CHAPTER III

RESEARCH METHOD

3.1 Research Paradigm

In general, academic research is described as a scientific method to obtain valid data with a specific purpose in an educational context. There are 4 terms regarding the definitions, which are scientific methods, rational, empirical, and systematic. The scientific method itself is a research activity based on scientific characteristics, which are rational, empirical, and systematic. Rational is described as a research activity that is carried out in a way that is makes sense in human reasoning. Empirical is described as a research activity that is carried out by addressing the human senses to find out the people who are being observed and the methods used. Meanwhile, systematic means the research activity is carried out in systematic steps, despite the different types of research approaches (Sugiyono, 2015).

Research paradigm is a set of assumptions from a group of people that will determine their response to something. Researchers need to base their assumptions through an investigation towards objective evidence, supported by theories. The objective evidence is assembled through combining relevant findings from secondary sources, namely reviewing academic literature from books, journals, and monographs. It is very important for the researchers to rely on the theories they collected to arrange the new developments (to measure, understand, and analyze). The role of theories can be seen based on the research task, such as operationalizing the key variables until integrating the findings (Birks et al., 2017).

Meanwhile, this study's adopted paradigm is built upon a set of assumptions which are consists of 'agreed-upon' knowledge, criteria of judgement, problem fields and ways to consider them. How the study perceived the research problem affects the paradigm they will adopt in either an implicit or explicit manner. As mentioned before, researchers rely on the variables that should be measured where research design and sample should be selected. The dominant perspective in

developing new theory has been one of knowledge philosophy called positivism. Positivism is a belief centralized in the view of understanding the consumer and the marketing phenomena in the academic field. The positivists believed that everything has a chain of causation both in the field of social and natural world (Birks et al., 2017).

There are two research paradigms used which are the positivist paradigm and interpretivist paradigm. Both paradigms are valid in conducting research. The positivist has distinctive differences with interpretivist. Although versions may change due to assumptions of the researchers, the nature context of the approach remains the same. The positivists have alternatives names of quantitative, objectivist, scientific, experimentalist and traditionalist. On the other hand, the interpretivist has alternative names of qualitative, subjectivist, humanistic, phenomenological, and revolutionist. The paradigms can be compared through a series of issues with related advantages and disadvantages in dealing with any research question (Birks et al., 2017).

In this research, the research is carried out exploratory. The dependent and independent variables were based on prior theories from previous studies that would be tested on a regression analysis. But there was also an additional variable included, which means there was an exploration on whether the additional variable proved an impact form the extended concept constructed. It is important to determine the composite variables, measurement, measurement-scale, coding and data distributions in choosing multivariate analysis methods (J. Hair et al., 2017).

The research used both quantitative and qualitative research in collecting the data. Based on Sugiyono (2015), the quantitative research is a research method based on the philosophy of positivism, used to examine certain populations or samples with generally random sampling techniques using research instruments and statistical data analysis to test established hypotheses. On the other hand, the qualitative research is a research method based on the post-positivism philosophy that examines the condition of the object naturally. The researcher is the key instrument, and the data sample is taken purposively, not randomly. The data

analysis is qualitative and the results emphasized on the meaning rather than generalization (Sugiyono, 2015). In addition, there will be a confirmatory interview at the end of the analysis to give a validation and deeper analysis of the main test conducted previously. The research design can be seen through the following chart:
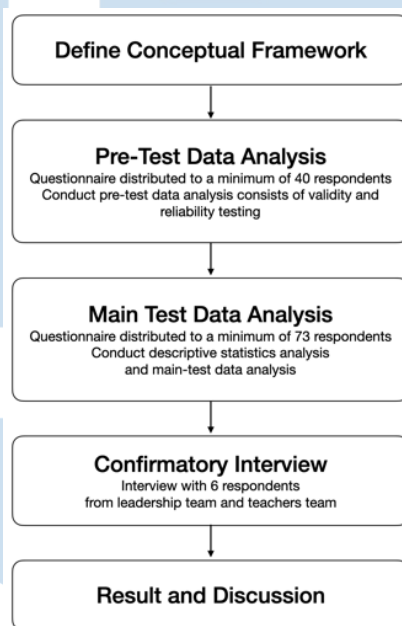

Figure 3.1 Research Design
(Source: Author, 2022)

3.2 Research Object

In this research, the research object are all teachers who has participated in a hybrid learning school setting during the COVID-19 pandemic in Indonesia.

3.3 Population and Sampling

In this section, the exploratory studies conducted with qualitative approach will be explained and tested with a quantitative approach. The results will be compared to the hypothesis and presented through structural relationship between the variables. Thus, researcher must understand the characteristics of the participants, on how they react to a particular issues and towards different contexts or environment which acts as a reminder of the understanding of participants that researcher must develop, in order to choose and apply the best research technique (Birks et al., 2017).

3.3.1 Population

In this research, the population are all teachers who has participated in a hybrid learning school setting during the COVID-19 pandemic in Indonesia.

3.3.2 Sample Unit

A sample is a selection of research objects taken from a larger population. The minimum sample size is required to become the first layer of testing to determine if each indicators are reliable and valid to be used for testing (J. Hair et al., 2017). In this research, the sample unit are teachers at XYZ school that has or is implementing a hybrid learning during the COVID-19 pandemic in South Tangerang, Jakarta, and Bogor.

Segmentation:

(1) The demographic segmentation of this research are male and female within the age of 22 to 45 years old.

(2) The geographic segmentation of this research are the teachers of XYZ school located in South Tangerang, Jakarta, and Bogor.

(3) The psychographic segmentation of this research are the teachers who has experience teaching in a hybrid learning setting in Indonesia.

The research will be conducted in three steps. The first one is the pre-test aimed to test the validity and reliability of the questionnaire statements. The second step is the main test using the revised questionnaire. The third step is confirmatory interview. The confirmatory interview will be conducted with a minimum of 6 respondents or will be stopped when there has been a pattern of answers detected (Nielsen Norman Group, 2021). Below is the confirmatory interview plan:

Table 2 Confirmatory Interview Plan

Role	Number of Respondents
Principal	1
Teachers	5
Total	6

(Source: Author, 2022)

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3.3.3 Sampling Method

In this study, the sampling method is done using nonprobability sampling which is also called purposive sampling. Purposive sampling, also called as judgmental sampling, is often used in exploratory research where it selects research object based on a specific purpose. It is appropriate for research objects that are difficult to reach and to identify particular types of cases for in-depth investigation (Neuman, 2002).

In this research, the samples are teachers at XYZ school that has or is implementing a hybrid learning on their teaching and learning process located in South Tangerang, Jakarta, and Bogor during the COVID-19 pandemic. To indicate the minimum sample size, the research used the 10 times rule (Barclay, Higgins, & Thompson, 1995; as cited in Hair et al., 2017). The 10 times rule indicated the sample size should be equal to the larger of

1. 10 times the largest number of formative indicators used on a single variable (Barclay, Higgins, & Thompson, 1995; as cited in Hair et al., 2017) or

2. 10 times the largest number of structural paths directed at a particular construct in the structural model (Barclay, Higgins, & Thompson, 1995; as cited in Hair et al., 2017).

Exhibit 1.7 Sample Size Recommendation in PLS-SEM for a Statistical Power of 80%												
Maximum Number of Arrows Pointing at a Construct (Number of Independent Variables)	**Significance Level**											
	10%				**5%**				**1%**			
	Minimum R²				**Minimum R²**				**Minimum R²**			
	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75	0.10	0.25	0.50	0.75
2	72	26	11	7	90	33	14	8	130	47	19	10
3	83	30	13	8	103	37	16	9	145	53	22	12
4	92	34	15	9	113	41	18	11	158	58	24	14
5	99	37	17	10	122	45	20	12	169	62	26	15
6	106	40	18	12	130	48	21	13	179	66	28	16
7	112	42	20	13	137	51	23	14	188	69	30	18
8	118	45	21	14	144	54	24	15	196	73	32	19
9	124	47	22	15	150	56	26	16	204	76	34	20
10	129	49	24	16	156	59	27	18	212	79	35	21

Source: Cohen (1992): A Power Primer. Psychological Bulletin 112: 155–159.

Figure 3.2 Determining the sample size unit based on significance level
(Source: Cohen, 1992; as cited in Hair et al., 2017)

Based on the conceptual framework, the maximum number of arrows pointing at a variable is 4 (to variable Teachers' Resilience). With the 10 times rule directed at a particular variable in the structural model, the sample size would be 40 sample. Based on the calculation to achieve a common used level of statistical power of 80% with a 5% probability error and taking a minimum R^2 of at least 0.10, then the minimum sample is 113 teachers (Cohen, 1992; as cited in Hair et al., 2017). Hence in this research, the sample size is 113 teachers with 40 respondents for the pre-test analysis. The validation test plan is as follows:

Table 3 Validation Test Plan

School Location	Total Questionnaire Distributed	Total Expected Questionnaire to Return
Bogor	15	15
Jakarta	15	15
South Tangerang	15	15
Total	45	45

(Source: Author, 2022)

3.4 Operationalization of Variables

In this study, the operationalization of the variables will provide clear and objective definitions of complex variables needed for testing the hypothesis using a variety of existing tools in a fast and precise result (Sugiyono, 2015).

3.4.1 Independent Variable

The independent variable is a variable that influences the dependent variable. In this study, the independent variables are Emotional Competence, Social Competence, Future Oriented, Teachers' Resilience, and Teaching Effectiveness.

3.4.2 Moderating Variable

The moderating variable is a variable that will help understand and prevent misleading conclusion between the dependent variable. In this study, the moderating variable is Computer Self-Efficacy.

3.4.3 Dependent Variable

The dependent variable is a variable that is influenced by the independent variable. In this research, the dependent variable is Perceived Learning Loss.

3.4.4 Measurement Scale

A measurement scale is a tool to determine the number of close-ended response questions (J. Hair et al., 2017). In this study, the measurement scale used to measure to what extend each respondent agree or disagree the statement mentioned on the questionnaire using a 5-interval scale measurement. The interval scale helped the research to have precise information on the rank order of how the variable is measured and its differences in values (J. Hair et al., 2017). According to Babakus & Mangold (1992), the 5-interval scale measurement reduced the level of respondent's confusion. Thus, it increased the level and the quality of the responses (Babakus & Mangold, 1992). The 5-intervial scale measurement consists of:

(a) Strongly Disagree

(b) Disagree

(c) Neither Agree nor Disagree

(d) Agree

(e) Strongly Agree

3.4.5 Table Detail Operational Research Variables

The research variables are explained as follow:

Table 4 Table Detail Operational Research Variables

No	Variable	Definition	Code	Indicator	Scaling Technique
1	Emotional Competence	A capability to have a positive self-concept, emotional regulation, being autonomous as well as having a sense of humor (Fishbein & Ajzen, 1975; Ajzen, 1988, Connor & Abraham, 2001; as cited in Punnoose, 2012).	EC1	Positive Self-Concept	Measurement scale of 1-5
			EC2	Emotional Regulation	Measurement scale of 1-5
			EC3	Being Autonomous	Measurement scale of 1-5
			EC4	Sense of Humor	Measurement scale of 1-5

2	Social Competence	A capability of having an overall good communication, stable relationships, empathy, and a quality of showing kindness in their social relationship (Masten et al., 1995; Fuller, 2001; Benard, 1991; Doll and Lyon, 1998; as cited in Knight, 2007).	SC1	Good Communication	Measurement scale of 1-5
			SC2	Stable Relationship	Measurement scale of 1-5
			SC3	Empathy	Measurement scale of 1-5
			SC4	Kindness	Measurement scale of 1-5
3	Future-Oriented	A capability to have a clear sense of purpose that life has a meaning, which gives optimism, flexibility and adaptive in proactively approaching situations that require problem solving with critical thinking (Wener & Smith, 1989, 1992; Brissette et al., 2002; Seligman, 2002; as cited in Knight, 2007)	FO1	Sense of Purpose	Measurement scale of 1-5
			FO2	Spiritual	Measurement scale of 1-5
			FO3	Optimism	Measurement scale of 1-5
			FO4	Flexible and Adaptive	Measurement scale of 1-5
			FO5	Proactive	Measurement scale of 1-5
			FO6	Problem Solving	Measurement scale of 1-5
			FO7	Critical Thinking	Measurement scale of 1-5
4	Teachers' Resilience	A teaching capability to understand emotion that were developed through dealing with negative life experiences during childhood and when encountering stress in daily life positively. This capability uses both their personal capability and resources around them (Edwards, 2010; Rutter, 1985, 1987; O'Hanlon, 200; Montgomery & Rupp, 2005; as cited in Eldridge, 2013)	TR1	Emotion Understanding	Measurement scale of 1-5
			TR2	Deal with Negative Childhood Experience	Measurement scale of 1-5
			TR3	Deal with Stress in Daily Life	Measurement scale of 1-5
			TR4	Relationship between Personal Capability and Resources Around	Measurement scale of 1-5
5	Teaching Effectiveness	A teaching capability to perform socioemotional skills, such as self-awareness and self-management, social awareness and situational management, as well as communication and relational skills to promote better student learning outcome (Boring et al., 2016; Schussler et al., 2016; as cited in	TE1	Perceived Better Student Learning Outcome	Measurement scale of 1-5
			TE2	Self-awareness and Self-Management	Measurement scale of 1-5
			TE3	Social Awareness and Situational Management	Measurement scale of 1-5
			TE4	Communication Skills	Measurement scale of 1-5

			TE5	Relational Skills	Measurement scale of 1-5
6	Computer Self-Efficacy	The ability to use the technology to perform certain behavior. It showed the response an individual shows to the technology (Gong et al., 2004; Agarwal et al., 2000; Igbaria & Iivari, 1995; Johnson & Marakas, 2000; as cited in Punnoose, 2012).	CS1	Operate Independently and Confidently	Measurement scale of 1-5
			CS2	Learn Quickly	Measurement scale of 1-5
			CS3	Persistency	Measurement scale of 1-5
			CS4	Self-Perception with Ability	Measurement scale of 1-5
7	Perceived Learning Loss	Level of belief on the decreased value of student learning outcome based on decreasing cognitive learning in problem-solving and higher order thinking processes abilities (Richmond et al., 1987; Bloom, 1956; as cited in Hooker & Denker, 2014)	PL1	Perceived Decreased Students' Learning Performance	Measurement scale of 1-5
			PL2	Perceived Decreased Students' Cognitive Learning	Measurement scale of 1-5
			PL3	Perceived Decreased Students' Problem-Solving Skills	Measurement scale of 1-5
			PL4	Perceived Decreased Students' Higher Order Thinking Abilities	Measurement scale of 1-5

(Source: Author, 2022)

3.5 Data Collection Technique

The data obtained through the research is empirical data that has valid characteristics showing an accuracy degree. It is necessary to test the questionnaire to obtain direct and valid data by testing its validity through reliability testing. Valid data should be reliable and objective. Here, reliability means the data has a degree of consistency over a certain period. Meanwhile, objectivity means the data has a common agreement among the respondents or an interpersonal agreement (Sugiyono, 2015).

The process of data analysis is done through two approaches, namely quantitative and qualitative techniques, based on how the data is collected from

(primary and secondary sources). In this study, the research is done through quantitative and qualitative data collected through primary and secondary data. Qualitative research is chosen as it enables the researcher to understand the issue at an in-depth level from the respondent's views on the relevant issue. The European-style qualitative research is introduced as the contradictory approach of quantitative research, where it was developmental, exploratory, and creative than evaluative. The qualitative research helped the researcher to gain findings of (1) Preferences and or experience of the researcher, (2) Preferences and or experience of the research user, (3) Sensitive Information, (4) Subconscious feelings, (5) Complex phenomena, (6) The holistic dimension, (7) Developing new theory, and (8) Interpretation (Birks et al., 2017). Whilst the quantitative provides validation towards the data that has been compiled from the qualitative research (Birks et al., 2017). The primary data is collected by the researcher for a specific objective related to the problem and can be in a form of qualitative and quantitative (Birks et al., 2017). The data collection method is followed by a questionnaire. The data collection method is described as follows:

3.5.1 Primary Data

The primary data is gained by hands-on experience for specific purposes to address the problem (Birks et al., 2017). In this research, the primary data is collected through a questionnaire. The primary data collected are from the distributed questionnaires that have been filled and returned from a sample of respondents. The respondents are teachers at XYZ school with hybrid learning in their teaching and learning process. The distributed questionnaires consist of 3 sections:

(a) Screening Questions: statements that requires the respondent to answer whether they are the teacher at XYZ school, the teaching level, number of classes they teach in a week, employment status, duration of experiencing the hybrid learning setting, school location, and level of Google Educator Certification.

(b) Statement Questionnaire with 32 questions.

(c) Demography Questions: statements that requires the respondent to answer their age, highest education level, residency, and sex.

3.5.2 Secondary Data

The secondary data is gained through theories and intelligence as the researchers develop their understanding on the issue (Birks et al., 2017). In this research, the secondary data is collected through literature review, expert surveys, and interviews. The secondary data collected through the literature review were taken from books, news, and journal which has been previously explained.

3.6 Data Analysis Technique

There are three methods in data analysis, which are descriptive analysis, measurement model analysis, and structural mode analysis. The previous path models constructed based on theory consisted of latent variables that needs to be analyzed through structural model (inner model) and measurement model (outer model). The structural model displayed the relationship between the latent variables whereas the measurement model displayed the relationship between the latent variable and its indicators (J. Hair et al., 2017).
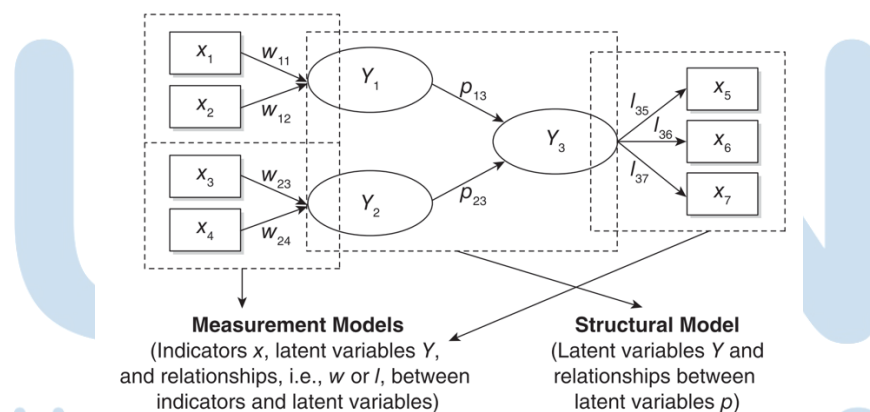

Figure 3.2 Path Model and Data for Hypothetical PLS-SEM Example
(Source: Hair et al., 2017)

3.6.1 Descriptive Analysis

Descriptive analysis is used to simplify the data. It focuses on the collection of processing, presentation, and interpretation of the quantitative data in the forms

of tables and graphs. It helps in identifying the phenomena and patterns in the data that may have been overlooked. It is the process of transforming the raw data into a form that is easier to understand (for example, in a form of a bar graph, pie chart, and so on). In many cases, quantitative description involves causal analysis, and it may yield stronger evidence in terms of the effect of an intervention; at the same time, descriptive analysis help explains the condition and the situation. A combination of descriptive analysis and causal analysis helps the researchers to understand the reason or the 'why' in research, especially on the intervention causal effect (Loeb et al., 2017).

3.6.2 Measurement Model Analysis

In this section, the validation test and reliability test will be explained along with the result from the pre-test.

1. Validation Test

The validity test is an assessment test considering based on the various types of evidence available (Sugiyono, 2015). The data taken is from the pre-test, that will be processed to check the validity and reliability. Sugiyono (2015) mentioned 3 types of validation test instruments, which are as follows:

a) Construct Validity

To test a construct validity, the study used the experts' judgements. After the instruments have been constructed based on the theories, it will be consulted experts of the field. Then, the research proceeded to test the instrument (Sugiyono, 2015).

b) Content Validity

To test a content validity, the research compared the contents of the instrument using an instrument development matrix. The variables' indicators act as benchmarks and the statements are described from these indicators. The measurement item is through item analysis and difference

test. Item analysis is carried out by calculating the correlation between the instrument item score and the total score (Sugiyono, 2015).

In this study, the research used Statistical Package for the Social Science (SPSS) version 23. The SPSS application helped generate the validity of each variable used. Then, the application will help analyze descriptive and statistical in this research. The data from the pre-test questionnaires distributed to 45 respondents. However, the total questionnaire returned are 40 respondents. The result of the validation pre-test is as follows:

Table 5 Validation Pre-Test Result with 40 Sample

No	Variable	Indicator	Pearson Correlation	Sig.	Criteria
1	Emotional Competence	EC1	0.690	0.000	Valid
		EC2	0.637	0.000	Valid
		EC3	0.695	0.000	Valid
		EC4	0.698	0.000	Valid
2	Social Competence	SC1	0.716	0.000	Valid
		SC2	0.935	0.000	Valid
		SC3	0.875	0.000	Valid
		SC4	0.925	0.000	Valid
3	Future Oriented	FO1	0.711	0.000	Valid
		FO2	0.528	0.000	Valid
		FO3	0.598	0.000	Valid
		FO4	0.712	0.000	Valid
		FO5	0.765	0.000	Valid
		FO6	0.266	0.097	Invalid
		FO7	0.607	0.000	Valid
4	Teacher Resilience	TR1	0.767	0.000	Valid
		TR2	0.778	0.000	Valid
		TR3	0.696	0.000	Valid
		TR4	0.589	0.000	Valid
5	Teaching Effectiveness	TE1	0.769	0.000	Valid
		TE2	0.851	0.000	Valid
		TE3	0.910	0.000	Valid
		TE4	0.905	0.000	Valid
		TE5	0.814	0.000	Valid
6	Computer Self-Efficacy	CS1	0.887	0.000	Valid
		CS2	0.893	0.000	Valid
		CS3	0.801	0.000	Valid
		CS4	0.896	0.000	Valid
7	Perceived Learning Loss	PL1	0.864	0.000	Valid
		PL2	0.920	0.000	Valid
		PL3	0.932	0.000	Valid
		PL4	0.846	0.000	Valid

(Source: Author, 2022)

The validation pre-test was carried out with 40 responses in total. The result was then analyzed with numerical value measurement of Pearson Correlation and Sig. value. The explanation of the table is as follows:

(1) Pearson Correlation is a test static that measures bivariate or a zero-order correlation where it represented the correlation between two variables (J. F. Hair et al., 2019). It summarizes the strength of association between two metrics to understand the product moment correlation (r) which varies between -1.0 and + 1.0. The product moment correlation (r) measured the proportion of variation of one variable explained by the other -which explains the strength of the linear relationship. The higher the value of r means the relationship is strong (Birks et al., 2017). The degree of correlation can be determined into 5 different categories. If the value is 0.9 to 1, means there is a perfect correlation. If the value is between 0.7 to 0.89, means it has a high degree of correlation. If the value is between 0.5 to 0.69, means it is a moderate degree correlation. If the value is between 0.26 to 0.49, means there is a low correlation. If the value is below 0.29, means there is a very low correlation. If the value is zero, means there is no correlation (Ahrens et al., 2020). In this research, if the value is more than 0.5, the indicator will be considered as valid.

(2) The Bartlett's Test of Sphericity is a test statistic for the overall significance of the correlation within a correlation matrix (J. F. Hair et al., 2019) that to determine whether the hypothesis is uncorrelated in the population sampling, each variable correlates in between r = 1, but if r < 0 then there is no correlation between the indicators (Birks et al., 2017). The value is shown through the Sig. value with less than 0.05 shows the significant relationship between the indicators.

A conclusion based on the parameters then can be drawn. First, the variable Future-Oriented has an indicator FO6 or Problem-Solving with Pearson Correlation lower than 0.5 and Sig. value more than 0.05, which makes the indicator considered not valid. The indicator Problem Solving (Indicator FO6) will then be taken out of

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the questionnaire and will not be analyzed in the main test survey later. Second, the highest Pearson Correlation value is SC2 from Social Competence with 0.935, whilst the lowest is TR4 from Teacher Resilience with 0.528. Third, except FO6 or Problem Solving, all of the indicators on each variable have Sig. value 0.000. Based on the analysis, it can be concluded that the questionnaire will be carried out without indicator FO6 or Problem Solving and the variable Future-Oriented will be carried out with the remaining 6 indicators (Sense of Purpose, Spiritual, Optimism, Flexible and Adaptive, Proactive, and Critical Thinking).

c) External Validity

To test an external validity, the study analyzed the similarities between the existing criteria on the instrument and the facts found. If there are similarities found between the criteria in the instrument and the facts from observation or exploratory studies, then the instrument has high external validity. With high external validity, it is expected that the research results will have a high value of validity as well. Thus, the results can be generalized or applied to other samples in the population studied (Sugiyono, 2015).

2. Reliability Test

The reliability test measured the validity and consistency of the characteristics from the existing data. In this research, the limit of the reliability value is oriented to Cronbach's Alpha value of 0.6. If all factors are above 0.6 then the measured items have demonstrated an acceptable consistency. Thus, the survey is considered a reliable measurement instrument to be carried out to the next main test (Moola & Bisschoff, 2012; Nunnaly, 1967; as cited in Amer et al., 2013).

In this study, the research used Statistical Package for the Social Science (SPSS) version 23. The SPSS application helped generate the reliability of each variable used. The pre-test questionnaires were distributed to 45 respondents. However, the total questionnaire returned

were 40 respondents. The indicator Problem Solving (Indicator FO6) from Future Oriented was taken out because the result was not valid. With 7 variables and a total of 31 indicators, the result of the reliability pre-test is shown below:

Table 6 Reliability Pre-Test Result with 40 Sample

No	Variable	Cronbach's Alpha	Criteria
1	Emotional Competence	0.608	Reliable
2	Social Competence	0.887	Reliable
3	Future Oriented	0.847	Reliable
4	Teaching Resilience	0.668	Reliable
5	Teaching Effectiveness	0.899	Reliable
6	Computer Self-efficacy	0.885	Reliable
7	Perceived Learning Loss	0.912	Reliable

(Source: Author, 2022)

The validation pre-test was carried out with 40 responses in total. The result was then analyzed with Cronbach's Alpha. The explanation of the table are as follows:

(1) The Cronbach's Alpha of the coefficient alpha determines the average possibility of split-half coefficients result from splitting the scale items (Birks et al., 2017). For exploratory research, the composite reliability value of 0.6 to 0.7 is acceptable. In confirmatory research, the composite reliability value of 0.7 to 0.9 is considered satisfactory (J. Hair et al., 2017).

A conclusion based on the parameters then can be drawn. First, all the variables have Cronbach's Alpha of more than 0.6, which is acceptable for exploratory research recommended by J. Hair et al. (2017). Second, the highest Cronbach's Alpha value is Perceived Learning Loss with 0.912, whilst the lowest is Emotional Competence with 0.608. Based on the analysis, it can be concluded that all variables are reliable and suitable for further analysis.

3.6.3 Structural Model Analysis

The structural test measured the hypothesized relationships in the structural model to determine whether the structural model is considered valid and reliable. In this research, the measurement used Structural Equation Model (SEM) program

to measure the relationships between variables, which has been used in many disciplines (J. Hair et al., 2017). The analytical method is applied to all data, and it does not require a large assumption and sample data. The statistical tool is used to solve multilevel models simultaneously which can't be solved by a linear regression equation (Sarwono, 2010).

In this research, PLS-SEM is chosen because the goal of the research is to identify the factors, where the structural model is complex with many variables and indicators and small sample size. With PLS-SEM, the research was able to measure the weighted composites of the indicators from each variable to indicate measurement error from its sum scores. Each weight w was set to 1 so the corresponding value was the sum of the respondents' scores. Understanding the weight of each response helped the study learned how each value gave important insights into each variable. PLS-SEM estimated coefficients that maximized the R^2 values of the endogenous variables, which became the prediction objective of PLS-SEM (J. Hair et al., 2017).

In this study, the research used SMARTPLS version 3 to measure outer model and inner model. The data taken from the main test processed to check the validity and reliability, further explained on the next chapter. The PLS-SEM algorithm used the obtained data for the indicators and determined its construct scores, path coefficients, indicator loadings and weighs, and analysis of R^2 values. For the outer model analysis, the study determined the validity and the reliability of the construct measures, as follows:

1. **Validation Test**

   The validity test considered convergent validity and discriminant validity. The convergent validity is evaluated through Average Variance Extracted (AVE). The discriminant validity is evaluated through Cross-loadings. If the variable has AVE more than 0.5 and Cross-loadings more than 0.6, then the variable can be considered as valid (J. Hair et al., 2017).

2.   Reliability Test

The reliability test is measured using Cronbach's Alpha and Composite Reliability with the consideration of explorative research. Due to the limitations of Cronbach's Alpha, it is suggested to apply a different measurement in addition, which is composite reliability. If the variable has Cronbach's Alpha value is more than 0.6 and or the composite reliability is more than 0.7, the variable can be considered as reliable (J. Hair et al., 2017).

The goal of PLS-SEM is to maximize the R^2 (explained variance) of the endogenous variables and its prediction. The R^2 values are usually between 0 and +1 which represent the amount of explained variance in the variable. The next step after testing the reliability and validity is to evaluate the important metrics of structural model (J. Hair et al., 2017). The important metrics are:

a)   Significancy (two tailed) Test

The empirical t-value and p-value are constructed from bootstrap standard error. If the t-value is larger than the critical value, then the coefficient is significant to a certain error probability. In testing critical values, the significancy two-tailed test is used. If the critical value is 1.65 (significant level of 10%); 1.96 (significant level of 5%); and 2.57 (significant level of 1%). If the research involves an experiment, then the assumed significant level is 1%. However, in general, the exploratory study often assumes a significance level of 10%. Thus, the confidence interval on the path model provided information on the stability of the estimated coefficient, especially in estimating a range of plausible population values on a parament dependent on the variation of the sample size (J. Hair et al., 2017).

b) R^2 (Explained variance)

The empirical t-value and p-value are constructed from bootstrap standard error. If the t-value is larger than the critical value, than the

coefficient is significant to a certain error probability. There are three level of R^2 which are 0.75 (for substantial value), 0.50 (for moderate value), and 0.25 (for weak value) (Hair et al., 2011; Henseler et al., 2009; as cited in Hair et al., 2017).

c) ***f^2* (Effect size)**

In addition to R^2, the measurement of f^2 is to measure the importance impact to the endogenous variable if a certain exogenous variable is taken from the model. The empirical *t*-value and *p*-value are constructed from bootstrap standard error. In assessing f^2, Cohen (1988; as cited in Hair et al. (2017) mentioned the three levels of effect which are 0.02 (for small effect), 0.15 (for medium effect), and 0.35 (for large effect) (Hair et al., 2017).