

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

#### **3.1 Research Method**

The research method that was being employed for the research is Quantitative Research Method. The purpose of conducting Quantitative Research Method is to create meaning through objectivity uncovered in the collected data, analyze for plausible relationships between variables and explain why they occur (Fraenkel & Wallen, 2012; John W. Creswell et al., 2017). As supported by various experts, Quantitative Research typically keen to find insights and predicting outcomes that will affect people and certain areas. The purpose is to develop generalizations that add to theory by establishing, confirming, or validating linkages (Paul D.. Leedy et al., 2014). Quantitative research also entails collecting of quantitative data, where the researcher often employing an instrument with questions and responses which later quantified or examined. (Williams, 2007)

#### **3.2 Research Design**

Since the goal of this study was to characterize the trends of a population, the research design used was survey research design. Typically, surveys collect data at a certain point in time to define the meaning of current conditions, to establish standards that may be compared to current conditions, or to draw links between specific events that are taking place (Cohen et al., 2007). Usually, it is used to search a wide plethora of approaches, demographics, programs, etc. to quantify or define any generalized features. There are major types of survey that can be applied to a research: cross-sectional survey and longitudinal survey. In this research, a cross-sectional survey design is used since the data will be gathered from a sample collected from a predetermined population at one specific point of a time. A cross-sectional survey gathers data from a sample taken from a predetermined population. In addition, the data is obtained at just one particular moment in time, although the time required to obtain it may be longer (Fraenkel & Wallen, 2012).

A questionnaire was employed to measure students' motivation on learning science through online learning through COVID-19 Pandemic. At the same time, the data was gathered using Google Form, an online platform for conducting surveys through forms. Students were given URLs to the forms; the link to the

questionnaire is [bit.ly/skripsiechan](https://bit.ly/skripsiechan). The results are then processed with Microsoft Excel and SPSS software version 26 to determine the frequency of data obtained and to profile Students' motivation. Tables, diagrams, and descriptive texts then also are to present the data gathered.

### **3.3 Population and Sample**

This research was conducted by using existing web-based page application or website, namely Google Form, to gather the data for this research. Thus, making it a web-based survey that is aimed for schools either private or public junior high school around Java region that are studying science in their school using online learning method during COVID-19 Pandemic. The data was gathered from the population of students from various Junior High School around Java region during the 2020/2021 academic year, with the 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> grade students as the target population. The population are as follows; 156 students of 7<sup>th</sup> grade, 183 students of 8<sup>th</sup> grade and 271 students of 9<sup>th</sup> grade, which makes up a total of 600 students from 7<sup>th</sup> to 9<sup>th</sup> grade. The period of data gathering takes about a week from 1<sup>st</sup> to 7<sup>th</sup> May 2021.

Meanwhile, simple random sampling is assigned as the sampling method for this research. Simple random sampling is a sampling procedure in which the odds of being chosen as the sample are equal and independent for each member of the population. (Fraenkel & Wallen, 2012)

### **3.4 Operational Definition**

Operational definitions are provided in this section to minimize misconceptions and ambiguities regarding the research. The following are the definitions for the terms:

#### **3.4.1 Science Learning Motivation**

In this research, Students' Science Learning Motivation refers referring to one of the key factor that influence the students to achieve something in their learning. It is then measured by 6 aspects; self-efficacy, active learning skills, science learning value, performance goal, achievement goal and learning environment stimulation.

#### **3.4.2 Online Learning**

In this study, online learning refers to learning activities that take place

online, whether through web applications, platform or websites, social media, or other online media. Some of its terminology such as online learning, web-based learning, open learning, distance learning, computer-assisted learning, mixed or blended learning, refer to the ability to learn from anywhere using devices that are connected to internet network. It may be performed at any time, in any rhythm, and with any medium.

### 3.4.3 COVID-19 Pandemic

In this research, COVID-19 Pandemic refers to the newly discovered SARS-Cov-2 virus as the source of Coronavirus 2019 (COVID-19) disease which spread in 182 countries around the world and was announced as Global Pandemic on March, 11<sup>th</sup> 2020 by World Health Organization.

### 3.5 Research Instrument

This research employed an instrument to profile students' learning motivation through online learning during the COVID-19 pandemic. The instrument is elaborated as follows.

#### 3.5.1 Students' Online Science Learning Motivation Questionnaire

In answering the research question of "how is students' science learning motivation through online learning during COVID-19 pandemic?" an instrument is needed to measure students' science learning motivation. The study was then broken down into several stages for constructing the Scientific Attitude Questionnaire. Figure 3.1 depicted the various stages.

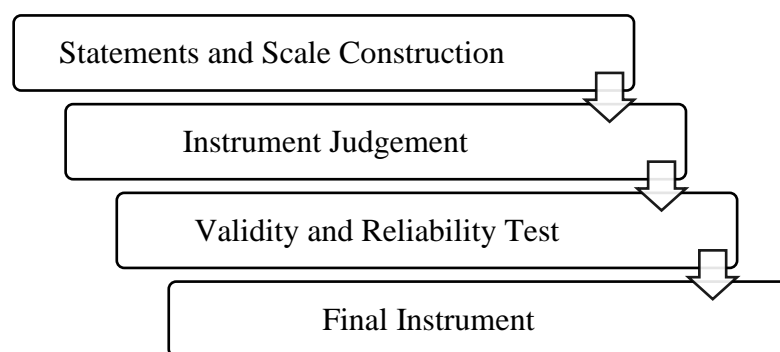


Figure 3.1 The diagram of process in developing students' online science learning motivation questionnaire for the research

Students' Online Science Learning Motivation Questionnaire is used to analyze students' science learning motivation through online learning during the

COVID-19 pandemic. The questionnaire was developed by adapting from existing questionnaire to create an instrument that would be relevant for the sample's characteristics. Figure 3.1 depicts the various stages of developing the questionnaire. The stages then described as follows;

### 3.5.1.1 Statements and Scale Construction

Survey research involves the use of a questionnaire to be given to a sample of respondents. Thus, standardized questionnaires are frequently used to collect data on a variety of topics. A questionnaire comprises of statement items that are grouped into several key factors. (Maria Teresa & Nadia, 2005). Hence, several instruments in the form of questionnaire are chosen to be referenced in the development of questionnaire for this research.

There were several questionnaire in the field of learning motivation and science learning such as Science Motivation Questionnaire II, Students' motivation towards science learning (SMTSL) questionnaire, and Motivated Strategies for Learning Questionnaire (MSLQ) (Glynn et al., 2011; Paul R. Pintrich et al., 2015; Tuan et al., 2005). However, the Students' motivation towards science learning (SMTSL) questionnaire was chosen as the main source of reference for Students' Online Science Learning Motivation Questionnaire since it is deemed as the one that fits the context of online learning.

The original SMTSL Questionnaire was comprised of 6 key factors (self-efficacy, active learning skills, science learning value, performance goal, achievement goal and learning environment stimulation). Each factors are defined and made into 35 statements. The statements of the original SMTSL Questionnaire are attached in Appendix 1, while the composition of the key factors is shown in Table 3.1.

Table 3.1 The composition of statements in the original SMTSL Questionnaire

No.	Key Factor	Definition	Statement Number
1	Self-Efficacy	Students have faith in their own abilities to excel in scientific learning projects.	1, 2, 3, 4, 5, 6, 7
2	Active Learning Skills	Students participate actively in the construction of new knowledge	8, 9, 10, 11, 12, 13, 14, 15

No.	Key Factor	Definition	Statement Number
3	Science Learning Value	based on prior information by employing a range of strategies. Students benefit from science learning because it helps them to build problem-solving abilities, participate in inquiry activities, stimulate their own thinking, and learn about the importance of science in everyday life. If students can understand the importance of these essential characteristics, they will be motivated to learn science.	16, 17, 18, 19, 20
4	Performance Goal	The goal of a student in science class is to compete with other students and get the attention of the teacher.	21, 22, 23, 24
5	Achievement Goal	When students' competency and achievement in science class improves, they feel better about themselves.	24, 26, 27, 28, 29
6	Learning Environment Stimulation	The motivation of students in the field of science learning was impacted by the learning environment around them, such as curriculum, instruction from teachers and students' interaction.	30, 31, 32, 33, 34, 35

SMTSL Questionnaire (Tuan et al., 2005)

The Original SMTSL Questionnaire is being adapted and added in some part or statement items, following the guidelines of (Daunert & Seel, 2020; Hambleton & Jong, 2002) to fit the context of online science learning during COVID-19 Pandemic. The questionnaire also then translated into Indonesian Language since it was assigned to students from public and private schools whom are using Indonesian Language as their main language when learning science. The adapted questionnaire is shown in Appendix 2 and the composition of the key factors in the adapted questionnaire is shown in Table 3.2

Table 3.2 The composition of statements in Students' Online Science Learning Motivation Questionnaire

No.	Key Factor	Definition	Statement Number
1	Self-Efficacy	Students have faith in their own abilities to excel in scientific learning projects.	1, 2, 3, 4, 5, 6, 7, 8
2	Active Learning Skills	Students participate actively in the construction of new knowledge based on prior information by employing a range of strategies.	9, 10, 11, 12, 13, 14, 15
3	Science Learning Value	Students benefit from science learning because it helps them to build problem-solving abilities, participate in inquiry activities, stimulate their own thinking, and learn about the importance of science in everyday life. If students can understand the importance of these essential characteristics, they will be motivated to learn science.	16, 17, 18, 19, 20
4	Performance Goal	The goal of a student in science class is to compete with other students and get the attention of the teacher.	21, 22, 23, 24, 25
5	Achievement Goal	When students' competency and achievement in science class improves, they feel better about themselves.	26, 27, 28, 29, 30
6	Learning Environment Stimulation	The motivation of students in the field of science learning was impacted by the learning environment around them, such as curriculum, instruction from teachers and students' interaction.	31, 32, 33, 34, 35, 36

Meanwhile, Likert Scale is used to measure Students' Online Science Learning Motivation Questionnaire. In educational research, Likert scale is frequently used as a measurement instrument (Creswell, 2012). The scale was written in the questionnaire within numbers from 1 to 4, with each number representing a different degree of favor, ranging from strongly disagree to strongly agree.

Table 3.3 Likert Scale in Students' Online Science Learning Motivation  
Questionnaire

Scale	Criterion	Point
1	Strongly Disagree	1
2	Disagree	2
3	Agree	3
4	Strongly Agree	4

Table 3.3 above represents Likert Scale that is being used in the Students' Online Science Learning Motivation Questionnaire. Each scale has its own criterion and thus also gaining certain points to be calculated. For example, Scale one means that the students strongly disagree with the statement, the student will also gain 1 point for their choice. Four-scale Likert Scale was also chosen to be used in this research to avoid neutral statement that might cause bias in the result analysis.

### 3.5.1.2 Instrument Judgement

The process of instrument judgement was conducted in a short period of time. Hence the instrument is only judged briefly by the research's supervisors. However, there are few things to consider based on the expert judgement such as:

a) The addition of context and items

The instrument was adapted from SMTSL questionnaire and there is a need of adding the context of online learning to fit the learning model during the COVID-19 pandemic. Some items related to online learning also recommended to be added on the developed questionnaire. The adaptation and addition of some items in the questionnaire must follow the existing guidelines. There was also a suggestion to add an open-ended question to further elaborate students' response.

b) The translation of instrument

The questionnaire was adapted from SMTSL questionnaire and translated to Indonesian since the respondent are mostly speaks amd conduct learning activities with Indonesian language. The translation process must be done attentively so that the sentences still has the same meaning with the English one.

The suggestions from the instrument judgement then applied to the developed questionnaire. However, the suggestion of adding open-ended questions were not applied considering the time that is going to be taken in processing the result.

### 3.5.1.3 Validity and Reliability Test

Validity and Reliability test is conducted to ensure the quality of the questionnaire that is tested to the student, in term of consistency and reliability. According to Fraenkel & Wallen (2012), the consistency of scores from one administration of an instrument to the next, as well as from one set of items to the next, is referred to as reliability. Meanwhile, the appropriateness, accuracy, and meaningfulness of the evidence that supports any conclusions from the scores is described as validity.

The Validity and Reliability test for the questionnaire is carried by collecting data of 30 students from various schools to answer the statement from the Students' Online Science Learning Motivation Questionnaire. The questionnaire was given using Google Form, an online platform for carrying out surveys through forms. Before ticking the statements on the questionnaire, they were also asked about their personal data such as name or initials, grade, schools, their type of school in terms of public or private and the occupation of their parents. The data extracted from the Google Form then were downloaded in the format of Microsoft Excel before moved to IBM SPSS 26 to be tested for its validity and reliability. In IBM SPSS 26 software, a feature of Reliability analysis and inter-item correlation for Validity test was used for testing.

Table 3.4 Reliability test result from Students' Online Science Learning Motivation Questionnaire

<b>Cronbach's Alpha</b>	<b>Cronbach's Alpha Based on Standardized Items</b>	<b>N of Items</b>
.800	.934	30

As shown on table 3.4 above, .800 is the value of Cronbach's Alpha for Students' Online Science Learning Motivation Questionnaire. Cronbach's Alpha coefficient can be used to tell if a questionnaire has a good consistency, this essentially indicates that respondents who chose high score for one item also chose



high scores for the others; conversely, respondents who chose low scores for one item also chose low scores for the others (Wadkar et al., 2016). In addition, (George & Mallery, 2011) provided the following rules of thumb: as the value of Cronbach's alpha;  $>.9$  – excellent,  $>.8$  – good,  $>.7$  – acceptable,  $>.6$  – questionable,  $>.5$  – poor and  $<.5$  – unacceptable. As supported by findings from (Kimberlin & Winterstein, 2008) which states interpretation of reliability test as shown on Table 3.5.

Table 3.5 Interpretation of Correlation Coefficient/ Cronbach's alpha in Reliability test

Correlation Coefficient	Reliability Category
0.80-1.00	Very high
0.60-0.79	High
0.40-0.59	Average
0.20-0.39	Low

Since the Cronbach's alpha of Students' Online Science Learning Motivation Questionnaire is .800, it can be inferred as having a good consistency. The Cronbach's Alpha analysis and Inter-item analysis for the whole item can be found in the Appendix B.1.

#### 3.5.1.4 Final Instrument

The Final instrument consist of 36 items in the form of positive and negative statements. Four-scale Likert Scale is used to measure the instrument. The composition of statements in each key-factor is described in Table 3.6 below.

Table 3.6 Items of Students' Online Science Learning Motivation Questionnaire

No.	Key Factor	Number of Statements
1	Self-Efficacy	8
2	Active Learning Skills	7
3	Science Learning Value	5
4	Performance Goal	5
5	Achievement Goal	5
6	Learning Environment Stimulation	6
	Total	36

Table 3.6 describes the total items in the Students' Online Science Learning Motivation Questionnaire and each items of each key factor. As the table shows, Self-efficacy key factor has the most items with the total of 8 items. Meanwhile the key-factor with the least item are Science Learning Value, Performance Goal, and

Achievement Goal. Each statement item is accompanied by a four-scale Likert Scale.

### 3.6 Data Collection

Students' online science learning motivation were gathered through a questionnaire that was delivered in an online form through Google Form platform. The questionnaire is divided into seven sections, the first of which is the personal data section, followed by the main questionnaire, which is divided into six sections based on the six key factors.

The questionnaire can be accessed through the link ([bit.ly/skripsiechan](https://bit.ly/skripsiechan)). Figure 3.2 below shows the interfaces of the online questionnaire.



The image shows a Google Form titled "Analisis Motivasi Siswa dalam Pembelajaran IPA Melalui Pembelajaran Daring Selama Pandemi COVID-19". The form is addressed to "Kepada Yth, Saudara/Saudari Responden". The sender is Echa Nurlaeli Naufal, a student at Universitas Pendidikan Indonesia (UPI). The form explains the purpose of the research, which is to study student motivation in IPA learning during the COVID-19 pandemic. It lists the criteria for respondents: SMP students from grade 1 to 3, and those learning IPA through online learning. The form also includes a statement of confidentiality and a thank you message. The contact information for Echa Nurlaeli Naufal is provided, along with a "Berikutnya" (Next) button.

**Analisis Motivasi Siswa dalam Pembelajaran IPA Melalui Pembelajaran Daring Selama Pandemi COVID-19**

Kepada Yth,

Saudara/Saudari Responden

Saya Echa Nurlaeli Naufal, mahasiswa Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam (FPMIPA), Universitas Pendidikan Indonesia. Saat ini saya sedang melakukan penelitian dengan topik "Analisis Motivasi Siswa dalam Pembelajaran IPA Melalui Pembelajaran Daring Selama Pandemi COVID-19". Penelitian ini ditujukan untuk menyelidiki motivasi siswa dalam pembelajaran IPA melalui pembelajaran daring selama Pandemi.

Kriteria responden penelitian ini adalah sebagai berikut:

1. Siswa SMP dari jenjang kelas 1 sampai dengan 3.
2. Mempelajari Ilmu Pengetahuan Alam (IPA) melalui pembelajaran daring.

Tidak ada jawaban benar atau salah dalam kuesioner, karenanya mohon mengisi kuesioner ini dengan jujur. Identitas Saudara/Saudari selaku responden penelitian dan jawaban atas kuesioner ini akan saya jamin kerahasiaannya karena jawaban atas kuesioner ini semata-mata ditujukan untuk kepentingan penelitian dan bukan untuk maksud-maksud lain.

Atas kesediaan dan kerja sama saudara dalam mengisi kuesioner ini, saya ucapkan terima kasih.

Hormat saya,

Echa Nurlaeli Naufal

Narahubung: [echanurlaeli@student.upi.edu](mailto:echanurlaeli@student.upi.edu)

Berikutnya

(a)

## Analisis Motivasi Siswa dalam Pembelajaran IPA Melalui Pembelajaran Daring Selama Pandemi COVID-19

\* Wajib

### Karakteristik Responden

Bagian ini ditujukan untuk mengetahui karakteristik responden melalui beberapa kriteria.

Nama/Inisial \*

Jawaban Anda

Jenjang Pendidikan \*

- ☐ SMP Kelas 1 (Kelas 7)
- ☐ SMP Kelas 2 (Kelas 8)
- ☐ SMP Kelas 3 (Kelas 9)

Nama Sekolah yang saat ini saudara/i bersekolah \*

Jawaban Anda

(b)

Kota/Kabupaten Sekolah \*

Jawaban Anda \_\_\_\_\_

Status Sekolah \*

☐ Negeri

☐ Swasta

Pekerjaan orang tua \*

Jawaban Anda \_\_\_\_\_

[Kembali](#) [Berikutnya](#)

(c)

**Efikasi Diri**

Walaupun konten pelajaran IPA sulit atau mudah, saya yakin saya bisa memahaminya melalui pembelajaran daring. \*

1 2 3 4

Sangat Tidak Setuju ☐ ☐ ☐ ☐ Sangat Setuju

Saya tidak yakin saya dapat memahami konsep pelajaran IPA yang saya pelajari melalui pembelajaran daring. \*

1 2 3 4

Sangat Tidak Setuju ☐ ☐ ☐ ☐ Sangat Setuju

Saya yakin saya dapat mengerjakan ujian pelajaran IPA secara daring dengan baik. \*

1 2 3 4

Sangat Tidak Setuju ☐ ☐ ☐ ☐ Sangat Setuju

(d)

Figure 3.2 Few interfaces of the online questionnaire

(a) shows the first page of the online questionnaire which shows a brief text of respondent criterion, (b) and (c) shows the first section of the questionnaire about students' personal data, (d) shows the next section which is the Likert scale statements of the questionnaire

### **3.7 Data Analyzing Technique**

Data analyzing process is needed in order to obtain the result from the Online Science Learning Motivation Questionnaire. The data analyzing technique is described as shown below.

#### **3.7.1 Normality Test**

Many statistical techniques, particularly parametric tests, require the assumption of normality to be verified since their validity is dependent on it. The resulting mean is not a representative value of the data if the data are not normally distributed (Ghasemi & Zahediasl, 2012). The Kolmogorov-Smirnov test, Lilliefors test, Shapiro-Wilk test, D'Agostino skewness test, and Anscombe-Glynn kurtosis test are all examples of normality tests. Two of the most commonly utilized tests are the Kolmogorov-Smirnov and Shapiro-Wilk tests.

The Kolmogorov-Smirnov test compares a set of scores that are regularly distributed and have the same mean and standard deviation as the sample's results. The Shapiro-Wilk test, on the other hand, is based on the data and normal scores' correlation. When the sample size is small, the Shapiro-Wilk test is regarded by numerous academics as the best approach for determining data normality (less than 50). The Kolmogorov-Smirnov test is preferable if the sample size is higher than 50. The significance level that was taken into account was 0.05. The data is regarded as normally distributed if the significant value is greater than 0.05. A parametric test can be used to examine data that is regularly distributed. Meanwhile, a Non-Parametric test is used to evaluate data that is not regularly distributed (Mishra et al., 2019).

Normality Test can be employed by using the feature in SPSS 26, the steps to use this feature is by selecting the Analyze > Descriptive Statistics > Explore, then moving the variable of interest towards the dependent list before ticking the plots box where the normality test is included. The data will later be shown in a

table describing the value of significance threshold in each Shapiro-Wilk and Kolmogorov-Smirnov test. The steps of testing Normality Test using SPSS 26 is further elaborated as follows:

- 1) Process the raw data obtained from Google Form in Microsoft Excel, the data will automatically be shown as a pivot table. The value of negative statements must be reversed on this point.
- 2) Create a new document/data set in SPSS 26, select variable view tab then input the variables. Since the questionnaire for this research has 36 statements item, the data set will have 36 variables initially. Change the data measure into ordinal since the type of data obtained from Likert-scale questionnaire is ordinal data.
- 3) Go to data view tab, copy the data (only values of statements) from Microsoft Office and paste it into data view tab.
- 4) Before being processed further, the data must be summed based on key-factors. This can be done by selecting Transform feature on the upper tab then select "Compute Variable...".
- 5) On the compute variable interface, select the command to sum the data by selecting "Sum" from functions and special variables. Select which variables to be summed based on key-factors, then give a name on the new variable for the summed up data based on key-factor.
- 6) A new variable then will be shown on variable view tab, continue on the other key factors.
- 7) Go back to data view tab, select Analyze feature on the upper tab. Selecting it will then show a list of drop-down menu. Select Descriptive Statistics, then "Explore...".
- 8) It will then open the interface of Descriptive Statistics menu. Select the summed variables based on key factor, drag and drop it to dependent list.
- 9) Select "Statistics..." and tick the needed options (Descriptive and Outliers). Click continue.
- 10) Select "Options..." and tick the needed options (Factor levels together, Stem-and-leaf, Normality plots with test). Click continue then OK.
- 11) A new viewer window will open, it will show the Normality test result and

stem-and-leaf graph for the data.

### **3.7.2 Spearman-Rank Correlation Test**

Spearman-Rank Correlation Test is an approach for testing the correlation between two or more variables. There are a lot of approach for testing correlation between variables such as Pearson correlation test or Chi-Square test, but Spearman-Rank Correlation test is when the data distribution is classified as not normal. It is also used for ordinal data such as data which are obtained from Likert-scale questionnaire. The Spearman's rank-order correlation is the nonparametric version of the Pearson Correlation test.

This research is using Spearman-Rank correlation test for investigating whether there is a correlation between one key factor and another from the Online Science Learning Motivation Questionnaire.

Spearman-Rank correlation can be measured manually through a formula or using a software. Spearman-Rank correlation test can also be conducted with the help of IBM SPSS 26 Software. The steps of testing Spearman-Rank correlation test using SPSS 26 is further elaborated as follows:

- 1) Process the raw data obtained from Google Form in Microsoft Excel, the data will automatically be shown as a pivot table. The value of negative statements must be reversed on this point.
- 2) Create a new document/data set in SPSS 26, select variable view tab then input the variables. Since the questionnaire for this research has 36 statements item, the data set will have 36 variables initially. Change the data measure into ordinal since the type of data obtained from Likert-scale questionnaire is ordinal data.
- 3) Go to data view tab, copy the data (only values of statements) from Microsoft Office and paste it into data view tab.
- 4) Before being processed further, the data must be summed based on key-factors. This can be done by selecting Transform feature on the upper tab then select "Compute Variable...".
- 5) On the compute variable interface, select the command to sum the data by selecting "Sum" from functions and special variables. Select which variables to be summed based on key-factors, then give a name on the new variable for

the summed up data based on key-factor.

- 6) A new variable then will be shown on variable view tab, continue on the other key factors.
- 7) The data set must be ranked first in order to perform Spearman-Rank Correlation test, to rank the data. A feature of data-ranking can be selected through navigating the upper tab, find “Transform” then select “Rank Cases”, the data set will then be ranked according to its value.
- 8) Go back to data view tab, select Analyze feature on the upper tab. Selecting it will then show a list of drop-down menu. Select Correlate, then select then “Bivariate...”. The interface will look like the (f) figure below.
- 9) Select the key factor that needs to be correlated, tick the Spearman box on correlation coefficients and two-tailed on test of significance. The, click “OK”
- 10) A new viewer window will open, it will show the result of Spearman-Rank correlation test.

### **3.7.3 One Way ANOVA Test**

(Fisher, 1925) invented the one-way analysis of variance. The one-way ANOVA approach may be used to compare the differences between two or more means. They can be used to see if a category variable has an influence on the mean value of another variable. In much more simple way, it is used to look for differences among different groups.

This research uses One Way ANOVA test for investigating whether there is a significant difference of the data result from different subject category. For example, comparing the mean result of the 8<sup>th</sup> grade students with mean result of the 9<sup>th</sup> grade students to see whether there is a difference between those groups.

There is some debate among scientists in using ANOVA test for Likert scale questionnaire, however (Norman, 2010) reports that parametric statistics like ANOVA test can be employed for Likert data, small sample sizes, uneven variances, and non-normal distributions, without danger of coming to the wrong conclusion. These conclusions are in line with empirical research from approximately 80 years ago.

In One Way ANOVA test, The F distribution is used to generate the testing



statistic for an analysis of variance. In IBM SPSS Statistics 26, computing and interpreting One Way ANOVA can be conducted by using Analyze One Way ANOVA feature, this feature can be commanded by clicking the tab Analyze > Compare Means > One-Way ANOVA. The steps of testing Normality Test using SPSS 26 is further elaborated as follows:

- 1) Process the raw data obtained from Google Form in Microsoft Excel, the data will automatically be shown as a pivot table. Sort it based on grades of the student. The value of negative statements must be reversed on this point.
- 2) Create a new document/data set in SPSS 26, select variable view tab then input the variables. Since the questionnaire for this research has 36 statements item, the data set will have 36 variables initially. Change the data measure into ordinal since the type of data obtained from Likert-scale questionnaire is ordinal data.
- 3) Create a new variable of “Grades”, this variable will be used to distinguish which grade of the students. Click “Value” on the variable view tab and input the value as shown on the figure above.
- 4) Go to data view tab, copy the data (only values of statements) from Microsoft Office and paste it into data view tab. It is recommended to paste the data based on grades then input the value for the “grade” variable.
- 5) Before being processed further, the mean value for key-factors must be counted. This can be done by selecting Transform feature on the upper tab then select “Compute Variable...”.
- 6) On the compute variable interface, select the command to count the mean of the data by selecting “Mean” from functions and special variables. Select which variables to be summed based on key-factors, then give a name on the new variable for the mean value of data based on key-factor.
- 7) A new variable then will be shown on variable view tab, continue on the other key factors.
- 8) Go back to data view tab, select “Compare Means” feature on the upper tab. Selecting it will then show a list of drop-down menu. Select “One-Way ANOVA...”.
- 9) The interface of One-Way ANOVA menu should then be opened. Select the

value of mean variables based on key factor, drag and drop it to dependent list. Select grade variable, drag and drop it on factor list.

- 10) Select “Post-Hoc” and tick Tukey as shown on the figure. Click continue.
- 11) Select “Options...” and tick the needed options (Descriptive, Homogeneity of variance test) as shown on the figure. Click continue then OK.
- 12) A new viewer window will open, it will show the One-Way ANOVA test result and Tukey Post-Hoc for the data as shown on the figure above.

### **3.8 Research Procedure**

In this study, there are three primary stages of systematically arranged procedure, which are classified into three categories which are; preparation, implementation, and completion. Each stages are described as follows:

- 1) Preparation Stage
  - a) Identification of problems to be investigated
  - b) Defining the research goal
  - c) Determining the focus of research variables
  - d) Conducting the literature review related to Students’ Science Learning Motivation and Online Learning
  - e) Arranging research proposal
  - f) Constructing research instrument in form of questionnaire
  - g) Instrument judgement by experts
  - h) Testing the instrument for validity and reliability
  - i) Assembling the instrument in online form (Google Form)
  - j) Preparing the permission letter
- 2) Implementation Stage
  - a) Determining the sample
  - b) Delivering and testing the instrument to students
  - c) Obtain the data from online form
- 3) Completion Stage
  - a) Analyze the data taken from the result of instrument
  - b) Discuss and conclude the data analysis from the result
  - c) Construct the research report

Figure 3.3 below depicts how this research was organized.

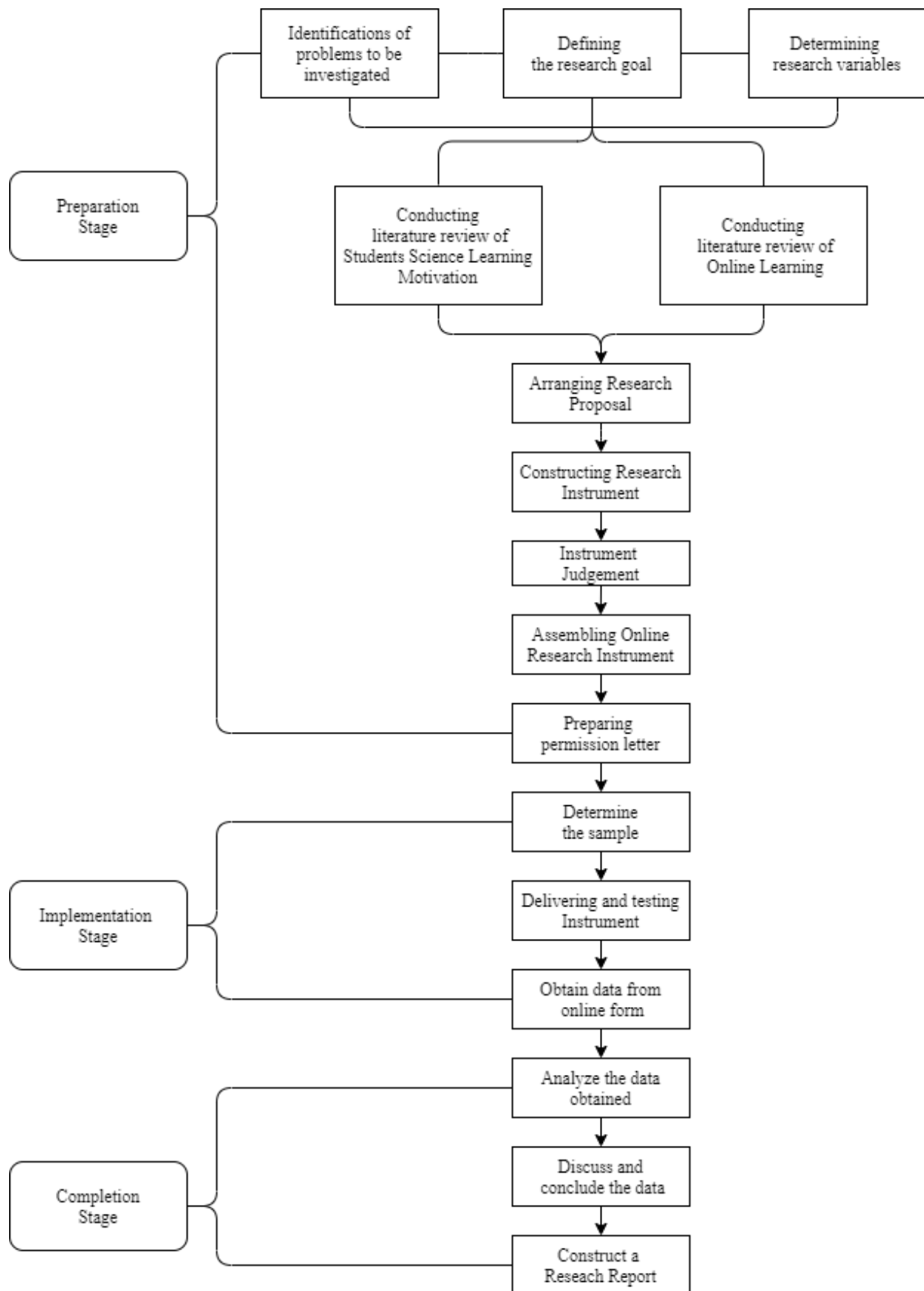


Figure 3.3 Three main stages of procedure in the research