CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Method

The research method used in this study is Quasi Experiment. This is related to the research which is to investigate the effectiveness of role play on students' concept mastery and students' creative skills in learning human circulatory system. Creswell (2012) stated that quasi experiment include assignment, but not random assignment of participant groups. This is because the experiment cannot artificially create groupf for the experiment. Quasi experiment provides the research with the opportunityto assess the effects of interventions or treatments. By applying this method, there were two group which are experiment and control class.

3.2 Operational Design

Every definition has indicator that can be measured form every variable in this research as the operational definition, those are:

1) Role playing is an alternative method that will implement in the learning activity in the class. It creates a meaningful and interactive learning activities, it attracts students involved during the learning activities (Daniau, 2016). For implementing the role playing, one class of experimental group will choose. Class will divide into 3 groups; one group consist of 8 students. They have to read first the circulatory system concept before make the scenario for the role playing. Rubric and observation sheet used to measure scenario they made and role play performance of each group.

Students' concept mastery for this research consists of cognitive aspect. A cognitive aspect for circulatory system is the main aspect to measure the students' concept mastery. According to Bloom's taxonomy revised cognitive aspects are consist of C1 (remember), C2 (understand), C3 (apply), C4 (analyze), C6 (Creating) 3 questions with essay form for pretest and posttest (Karthwohl, 2001). Creative skill is the ability to find something new and valuable, it created new combinations from several ideas, direct communication and other things. There are some indicators that can measure students' creative skill based on William (1987) such as in

process of creative skill that included: dare to take a risk, feel the challenge, curiosity, and imagination while in product in creativity included: fluency, flexibility, originality, and elaboration. Therefore, using rubric as an instrument that measure students' creative skill during the role playing.

3.3 Research Design

This research finds students to be tested. Then the researcher introduces a role play that should change the people and test to see if there were any changes.

The pre-test post-test that would be taken in this research as following steps:

1) Test the students' prior knowledge regarding of circulatory system as the topic.
2) Perform the experimental through role play
3) Test the students after the role play completed to be done as the post-test to see the changes of students' concept mastery and creative thinking.

The research design was used in this research is one group pretest and posttest design. The data was taken from the result of:

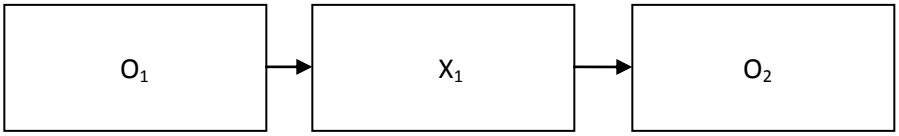

Figure 3.1. Design Illustration of one group Pretest-Posttest

(Source: Freankel et. al., 2007)

Notes:

O_1 : Pretest

O_2 : Posttest

X_1 : Treatment

Based on the Figure 7 described that pretest-posttest applied without control variable using one class as experiment variable using a test to know students' prior knowledge or pretest (O_1), role play as a treatment and the final posttest (O_2) to know the result after implementation the treatment. Research design was taken during a process and product result of students' creative thinking and students' concept mastery in implementation role play.

3.4 Research Subject

1) Research Location

This research is conducted in one of school in Bandung which applied *Kurikulum 2013* in the teaching and learning process. The data collection was done in May 2018.

2) Population and Sample

Based on Arikunto (2010) stated that population is a set or collection of an element processing one or more attributes of interest all subject in research. The data population was conducted from all students' school in 8^{th} grade in investigating the teaching learning process in the classroom. The sample of this research is one of 8^{th} grade class in one of junior high school in Bandung that applying *Kurikulum 2013*using cluster technique sampling. Clusterrandom sampling is determining sample randomly which give better probability for this research.

The population in this research was 8th grade student at Junior High School in one of the Bandung School years 2017/2018. After observation the taken sample was 8th grade students from two different classes in Junior High School "X" Bandung. Researcher conducted the research in the 8B Class which learn the topic about human circulatory system by implementing of role play as learning method for the experiment class. Another class for compare is the 8C as the control class, which learn the same topic by implementing of common project, group discussion and communicate the result in front of the class as the task for students.

3.5 Assumptions

According to the literature review, it could be assumed that:

1) Role playwould become a useful learning method that ease students to master the concept and get better score result in final exam.
2) Role playwould become a useful learning method that trigger students to be skillfully creative.
3) Role play could help to create a good communication between the teacher and students.

3.6 Hypothesis

To analyze the hypothesis more significant using pretest and posttest, the hypothesis for this research is:

H_o: There are no significant differences for students' concept at role play in learning human circulatory system.

H_1: There are significant differences for students' concept mastery and creative skill at role play in learning human circulatory system.

3.7 Research Procedures

There are several procedures that are conducted in this research. Therefore, the procedure is generally will classify into three stages which are preparation stage, implementation stage and completion stage. Each stage consists of several activities. Which are conducted during the experiments.

3.7.1 Preparation Stage

1) Preliminary study in the curriculum in junior high, the syllabus of human circulatory system topic.
2) Analysis of study and literature review that consist of analyzing role play as a learning method, analyzing the students' concept mastery and analyzing the students' concept mastery.
3) Discussion with experts to formulate research problem identification.

   Research question was purposed that consist of the impact of role play on students' concept mastery, the effect the role play on students' creative thinking and the impression students' response before role play as the treatment.

3.7.2 Implementation Stage

1) The instruments were arranged that consist of lesson plan, worksheet objective test, rubric, observation sheet and questionnaire.
2) Instrument judgment was conducted by expert that will judge the validity instrument.
3) Conducting validity of objective test

   Validity refers to the appropriateness, meaningfulness, correctness and usefulness of the specific interferences researchers make based on the data collected (Cohen, Manion & Morrison, 2007). Thee validity conducted by the researcher was content validity. Content validity is related to the content knowledge the researcher is going to take (Fraenkel, Wallen &Hyun, 2012). The instrument used in this research is a form of multiple choices questions and essay question. Twenty multiple choices and three essay questions can be used for pretest and posttest to collect the data. The item test should be tested or validated by the experts before make it as the objective test. After validated it to the expert, it is necessary to do the trial as the instrument validity test. The trial test item will be given to the students that already learn about human circulatory system which is the 9^{th} grade of junior high school.
4) Analyzing Reliability

   Reliability is important for instrument that gives the same results if the given subject.Reliability is the consistency of scores-obtained. It is such a how consistent the questions for each individual from one set of items to another (Cohen, Manion & Morrison, 2007).At different times and different places. reliability testing was not showed on all of the

items were made, but the items that considered. To get the number of reliability, the researcher used ANATES software.

(Source: Crocker & Algina, 2008)

Where μis the mean of total score δ^2_x is the total score variance, k is the number of items of the test the interpretation of the score gained for the calculation is shown on the Table 3.1.

Table 3.1

The Interpretation of Reliability Coefficient

Reliability	Interpretation
0.90 and above	Excellent; at the level of the best-standardized tests
0.80-0.90	Very good for a classroom test
0.70-0.80	Good for classroom test; in the range of most. The few items could be revised
0.60-0.70	Somewhat low. Some items probably should be revised
0.50-0.60	Suggests the need for revision of the test, unless it is quite short items
0.50 or below	Questionable reliability. It needs revision

(*Source: University of Texas, 2003)*

The researcher used the test-retest method to check the consistent of the questions (Fraenkel, Wallen, & Hyun, 2012). It was tested in the same group to get the reliability coefficient.

5) Analyzing the Difficulties level

The difficulty level measures the difficulty of each item. The good item will have the same proportion of easy, medium and hard questions (Crocker & Algina, 2008).This study arranged the items for pretest and posttest from the difficulty level of question. The easy question was 25%, medium was 50% and the hard question was 25%. Crocker & Algina (2008) added the value of difficulty level range from 0.00 to 1.00 which means the closer the score ro point 1.00, the good the difficulty level is. Therefore, in order to find out the level of difficulty for each item in the test, the following formula was used:

$$\mu_p = \frac{(\mu_x)}{k}$$

(Source: Crocker & Algina, 2008)

Notes:

μ_p = Difficulty index

μ_x = The amount of correct answer

k = Number of test items

The calculation was done by using ANATES software and the result can be seen in the Appendix B. Based on the Calculation, the results of the difficulty level are classified as follows:

Table 3.4
The Interpretation of Difficulty Level

Scale	Category
DL < 0.25	Very Easy
0.26-0.30	Easy
0.31-0.70	Fair
0.71-0.80	Difficult
DL>0.81	Very Difficult

(Source: Nitko, 1996)

6) Analyzing Discriminating Power

Discriminating power used to identify the high and low achiever from the results of the test item (Crocker &Algina, 2008). Therefore, to obtain the discrimination power(D) of the items, the following formula has been used:

$$D = p_u - p_l$$

(Source: Crocker & Algina, 2008)

Notes:

D = Discriminatory power

p_u = Number of correct answers by the upper group

p_l = Number of correct answers by the lower group

7) The instrument of objective test already valid
8) Trial of test instrument
9) Based on the analysis by the experts the validation occurs if the test.
10) Revision of the instrument was conduct.
11) Qualified and valid of research instrument that already used for implementing treatment process.
12) The process for implementation that giving pre-test was conducted to identify students' prior knowledge about human circulatory systems.

13) After the role play already conducted, next is collecting all of the data.

3.7.3 Completion Stage

Completion Stage consists of four stage, as follows:

1) All of data which is obtained was calculated
2) The result of the data calculation was analyzed
3) Discussion was done to elaborate the result.
4) Conclusion was obtained based on the result.

In the part of analyzing the plot of the procedures above, it is represented in the following chart will illustrates the framework of research as follow:

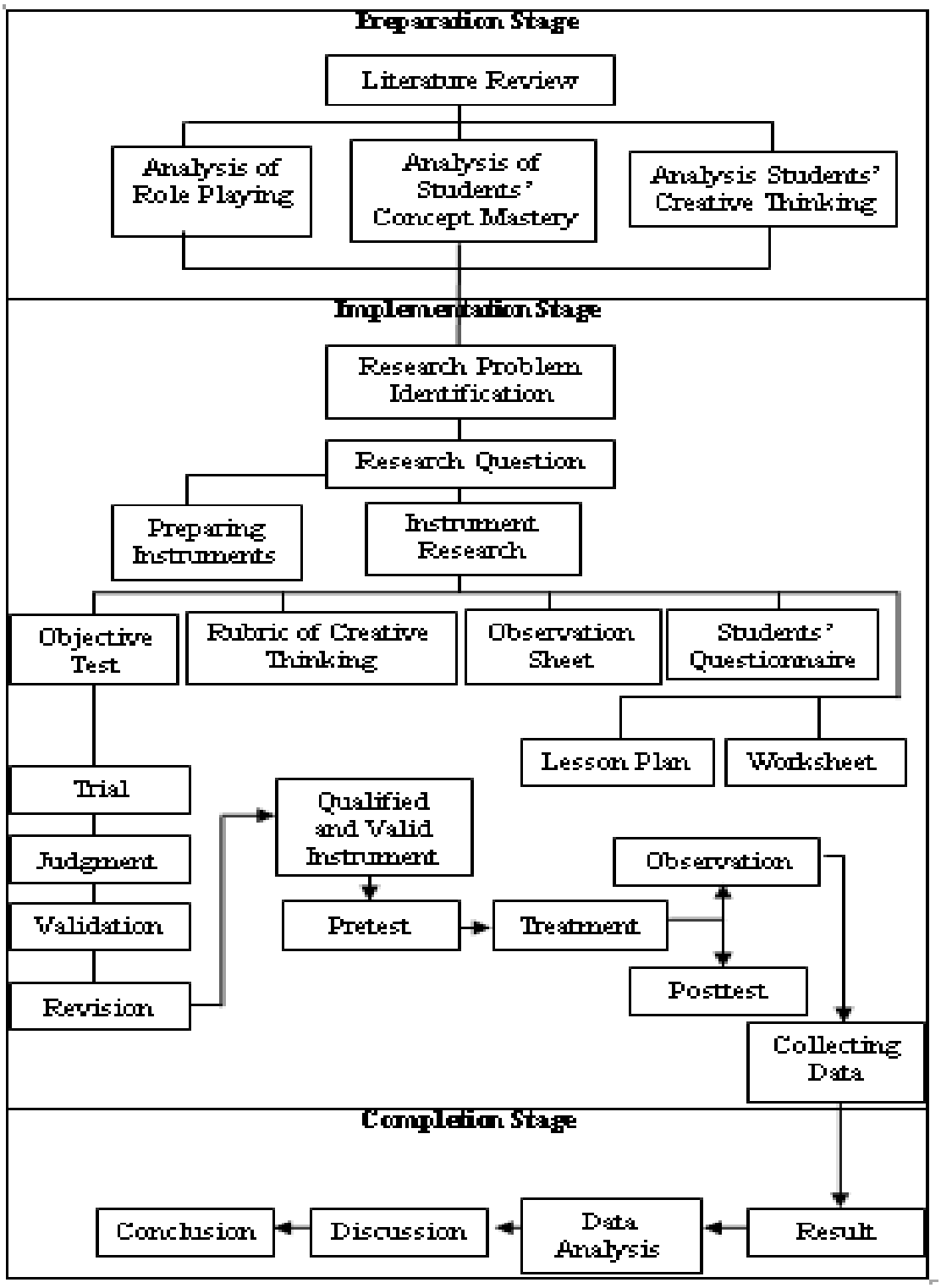

Figure 3.2. Research Plot

3.8 Research Instruments

In this research, instruments are essential used for gaining data. There are three types instrument that are used in this research. Those are objective test related to students' concept mastery in the form of multiple choice, creative skill skills rubric for assessment of the implementation of role play and observation sheet to make sure the teacher done the step of learning process based on lesson plan that already arranged.

Before the instruments used for the research, the researcher validates to expert judgment. Instructional tools that is used in the implementation of this research as the table follows:

Table 3.5
Research Instruments

No	Instruments	Aspects	Source of Data
1	Objective test	Understanding about the material that must be mastery by students	Answer the question of multiple choice about human circulatory system
2	Observation sheet	Teaching strategy in classroom	Teacher activity in classroom based on lesson plan that already arranged
3	Creative skills rubric	Creative skills level	During the implementation of the role play

Instrument which is used to collect the data in this research consist of:

1) Objective Test

Test instrument is used for analyzing cognitive aspect of students. Pretest is given to students before the activity to know students' ability in human circulatory concept, while posttest is given to students after the activity as evaluation to measure students' improvement. Pretest conducted to determine the students' ability before given treatment. Thus, it can be seen that

differences in cognitive skills may ultimately provide an overview of the level of learning success.

Objective test is form of instrument in order to obtain the quantitative data that was gained from the research. The data was collected through pretest and posttest in form of multiple choice to measure the students' concept mastery before and after treated by implementing role play in learning human circulatory system. The objective test consists of 25 questions with the cognitive domain of remembering (C1); understanding (C2); applying (C3); analyzing (C4); evaluating (C5) and creating (C6).

The instrument needs to be judge by the experts in related field. After being judged, there will be numbers of instrument that should be revise. After the instrument had been revised, it also tried to the class that already learn about the topic before.

Based on Miller on "Measurement and Teaching's book" stated that objective test items are easy to write and score it also can be work for large amounts of content. As the form of instrument used is in multiple choices, thus the calculation is only done to identify validity, reliability, difficulty level, discriminating power and distracter.

2) Rubric

Rubric was used to access and determine the scoring based on indicator and criteria that already have. The data is determined the aspect about the creative skills from process and product of students' result in learning human circulatory system. Based on William model if creative skills that creative skills have two aspects such as as process and cognitive as a product of creative skills.

Rubric performance used in this instrument will be used to measure role play performance test based on William (1987) which is consist of criteria creative skill that could be seen on the Table as follows:

Table 3.6
Blueprint rubric for performance

Criteria	Description	Score		
		3	2	1
Flexibility	Speaking activeness in giving ideas	Student active with three dialogues that	Student active with two dialogues that	Student not active during the role play

Criteria	Description	Score		
		3	2	1
		speak during the role play drama	speak during the role play drama	drama
Fluency	The ability to speak fluently with correct pronunciation	Student can speak fluently with correct pronunciation with vocabulary more	Student can speak fluently with correct pronunciation but have not been able to understand the vocabulary	Students are not able to speak fluently and still require stimulation of the words
Cooperation in group	Participation and respect for the role play group	Students are very excited to play the drama	Students are less eager to play the drama	Students are not eager to play in drama and still need to be motivated
Body language	The ability to express the body language	Students are active in playing the hand on gestures and motions	Students are still in doubt play the body movements and hand gestures	Students do not play the body movements and hand gestures
Voice, intonation, articulation	The ability plays tone and voice change as characterization and speak loud enough to be able to be heard by the audience	Proficient of the students to play the appropriate	Less proficient students to play sound but speak loud enough to be heard by the audience	The voice sounded very small and less audible for the audience
Expression	Ability to play and change the character of changes within their expression of the characterization	Students are adept at changing the expression to exactly fit the character	Less adapt at changing the expression to exactly fit the character	Not adept at changing the expression to exactly fit the character
Originality	Give unusual answer different with others and real	Can think their own thoughts accordance idea	Hesitation in giving an idea of their own thoughts	Do not give their own ideas

Criteria	Description	Score		
		3	2	1
	from their own			
Elaboration	The ability to develop add and enrich ideas (Sustainability role with dialogue)	Can add and expand their own idea	Hesitate to add or expand their own ideas	Do not add and expand their own ideas
Dare to take a risk	Not afraid to fail and criticized	Dare to take a role	Hesitate to take a role	Do not dare to take a role
Feel the challenge	It can feel the challenge in playing a role	Actively participate in the challenge to feel how to play an actual role	Not very active, not feel challenged	Not actively participate in the challenge how to be in the actual challenge
curiosity	Acceptable in taking a role	Students are able to play the character	Students undecided to play the role that suits his character	Not correspond at all to the role
Imagination	Feel the emotion, feeling happy and confident	Students look confident in playing the role play	Students are not hesitant to play a role	Students are not confident

(William, 1987)

The table 3.6 is the rubric for their performance during the role activity, the researcher should observe their performance of all the students according to the rubric on the table 3.6. and for measuring the students' creative skill in the product of scenario design, can be seen on the next table, Table 3.7.

Table 3.7
Blueprint of rubric of Scenario Design Product

Criteria	Description	Score		
		1	2	3

Completeness	Existence of theme, title, aims, setting plot, conflict, conclusion solution, message, design picture	The scenario aspect shows less than 7 aspects of all poster content	The scenario fulfills 7-9 aspects of all scenario contents	The scenario fulfills completely 10 aspects of all scenario content
Content accuracy (Fluency)	Sparkling a lot of idea and always think about more than answer	There is not shown the description in story line	There is description in story line	The scenario shows description in story line with design picture.
Relevancy	Correlation among the scenario aspects			

(William, 1987)

3) Validity

Validity is the extent to which a test measures what it was intended to measure. Validity is the most important characteristic of any test. Even if other practical and technical considerations are satisfactory, the test's quality is doubtful without supportive evidence of validity. The four types of validity tests are content, construct, concurrent and predictive. content validity is the most common type of validation used by researcher to ascertain if a test provides an accurate assessment of instructional objectives (Miller, 2008). Each type of validity follows specific procedure and has the primary use.

Table 3.8
Types of Validity Test

Validity	Procedures	Primary Use
Content	Compares test items with instructional objectives	Assessment of content
Construct	Identifies underlying concepts measured by the test	Assessment of adequacy
Concurrent	Compares test with similar measure of present performance	Provision for more convenient test that measures desired behavior
Predictive	Compares test	Selection and classification of

	performance with future outcome	students

(Miller, 2008)

Thus, the researcher chose the content validity to measure the validity of instructional objectives. Test items are individually analyzed and compared with levels of behavior specified in the objectives. Usually content area experts review what will be taught with what is content validity is concerned with making sure that the test measures what students are expected to learn. To establish content validity, so that the researcher using the validation test in one classroom of 8^{th} grade then the result was analyzed. The researcher also using two expert judgments to carefully review the test before it is administrated to students.

After receiving feedback, researcher was considering the reviewers' comments or expert judgments comments to fix the instrument and make the appropriate corrections. The test items are valid aby validation test and reviewing by expert judgments.

The instruments of this research are validated by research experts. Based on the validation, there are suggestions from the expert for the test items. After the items fixed, the

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

items are tested through trial of test items.

(Arikunto, 2010)

Note:
r_{xy} : correlation coefficient between x and y variables
n : amount of students
x : total score in test items
y : total score of students

According to Minium et al., (1993) interpretation about correlation coefficient between x and y variables are divided into different categories as shown on the following table.

Table 3.9
Interpretation of Validity

Value r	Interpretation
0.80 <r≤ 1.00	Very High
0.60 <r≤	High
0.40 ≤r≤0.60	Enough

1) Conduct trial test items

Trial test item will be implemented in the upper grade of population. In this research, the trial of test item will be implemented in grade 9

2) Conduct analysis of test item based on trial test

Analysis of test item involves validity test, reliability test, difficulty level and discriminating power.

4) Instrument Analysis Result

The Instrument for measuring students' concept mastery using objective test. The researcher was arranged 25 questions. The instruments were tested term of validity, reliability, difficulty level, discriminating power and distractor as explained before. The test was given to 43 students that have learned about the material that is learned for the research. The recapitulation of item test analysis is shown in the table 3.8.

Item Test Recapitulation

Reliability Test : 0.96 (Very High Degree)

Table 3.10
Recapitulation of Item Test for Students' Concept Mastery

Question Number	Discriminating Power	Validity	Difficulty Level	Status
1	Satisfactory	Low	Very Easy	Accepted
2	Poor	Enough	Very Easy	Accepted
3	Poor	Invalid	Very Easy	Rejected
4	Good	Low	Middle	Accepted
5	Satisfactory	Low	Easy	Accepted

Question Number	Discriminating Power	Validity	Difficulty Level	Status
6	Good	Low	Middle	Rejected
7	Excellent	Enough	Difficult	Rejected
8	Excellent	Enough	Middle	Rejected
9	Satisfactory	Low	Easy	Accepted
10	Excellent	Enough	Middle	Accepted
11	Excellent	Enough	Middle	Accepted
12	Satisfactory	Low	Easy	Rejected
13	Satisfactory	High	Middle	Rejected
14	Excellent	High	Middle	Accepted
15	Excellent	High	Middle	Accepted
16	Good	Enough	Very Easy	Accepted
17	Good	Enough	Easy	Accepted
18	Good	Enough	Easy	Accepted
19	Good	High	Easy	Accepted
20	Good	High	Easy	Accepted
21	Excellent	High	Middle	Accepted
22	Excellent	High	Easy	Accepted
23	Satisfactory	Low	Easy	Rejected
24	Satisfactory	Enough	Easy	Rejected
25	Good	Enough	Easy	Accepted

The Table 3.8 shown that the result of recapitulation of the item tests that it showed on the several numbers that the test items are rejected could those by the difficulty level, the validity and the discriminating power that the researcher should revise whether it is the item tests or only the options according to the needs of the revision and the researcher should discuss it also with the experts the researcher chose to review all the item tests before did the validity spreading out all of the potential objective test to be tested were those could be used or not based on the status resulted by the ANATES.

It could be seen on the Table 3.8 that the item test number 3 was rejected, show that the validity is invalid and the difficulty level was very easy so it was not objective to be an item test, thus the researcher revised the item test. Then the test item number 6 shown that it was rejected although the discriminating power showed was good and the difficulty level showed it was on the middle but the validity showed that it was low, then the researcher changed the options of the number 6 item test. It applied to other item tests, the researcher would revise the test item that shown rejected.

5) Data Processing

This research is included as quantitative kind of research. For quantitative research, data is obtained from pretest and posttest to measure students' concept mastery in learning human circulatory system. By using Microsoft Excel calculation to determine the result and score of pretest and posttest. The value of quantitative data is gained by the result of N-Gain (Normalized Gain). In the process of calculating data is explained by the score of item test. In this research, score of item test used to measure the improvement of students' understanding. This test is objective test in the form of multiple choice consist of 25 item tests. Each multiple choice is given score 1 (one) if the correct answer and 0 (zero) if the correct answer.

The next step after obtain the score of item test, the researcher was calculating the gain. gain is calculated to determine differences between pretest and posttest score so that the improvement of learning process can be seen clearly and the effect of treatment will be seen. Then, Normalized Gain (N-Gain) can be obtained to determine the categories from the significant effect of the students' concept mastery.

For the calculating the data, the researcher using the formula by Hake (1999), according Hake (1999), Gain can be obtained by the formula as follows:

$$G = S_f - S_i$$

(Hake, 1999)

Note:

G = Gain score

S_f = Posttest Score

S_i = Pretest score

The result of the normalized gain (N-Gain) show the effectiveness of the role play implementation in increasing students' concept mastery in learning human circulatory system. Normalized Gain (N-Gain can be shown the improvement of the higher achiever and lower achiever clearly. The formula to calculate the N-Gain as follows:

$$< g >= \frac{S\ post - S\ pre}{S \max - S\ pre}$$

(Hake, 1999)

Note:

$<g>$ = Normalized Gain

S_{post} = Posttest score

S_{pre} =Pretest score

S_{max} = Maximum score

After that the value of Normalized Gain (N-Gain) is determined based on the categories below:

Table 3.9
Categories of the Normalized Gain Value

Value <g>	Category
<g> ≥0.7	High
0.7 ><g> ≥ 0.3	Medium
<g>< 0.3	Low

(Hake, 1999)

This test using parametric test statistical deal with the assumptions that each of analyzed variable is normal distribution. If, the data is abnormal so that the homogeneity variant teat cannot be done or it cannot use the parametric test. Meanwhile if the data is normal and homogenous, the parametric technique can be used. This research using SPSS 24, Kolmogorov-Smirnov with significance level 0.05, hence H_o is accepted and if significance value more than 0.05 then the H_o is rejected or denied. Normality test item aims to know the sample which comes from population has normal distribution or not. For analyzed the data, this research must be arranged the hypotheses to be tested.

The population should be originated both two class are homogenous so that should be homogeneity test. The research uses statistics from SPSS 24, with significance level (α) is 0.05. when significance value ≥ 0.05, the data is considered as homogenous (Sudjana, 2005).

The correlation of this research was performed to find the value of r or it is called as correlation can be define as the strength of relationship between two variables in this cause are students' creativity and cognitive aspect. For processing the value of correlation used Microsoft Excel. The analysis of correlation can be interpreted in some categories by Tanner (2012) as follows:

Table 3.10
Interpretation of Correlation Coefficient

Correlation Coefficient	Interpretation
0.00-0.30	Weak
0.31-0.70	Moderate
0.71-1.00	Strong

(Tanner, 2012)