CHAPTER III

RESEARCH METODOLOGY

A. Research Method and Research Design

The method that is applied in this research was Pre-Experimental or in the other word called as weak experiment. According to Fraenkel, Wallen, & Hyun (2011), this design is weak and do not have built-in control for threats to internal validity. In addition to the independent variable, there are number of other plausible explanations for any outcomes that occur. This might be happened because there is no control variable and sample was not chosen randomly.

The design used in this research is One-Group Pretest-Posttest Design. Based on Fraenkel, Wallen, & Hyun (2011), in the one-group pretest-posttest design, a single group is measured or observed not only after being exposed to treatment of some sort, but also before. In this research sample was given a pretest before treatment and in the end of learning posttest was given as well. This design is in line with the research purpose which is to determine students's understanding improvement after implementation of Teams-Games-Tournaments. Table 3.1 shows how the research is designed.

Table 3.1 One-Group Pretest-Posttest Design

O	X	O
Pretest	Treatment	Posttest

(Fraenkel, Wallen, & Hyun 2011)

In case of the research done, the diagram of the research design is shown in Table 3.2.

Table 3.2 One-Group Pretest-Posttest Design

O	X	O
Pretest: (25 items related to Food Additives and Addictive	Treatment (Two treatments done using Teams-Games-	Posttest: (25 items related to Food Additives and

substances concept were given) (Dependent Variable)	Tournaments strategy)	Addictive substances concept were given) (Dependent Variable)

B. Participants, Population, and Sample

The location of this research is one of Junior High School in Kuningan. The population in this research is all 8th grade students in one of Junior High School in Kuningan, which are consist of eight classes. The sample was 38 students from one class (VIII I) which is chosen by using purposive sampling. Based on Fraenkel and Wallen (2007), purposive sampling is the sampling in which researchers do not simply study whoever is available but rather uses their judgment to select a sample that they believe, based on prior information, will provide the data they need. Based on the observation and teacher recommendation the VIII I class can be use as the representative sample from the population.

C. Research Instruments

In this research, instrument is necessary to be used for gaining the data. There are three types instrument that are used in this research:

Table 3.3 Table of Instrument Needs of Research

Data Needs	Instrument
Check the learning activity (TGT)	Teacher observation sheet and student observation sheet
Student Understanding	Pretest and post test
Students' teamwork skills	Rubric for self-assessment and peer-assessment

Those instruments are described below:

1. Observation Sheet

Observation sheet in this research is used to make sure that the teaching procedures are based on Cooperative model types Teams-Games-Tournaments (TGT). Observation sheet was used by the observer to measure the teaching learning activities done by the teacher and students. The observation sheet will give the information about the

percentage of activities done based on the teams-games-tournaments steps.

2. Objective Test

Objective test is a test item format that provide two or more possible responses and require the examine to make a selection, then latter the result can be scored with little subjectivity (Crocker and Algina, 2008). Objective test in this research was in form of multiple choice questions that measure students' understanding including understanding (C2), applying (C3) and analyzing (C4) based on A Revision of Bloom's Taxonomy. The multiple choice questions include 25 questions. The questions given as *pretest* and *posttest* after the students get *treatment* with test-measuring technique.

Table 3.4 Blue Print of Food Additives and Addictive Substances Concept Objective Test

No	Concept	C2	C3	C4	Total
1	Kind and function of food additive substances	1,2,3,4	5,6,7,8	9,10,11	11
2	Kind of addictive substances	12,13,14	15,16	17,18	7
3	The effect of addictive substances to health	19,20	21,22,23	24,25	7
Total		9	9	7	25
Percentage (%)		36%	36%	28%	100%

3. Teamwork Skills Rubric

The rubric used was teamwork skill rubric. The rubric was adapted from teamwork rubric for self-assessment and peer-assessment created by Karen Franker (2007). The rubric was used to evaluate five categories in group working which are contributions, problem solving, attitudes, focus on the task and working with others. In using the rubrics the researcher translate the rubric into Bahasa. The criteria for every score given are shown in the Table 3.5.

Table 3.5 Table of teamwork rubric

Category	4 points	3 points	2 points	1 point
Contributions	Routinely provides useful ideas when participating in the group and in classroom discussion. A leader who contributes a lot of effort.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard!	Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Problem-solving	Actively looks for and suggests solutions to problems.	Refines solutions suggested by others.	Does not suggest or refine solutions, but is willing to try out solutions suggested by others.	Does not try to solve problems or help others solve problems. Lets others do the work.
Attitude	Is never publicly critical of the project or the work of others. Always has a positive attitude about the task(s).	Is rarely publicly critical of the project or the work of others. Often has a positive attitude about the	Is occasionally publicly critical of the project or the work of other members of the group. Usually has	Is often publicly critical of the project or the work of other members of the group. Is often negative

Category	4 points	3 points	2 points	1 point
		task(s).	a positive attitude about the task(s).	about the task(s).
Focus on the task	Consistently stays focused on the task and what needs to be done. Very self-directed.	Focuses on the task and what needs to be done most of the time. Other group members can count on this person.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on task.	Rarely focuses on the task and what needs to be done. Lets others do the work.
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

D. Instrument Validation Result

The objective test in the kind of multiple choice questions that is used in this research should be validated first before used. The instruments was tested to measure its validity, reliability, discriminating power, and difficulty level. To get the data of instrument validation, a limited test need to be done. The test assigned to 25 students which have learned lights and optics concept. The limited test consist of 25 multiple choice questions. The data obtained from the limited test was analyzed by ANATEST 4.0 software. The content

validation is mostly good and it has been analyzed from expert judgments. The reliability of the test item is 0.07 which included as very low. It may because the class that used for tested the instrument are high achievement class so that the result of each student mostly same. Otherwise the researcher also did some revision on the instrument based on the ANATEST result.

The instruments of multiple choice questions consist of three sub-concepts of food additives and addictive substances. The measurement that is used as consideration of the usage of instrument from ANATEST 4.0 is the reliability. The validation of instruments is more considered from the expert judgments. Several revisions are done based on the recommendations from judgments but the content of the questions does not really change.

E. Research Procedure

1. Preparation Stage

The steps are including the following activities bellow:

a. Literature review conducted to analyze the information about Teams-Games-Tournaments, students' understanding, teamwork skill and food additives and addictive substances.

b. As the result of literature review, research problem is identified and elaborated into several research question arranged. In order to answering research questions, instruments were arranged as tools to obtain the data. Arrangement of instruments including objective test, rubrics to measure students' teamwork skill, observation sheet about Teams-Games-Tournament. Instructional tools were used are lesson plan and worksheet and a set of card question that arranged to help the implementation of Teams-Games-Tournaments.

c. Judgment of instruments was conducted by experts.

d. Trial test of objective test instrument was conducted to identify the quality of instrument.

e. The result of multiple choice questions test trial was analyzed.

f. Revision of instruments was done based on judgment result and test item analysis.

2. Implementation Stage

The implementations of this research are explained as follows:

a. Analyzing student previous chapter score to know the composition of higher and lower achiever in order to determine the group composition that used by using Teams-Games-Tournaments.
b. Distribute the pre-test question to identify students' preliminary skills.
c. Applying the treatment using TGT.
d. Distribute Post-test in the form of objective test to identify the final students' understanding.
e. Make a recapitulation from data gained to be analyze in the next stage.

3. Completion Stage

Completion stage consists of following activities, which are:

a. Analyze the data gained accordance with the instrument used for each variable that measured.
b. Interpreting the data gained
c. Make discussion to elaborate the result of analysis,
d. The conclusion obtained based on the result.
e. Completing the research report

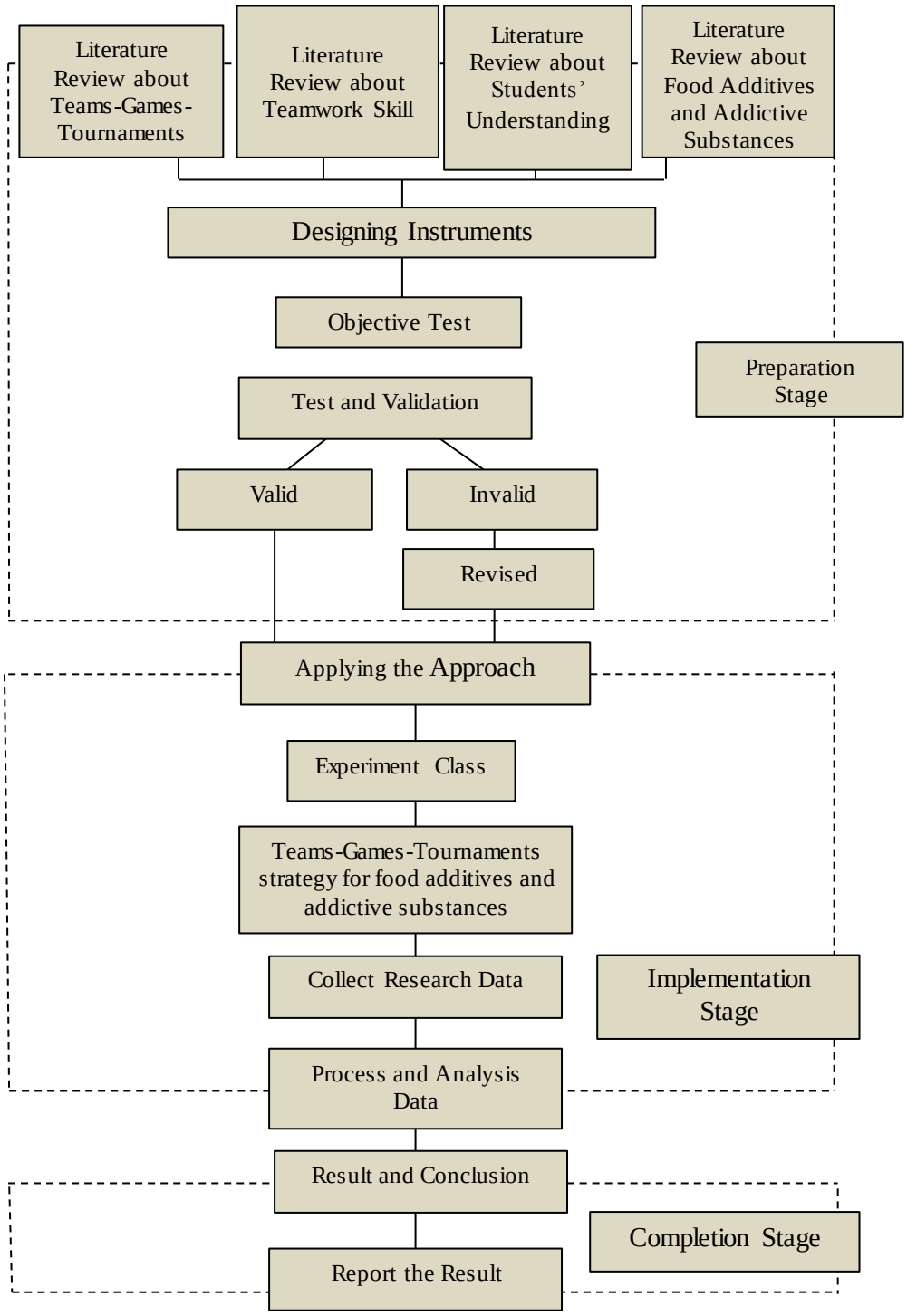

Figure 3.1 Flowchart of Research Procedure

F. Data Analysis

There are two kinds of data that were used in this research, the quantitative and qualitative. Quantitative data was obtained through objective test in pre-test and post-test, while qualitative data was obtained through the rubric and observation sheet. Thus the data processing technique were done as follows:

1. Quantitative Data Processing

The quantitative data in this research was student understanding about food additives and addictive substances.

a. Hypothesis Test

The hypothesis in this research was tested using SPSS for Windows Version 16.0 program. The test will be used are paired sample T-test. The paired sample T-test is used to compare two means that are from the same individual, subject, object or related units. The two means typically represent two different times, one of example is pre-test or post-test. But before use the paired sample t-test, the test of normality and homogeneity were done. If the data is normally distributed and homogenous, the test of hypothesis which is used is parametric test Paired Samples Test. If not, the test which is used is non-parametric Wilcoxon Signed Rank Test.

The hypothesis test of differentiation is used to see whether pretest and posttest score have difference result or not. The hypothesis which is tested is shown as follow:

H_0 : There is no difference on students' understanding in learning food additives and addictive substance after using Teams-Games-Tournaments strategy.

H_1 : There is difference on students' understanding in learning food additives and addictive substance after using Teams-Games-Tournaments strategy

b. Score of Item Test

The score of test item for measuring the improvement of students' understanding are obtained from the set of test item that consist of 25 questions. Each question is given one score if correct and zero if incorrect. In order to identify the final score that gotten by the student the formula used is:

$$Final\ Score = Total\ Correct\ Score\ x\ 4 \quad \text{..... Formula 3.1}$$

Note: Maximum score is 100

c. Normalized Gain

The improvement of students' understanding in pretest and posttest results was calculated using normalized gain equation. Based on Hake (1999), the *pretest and posttest* could be computed using the equation below:

$$< g > = \frac{(average\ of\ posttest\ score) - (average\ of\ pre}{maximum\ score - (average\ of\ pretest)} \quad \text{..... Formula 3.2}$$

The data then interpreted into a normalized gain criteria as shown in the Table 3.6.

Table 3.6 Criteria of Normalized Gain

<g>	**Criteria**
<g> ≥ 0,7	High
0,3 ≤ <g> < 0,7	Fair
<g> < 0, 3	Low

(Hake, 1999)

2. Qualitative Data Processing

The qualitative data in this research was the teamwork rubric and observation sheet for teaching process through Teams-Games-Tournaments.

In this research, the author calculates the result of observation sheet rubric and teamwork skills by converting into percentage form. The way to convert the raw score into percentage is used th following formula:

$$P = \frac{R}{MS} x\ 100\% \quad \text{..... Formula 3.3}$$

Information:

P = Percentage

R = Raw Score
MS = Maximum Score

(Arikunto, 2010)

The result of percentage can be interpreted using following Table 3.7

Table 3.7 Interpretation of Percentage

No	Percentage	Criteria
1	80 – 100 %	Very Good
2	66 – 79 %	Good
3	56 – 65 %	Moderate
4	40 – 55 %	Lack
5	< 40 %	Very Lack

(Arikunto, 2013)

G. OPERATIONAL DEFINITION

In order to avoid misconception about this research, some operational definitions are explained in this research. The terminologies are as follow:

1. Teams-Games-Tournaments (TGT) is a type of cooperative learning method which has principle that the success of a team lies on the success of the individuals composing the teams. There are 5 steps in Teams-Games-Tournaments which are class presentation/teacher explanation, teams work, games, tournaments and group recognition/ reward (Slavin, 2011). Learning process is conducted based on lesson plan and it was measured by using observation sheet.
2. Students' understanding that is measured in this research involves level cognitive of understanding (C2), applying (C3), and analyzing (C4) based on Anderson 2001. This competence is measured by using multiple choice questions (pre-test and post-test) about food additives and addictive substances.
3. Students' teamwork skills describe as a set of skills that individuals use to foster the success and effective teamwork which are produced when all the

individuals involved harmonize their contributions and work towards a common goal. The data gained from the self-assessment and peer-assessment/ peer feedback.