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## **Analysis of Validity and Reliability Test of *Self-Efficacy* Instrument in Learning Wave Material Physics at SMA Kota Padang**

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### **Abstract**

Self-efficacy is the result of a person's cognitive processes that produce decisions. A person's beliefs or expectations regarding their ability to complete a task or action necessary to achieve a desired outcome. This research aims to create an instrument that can measure student self-efficacy by measuring the level of validity and reliability, and this instrument was tested by expert lecturers and tried out in schools. The student self-efficacy instrument for learning wave material physics was processed using the SPSS application. This research uses quantitative methods. This research was conducted at SMA 7 Padang City, with a total sample of 122 students. The results were that all aspects of the study obtained an overall percentage score of 91% on the instruments tested by expert lecturers. The self-efficacy instrument used contains five indicators with 30 statement items. With responses based on a Likert scale score of 1 to 4. Furthermore, the results of this research found that from the 30 statement items, 17 statements were valid. Meanwhile, the reliability calculation obtained was ( $\alpha = 0.758$ ).

**Keywords:** Reliability, Self-efficacy, Validity

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### **INTRODUCTION**

*Self-efficacy* is one of the internal components that are very important to student's learning success (Ningsih & Hayati, 2020). This impacts habituating logical and systematic thinking, training imagination, and idea formation, all of which contribute to the human ability to solve life problems (Sudrajat et al., 2021). According to Hendriana (2012), high self-confidence will increase the desire to achieve success because greater confidence in one's abilities leads to a greater desire to complete tasks. In addition, Abiconro and Purnamasari (2011) state that individuals with high self-confidence will have confidence in their ability to organize and complete the tasks necessary to achieve specific results in various contexts. Therefore, *self-efficacy* must be developed in students so that they can understand the learning process in everyday life and be able to solve problems.

*Self-efficacy* can be defined as motivation for students to do something to achieve a goal (Putry et al., 2020). In academics, *self-efficacy* relates to students' confidence in their ability to perform tasks, organize learning activities, and live by their own and others' academic expectations. In conclusion, the higher a student's self-confidence, the more effort they put into achieving their goals. A person with high self-efficacy has confidence that they can interact and change the situation around them. However, a person with low *self-efficacy* believes that they cannot do whatever is around them. People with low *self-efficacy* tend to give up and do not have the spirit to get up in difficult situations. In contrast,

*people with high self-efficacy will try harder to overcome existing difficulties to bounce back and succeed.*

Learners with levels of *self-efficacy* The good ones will be able to complete the task well so that happiness can motivate them to participate in every academic activity. Otherwise, learners with a level of self-efficacy Low will related feelings such as depression, anxiety, lack of maximum in completing tasks, and low self-esteem (Hidayat et al., 2021; Loviasari & Mampouw, 2022; Nurjanah et al., 2021). Someone with *self-efficacy* The low ones tend to avoid or give up when faced with difficulties (Permana et al., 2016). In contrast, individuals with *self-efficacy* The high will take specific actions to solve problems when encountering difficulties (Tseng et al., 2022).

In reality, students' *self-efficacy* is still low. The results of preliminary observations show that most students do not have the confidence and awareness to learn independently during the learning process. This is characterized by the number of students who imitate the work of their friends when doing problems. Some students are not eager to learn because they just copy the work of their friends instead of doing the problems given by the teacher. Students remain dependent on other students who are considered to have better academic abilities. This shows students do not believe in planning, realizing expectations, and achieving goals.

During the learning process, some children are not enthusiastic, lack participation, and lack understanding of the material. This is shown by the attitude of students who tend to be embarrassed to express their opinions when held questions and answers and choose not to ask questions even though they do not understand the material provided. If asked voluntarily to re-explain what they received after listening to the teacher's explanation, some students were still embarrassed and unwilling to come forward. In answering questions, most students focus on the final answer rather than the process of solving it. In addition, if the problem differs from the example, the student becomes unsure of how to solve it.

Learning physics is still considered a complex subject for many students. Students prefer to remain silent and not ask questions when they see something they do not understand. This situation still has no impact on students' *self-efficacy*. As a result, researchers wanted to determine how effective *students' self-efficacy* was in physics learning in high school. To achieve this goal, an instrument was made, such as a questionnaire, that refers to the indicators of *students' self-efficacy* in learning physics to obtain accurate information. To achieve this goal, legitimate and reliable empirically tested instruments are needed.

Based on the description that has been submitted, it is necessary to analyze the instrument's self-efficacy quantitatively so that the quality of the instrument can be known through validity and reliability test activities. Therefore, the title of this study is "Analysis of Validity and Reliability Test of Self-Efficacy Instruments in Learning Wave Material Physics at SMA Kota Padang."

## **METHODS**

This research was conducted using a quantitative analysis design, where an instrument was designed to measure students' self-efficacy levels in schools. A statistical validity and reliability test was carried out. Data collection was carried out in August 2023 prospectively to 122 class XII students of SMA Negeri 7 Kota Padang. The student self-efficacy instrument *is a* questionnaire consisting of 30 statements (26 positive and four negative) that refer to *self-efficacy* indicators. This questionnaire is closed with four choices of agreeable responses based on the Likert scale, eliminating the choice of doubt. The

scores for positive statements are scores 1 to 4 in the order of choice: STS (strongly disagree), TS (disagree), S (Agree), and SS (Strongly agree). In contrast, for negative statements, the opposite score applies. The designed instrument has been theoretically tested. After being tested theoretically, the following questionnaire was carried out in empirical trials, and the validity and reliability of the questionnaire results were then analyzed. This study only describes the results of empirical trial analysis.

The product-moment correlation formula calculates the validity of the question items in the self-efficacy questionnaire instrument's test results. It is interpreted as a validity correlation coefficient classification (Suherman, 2003), as seen in Table 1.

**Table 1. Classification of validity correlation coefficients**

<b>Coefficient Validitas</b>	<b>Interpretasi</b>
$0.00 \leq < 0.20 r_{xy}$	Very Low
$0.20 \leq < 0.40 r_{xy}$	Low
$0.40 \leq < 0.70 r_{xy}$	Keep
$0.70 \leq < 0.90 r_{xy}$	Tall
$0.90 \leq < 1.00 r_{xy}$	Very High

Further, the obtained coefficient of validity (count) in the correlation formula product moment was compared to  $R_{table}$ . If  $r_{count} \geq R_{table}$ , Then the question item is said to be valid. Conversely, if  $r_{count} < R_{table}$ , then the question item is said to be invalid (Indrawandan Yaniawati, 2014). At the same time, the calculation of test reliability uses the Alpha formula. It is interpreted based on the classification of reliability correlation coefficients (Suherman, 2003), as seen in Table 2.

**Table 2. Classification of reliability correlation coefficients**

<b>Reliability coefficient</b>	<b>Interpretation</b>
$r_{11} < 0.20$	Very Low
$0.20 \leq r_{11} < 0.40$	Low
$0.40 \leq r_{11} < 0.70$	Keep
$0.70 \leq r_{11} < 0.90$	Tall
$0.90 \leq r_{11} < 1.00$	Very High

Next, the obtained reliability coefficient (calculated) needs to be compared with the stable. If  $r_{counts} \geq r_{table}$  in the table, then the question item is said to be reliable. Conversely, if  $r_{counts} < r_{table}$ , the question items are said to be unreliable (Indrawandan Yaniawati, 2014).

## RESULTS & DISCUSSION

The initial process of research begins with compiling a list of instrument questions. In this study, the questionnaire used contained questions about *students' self-efficacy* in physics learning, as shown in the following table 3:

Table 3. Research Instrument *self-efficacy* in physics learning

Indicator	Problem Number		Number of question items
	Positive Statements	Negative Statements	
Confident in completing a specific task	1, 2, 3, 4, 5,	27	6
Confidence can motivate you to take the necessary actions to complete the task.	6, 7, 8, 9, 10, 11, 12	28	8
Confident that one can try hard, persistently, and diligently	13, 14, 15, 16, 17	29, 30	7
Confident that one can withstand obstacles and difficulties	18, 19, 20, 21, 22	-	5
Confident that you can complete tasks that have a wide or narrow range (specific)	23, 24, 25, 26	-	4
<b>Sum</b>	<b>26</b>	<b>4</b>	<b>30</b>

Sumber : Brown dkk. (Manara, 2008: 36)

The method used in this study comes from expert findings on product validation. Next, score interpretation criteria are used to transform the data to determine the validity of the created product. Products are considered viable if they get a minimum score between 41 and 60 percent and are included in the "Good Enough" category (Riduwan, 2015: 15). Experts assess products and provide criticism and suggestions on validation sheets. Table 4 shows a recap of data from expert validation results.

Table 4. Recapitulation of Expert Validation Results

No	Validator					Sum	Average	Percent	Average Percentage	Category
	1	2	3	4	5					
1	4	3	4	4	4	19	3,8	95%	91%	Very good
2	4	3	4	3	4	18	3,6	90%		
3	3	3	4	3	4	17	3,4	85%		
4	3	4	4	3	4	18	3,6	90%		
5	4	4	4	3	4	19	3,8	95%		
6	4	4	4	3	4	19	3,8	95%		
7	3	3	4	3	4	17	3,4	85%		

According to Table 4, each aspect of the research obtained a score of 91% with the category "Very good," which indicates that the product developed has met the minimal category and can be tested. The minimal category occurs when the minimum score is between 41 and 60%.

Experts have given the instrument theoretical validity. Furthermore, the self-efficacy questionnaire tool was tested empirically on 122 students from class XII of SMAN 7 Padang. The validity and credibility of the questionnaire were analyzed using *the product-moment* correlation method between the score of each questionnaire item and the total score, or the total number of scores. Next, reliability tests were conducted using *Cronbach's alpha method*. Table 5 shows the results of validity and reliability tests analyzed against self-efficacy questionnaires.

Table 5. Correlation Value (Each Knowledge Question Item)

No. Item	Validity Test		Information	Category
	r calculate	r table		
1	0.030	0.176	Gugur	Very low
2	0.053	0.176	Gugur	Very low
3	0.380	0.176	Valid	Low
4	0.066	0.176	Gugur	Very low
5	0.243	0.176	Valid	Low
6	0.250	0.176	Valid	Low
7	0.173	0.176	Gugur	Very low
8	0.635	0.176	Valid	Keep
9	0.143	0.176	Gugur	Very low
10	0.036	0.176	Gugur	Very low
11	0.271	0.176	Valid	Low
12	0.400	0.176	Valid	Keep
13	0.064	0.176	Gugur	Very low
14	0.680	0.176	Valid	Keep
15	0.413	0.176	Valid	Keep
16	0.662	0.176	Valid	Keep
17	-0.053	0.176	Gugur	Very low
18	0.092	0.176	Gugur	Very low
19	0.306	0.176	Valid	Low
20	0.105	0.176	Gugur	Very low

21	0.305	0.176	Valid	Low
22	0.382	0.176	Valid	Low
23	0.271	0.176	Valid	Low
24	0.072	0.176	Gugur	Very low
25	0.250	0.176	Valid	Low
26	0.125	0.176	Gugur	Very low
27	0.236	0.176	Valid	Low
28	0.427	0.176	Valid	Keep
29	0.168	0.176	Gugur	Very low
30	0.666	0.176	Valid	Keep

Based on the results of the validation test in Table 5, research tests were carried out on the instrument items; then the validity test results were obtained on 30 points of statements tested, 13 items of invalid statements were obtained, and as many as 17 points of statements from the valid self-efficacy instrument. Valid statements will be used to capture research data. Valid statements have a range of values indicating calculated values > 0.2-0.6 than in table 0.176. The statements on the *self-efficacy* questionnaire are in very low, low, and medium categories.

Table 6 Reliability Statistics

Cronbach's Alpha	N of Items
0.758	17

Table 6 shows that the *self-efficacy* instrument is a reliable assessment tool. Out of 30 statements, 17 are valid and reliable, giving a reliability score of 0.758 in the high category. Of the remaining 20 statements, they meet every grid indicator. The self-efficacy instrument was found to be reliable because the calculated value of the  $r_{table}$  was 0.758 > 0.6. This shows that the developed self-efficacy instrument questions regarding physics learning are suitable for assessing students' self-efficacy abilities on physics learning materials.

The student self-efficacy instrument is valid and reliable, so it can be used to measure student self-efficacy. If they are valid and reliable, these instruments are considered excellent and worthy of use (Airlanda & Nugroho, 2020; Imania & Bariah, 2019; Nugroho & Mawardi, 2021). Each tool is designed based on learning indicators and students' self-ability. An assessment instrument must be valid, practical, continuous, meaningful, and focus on student competence (Hikmah, 2021; Nurbayati et al., 2018).

The instrument must be able to measure students' abilities so that teachers can find out the abilities of each student. Assessment is a tool to measure students' learning abilities and development (Airlanda & Nugroho, 2020). Assessment instruments will allow teachers to evaluate the learning methods and determine whether the learning objectives have been achieved well. The instrument's accuracy influences the evaluation results (Imania & Bariah, 2019). This is very important so that the measured and measured results are precise, and there are no mistakes when making decisions or conclusions (Nugroho & Mawardi, 2021). The source used to make the instrument must also be adjusted to the type of instrument to be used, as well as to the goals and characteristics of students (Nurbayati et al., 2018).

## CONCLUSION

Based on the results of the tests, the self-efficacy instrument developed is valid and reliable. It is suitable for measuring *students' self-efficacy* in learning wave-matter physics.

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