoff, Larrazolo, & Rosas, (2000). The interpretation is based on Arikunto (2013)

d) Discriminating Power

Discriminating power is used to measure and identify the high and low achievers from the result of answering the test item. The completed formula is based on Backhoff, Larrazolo, & Rosas, (2000). The value interpretation is based on Arikunto (2013)

e) Distractor

Item discrimination refers to the extent to which an item distinguishes correctly among examinees in behaviors designed to measure tests. When the overall test must be evaluated by means of validation related to the criteria, the item itself can be evaluated and selected based on their relationship with the criteria. In many achievement tests and aptitude tests, the criteria are the total test scores. The completed formula based on Kaplan and Sacuzzo (2005)

2) Objective Test Analysis Result

Table 3.3

Objective Test Analysis Result

No	Difficulty Level	Discriminating Power		Correlation		Decision
1	67,65 Medium	-11,11	Very Poor	0,011	-	Rejected
2	70,59 Very easy	55,56	Good	0,485	Very significant	Accepted
3	17,65 Difficult	22,22	Satisfactory	0,160	-	Revise
4	94,12 Very easy	11,11	Poor	0,156	-	Revise
5	26,47 Difficult	-33,33	Very Poor	-0,434	-	Rejected
6	94,12 Very easy	0	Poor	0,093	-	Rejected
7	79,41 very easy	44,44	Good	0,456	Very significant	Accepted
8	61,76 Medium	33,33	Satisfactory	0,209	-	Revise
9	50,00 Medium	77,78	Excellent	0,648	Very significant	Accepted
10	82,35 very easy	33,33	Satisfactory	0,250	-	Revise
11	20,59 Difficult	-33,33	Very Poor	-0,272	-	Rejected
12	64,71 Medium	44,44	Good	0,353	Significant	Accepted
13	73,53 Very easy	33,33	Satisfactory	0,333	Significant	Accepted
14	85,29 Very easy	44,44	Good	0,480	Very significant	Accepted

15	44,12 Medium	77,78	Excellent	0,396	Very significant	Accepted
16	58,82 Medium	77,78	Excellent	0,659	Very significant	Accepted
17	41,18 Medium	66,67	Good	0,551	Very significant	Accepted
18	35,29 Medium	-22,22	Very Poor	-0,072	-	Rejected
19	58,82 Medium	-66,67	Poor	-0,490	-	Rejected
20	29,41 Difficult	-33,33	Very Poor	-0,404	-	Rejected
21	94,12 Very easy	11,11	Poor	0,188	-	Revise
22	85,29 Very easy	44,44	Good	0,501	Very significant	Accepted
23	52,94 Medium	77,78	Excellent	0,664	Very significant	Accepted
24	55,88 Medium	44,44	Good	0,488	Very significant	Accepted
25	38,24 Medium	77,78	Excellent	0,603	Very significant	Accepted
26	5,88 Difficult	11,11	Poor	0,160	-	Revise
27	50,00 Medium	66,67	Good	0,633	Very significant	Accepted
28	55,88 Medium	77,78	Excellent	0,593	Very significant	Accepted
29	67,65 Medium	77,78	Excellent	0,727	Very significant	Accepted
30	11,76 Difficult	11,11	Poor	0,188	-	Revise
31	52,94 Medium	-33,33	Very Poor	-0,335	-	Rejected
32	67,65 Medium	22,22	Satisfactory	0,202	-	Revise
33	47,06 Medium	55,56	Good	0,410	Very significant	Accepted
34	47,06 Medium	33,33	Satisfactory	0,350	Significant	Accepted
35	8,82 Difficult	-22,22	Very Poor	-0,208	-	Rejected

3) Guided note

The guided note is the instrument as media for learning. It includes articles and posters about biotechnology. There is blank space in the paragraph of guided note. Students should read the article and poster to find the answer and rewrite in blank space. There is three-part of the guided note that students should access information on the internet. In part biotechnology conventional students should search for the bacteria that have a role in fermentation. Identify and explain the picture of cloning. Search information about the good and bad impact of biotechnology. When applying guided note, students should read page one, which is read the way to find reliable information and the part that should consider.

In the next page, there is two articles. Students should differentiate these article and find a reliable article by considering several aspect. Like source of information, author, and other people opinion about information.Then, students continue with reading poster about basic principle of biotechnology, and answer the blank space. Students also watching the video that provides by teacher and gets information in the video. Then write the information into blank space. If all of students finish to write

answer in the blank space, teacher give clarification about the right answer. The validity of the guided note is measure by expert judgment that use rubric in table 3.4. The rubric is adaptation, and author changes it according the need of the research.After Guided Not have score from judges, the score will read use interval value.

Table 3.4

Rubric for Asess Guided Note

Aspect	1	2	3	4
Format	Format of the guided note is not suitable for learning biotechnology	Format is suitable for learning biotechnology and need many revision	Format is suitable for learning biotechnology and some need revision	Format is suitable for learning biotechnology and no need revision
Language	The language of the guided note is not clear	The language of the guided note is clear and need many revision	The language of the guided note is clear and need some revision	The language of the guided note is clear and no need revision
Content	The content is not deal with curriculum 2013	The content is deal with curriculum 2013 and need many revision	The content is not deal with curriculum 2013 and need some revision	The content is deal with curriculum 2013 and no need revision
Design	The design is not suitable with junior high school students	The design is suitable with junior high school students and need many revision	The design is suitable with junior high school students and need some revision	The design is suitable with junior high school students and no need revision

(Source : Dewantara, Hasan, & Annur, 2018)

The format of the guided note is should consist of blank space and suitable for learning. Students can rewrite the answer and read the material. The language should be clear and can make students understand about biotechnology. The language used in guided note is Indonesia, because the curriculum in school use 2013 curriculum. The content also refers to 2013 curriculum. The design of the guided note consist of figure related about biotechnology. Like product of fermentation and cloned sheep.

Table 3.5

The Result of Judgment

Aspect	1	2	3	4	Coment
Format			✓		
Languange			✓		
Content			✓		
Design			✓		

The interval value of the result of the judgment is based on Widoyoko (2013). The result of judgment is three, mean the guided note is valid. It means the indicator was good but need some revision. The language of the guided note should change to more simple language to make students easy to understand. The type of the font should be changed to make easy to read by students. There are some wrong concepts of the guided note, and should change. Like modern biotechnology is not always used genetic engineering. It is just one part of modern biotechnology.

The positive and negative impact of in key answer is not to balance. The key answer should be changed. It is based on invention of students when searching for information. The judges also give recommendations about the design. The design of the guided note should be improved to more colorful and put more figure that makes students more interest when learn using guided note.

The first design from the guided note is very less of the figure, and the article is very complicated consist of word that very scientific. After that, revise to become more colorful with add the figure that related with biotechnology. The article also changes to become more simple and short. It is make students want to read. Long article makes students didn't want to read the article and make it is useless.

The article in the guided note is the article that get from the internet but modified by the author. Simplifying words and inserting concepts in articles. The article also related to daily life. Students are not just read the concept but the relationship of concept in daily life. Students will understand the concept and the implementation in daily life. The poster in the guided note just consists of concept. But there is just one poster.

4) Questionnaire

The questionnaire is adapted from Lisa Bautelspacher from the Departement of Information Science, Heinrich Heine University. The questionnaire for information

literacy includes the knowledge of the students how to find, evaluate and use information. The students will exercise using guided notes to find, evaluate and use information. after that, the ability of the students will measure using questionnaire. There are three aspects that will measure by information literacy questionnaire. Determine which resources are most suitable to access information, that consist of five questions. Evaluate the reliability of information six question and use appropriate information is four questions. The result categorized into three types which are, below proficient (if students test result is below 65%), proficient (if 65%>test score<90%), and advanced (if students score is above 90%). The blue print of information literacy questionnaire can be seen in Table 3.6

Table 3.6

Blue Print for Information Literacy

No	Indicator	Number of questionnaire
1	Determine which resource are more suitable to access information	1,2,3,4,5
2	Evaluate the reliability of information	6,7,8,9,10,11
3	Use information accuretely for the issue or problem	12,13,14,15

Table 3.7

Expert Judgement Sheet for Information Literacy Questionnaire

No	The Assessed Aspects	Experts' Assessment (✓)	
		Yes	No
1	The format of information literacy questionnaire is appropriate		
2	The statements in the information literacy questionnaire are clear		
3	The constructs of the questionnaire are appropriate		
4	The questionnaire can measure information literacy aspects		

There are four answer options for each question. This questionnaire explained descriptively. The validity of the questionnaire will measure by expert judgment. Questionnaire use linkert scale. The scale one until four. Each answer has different score. The four answers in each question, the most correct answer will get score four. The less level of truth then the value will decrease. The result of the judgment shown in table 3.8

Table 3.8

Expert Judgment Result for Information Literacy Questionnaire

No	The Assessed Aspects	Experts' Assessment (✓)	
		Yes	No
1	The format of information literacy questionnaire is appropriate		✓
2	The statements in the information literacy questionnaire are clear		
3	The constructs of the questionnaire are appropriate	✓	
4	The questionnaire can measure information literacy aspects	✓	

Many suggestions from the judge about the questionnaire. The way to score or explain the questionnaire should explain with detail. Some statements also should revise because there are typos and some statement that make students confused. The statement that confusing because of adaptation from english into bahasa. The language that use in the questionnaire should change to be more understandable. Based on judges the constructs of the questionnaire are appropriate and the questionnaire can measure the information

3.7 Research Procedure

1). Preparation Stage

a. Analysis of the curriculum, core and basic competence, biotechnology, Students concept mastery, and information literacy
b. Formulate the problem determine the variable of the research
c. Research instrument making

d. Research instrument validation by expert
e. Research Instrument revision

1) Implementation Stage

a. Pretest give to the sample class to get the initial condition of students
b. Conduct research activity by implementing guided note in class
c. Give post-test in the sample class recognize the improvement of students concept mastery and information literacy

3) Completion Stage

a. Collect research data
b. Analyze the data of the whole research
c. Hypothesis test using statistic (IBM Statistic 24)
d. Make conclusion from the data analysis result
e. Completing the research paper

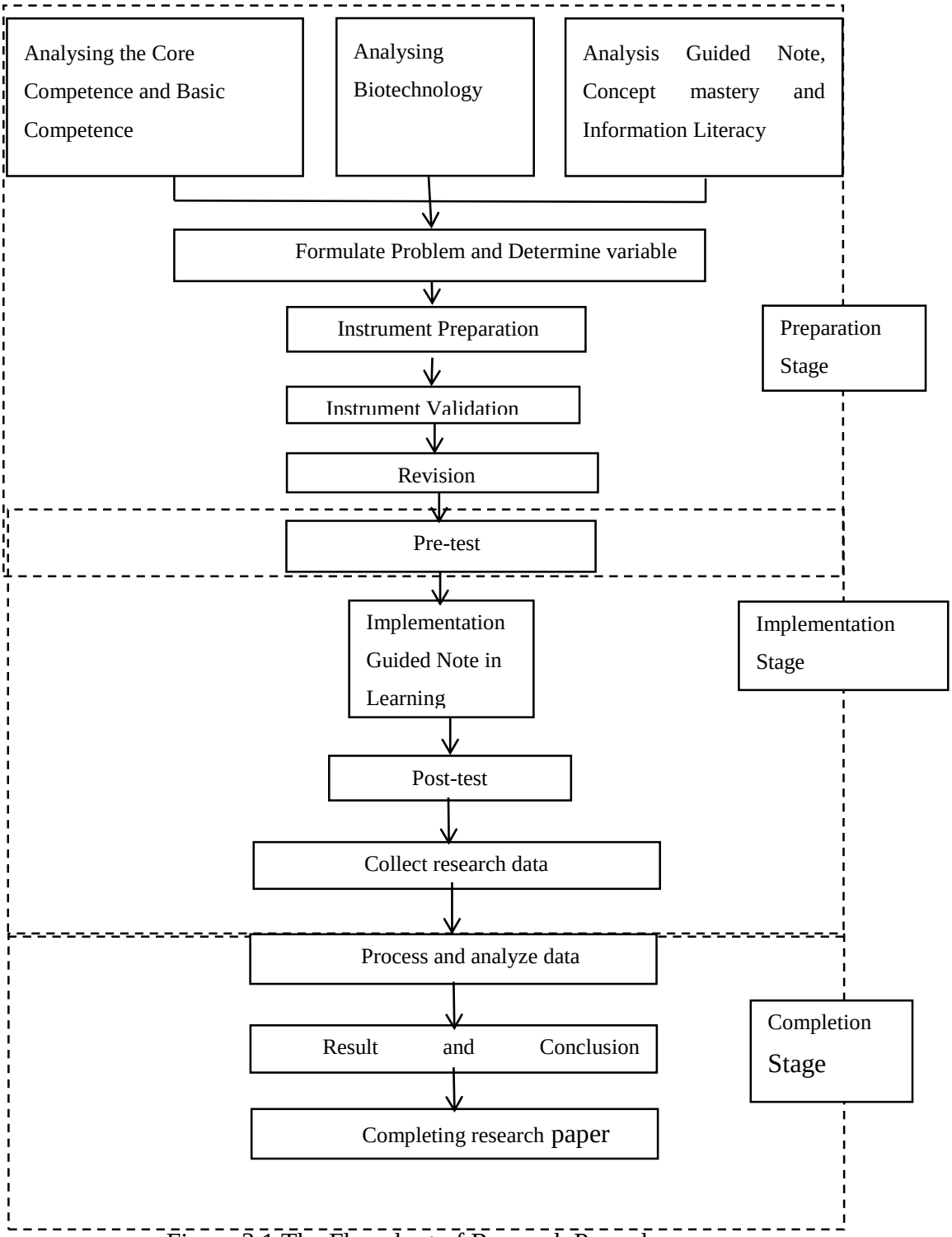

Figure 3.1 The Flowchart of Research Procedure