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Development of Footwork Skill Test Instrument for Junior Badminton Players

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Abstract This study aims to develop a valid and reliable footwork skill test instrument to measure the skills of junior badminton players. The research method used is the research and development method. The steps in this study refer to the development research model (Borg & Gall, 1983) which includes Research and Information Collecting, Planning, Develop Preliminary Form of Product, Preliminary Field Testing, Main Product Revision, Main Field Testing, Operational Product Revision, Operational Field Testing, Final Product Revision, Dissemination and Implementation. The results of the research product are in the form of a valid and reliable footwork test instrument as a measure of the footwork skills of junior badminton players. Based on the opinions of expert practitioners, academics, and badminton coaches who assess the validity of the instrument, a "very good" score is produced. While the reliability of the instrument used statistical data tests involving a sample of badminton players, resulting in a high score. So it can be concluded that the footwork test instrument product developed for junior badminton players shows the category "good and suitable for use as a footwork test instrument".

Keywords Footwork Test Instrument, Young Badminton Player

1. Introduction

Research and development is an educational development model for designing new products or procedures [1]. Development is an effort and modification made to meet unmet needs. More than most other research approaches, development research aims to make practical and scientific contributions [1][2]. There are ten steps in the research and development stages proposed by Borg and Gall, namely: (1) Potential and problems, (2) Data collection, (3) Product design, (4) Design validation, (5) Design revision, (6) Product trial, (7) Product revision, (8) Usage trial, (9) Product revision and (10) Mass production.

Currently, agility is considered an open skill and has recently been defined as a change in speed or direction in response to a stimulus that cannot be planned [3]. Agility is a rapid whole-body movement with a change in direction

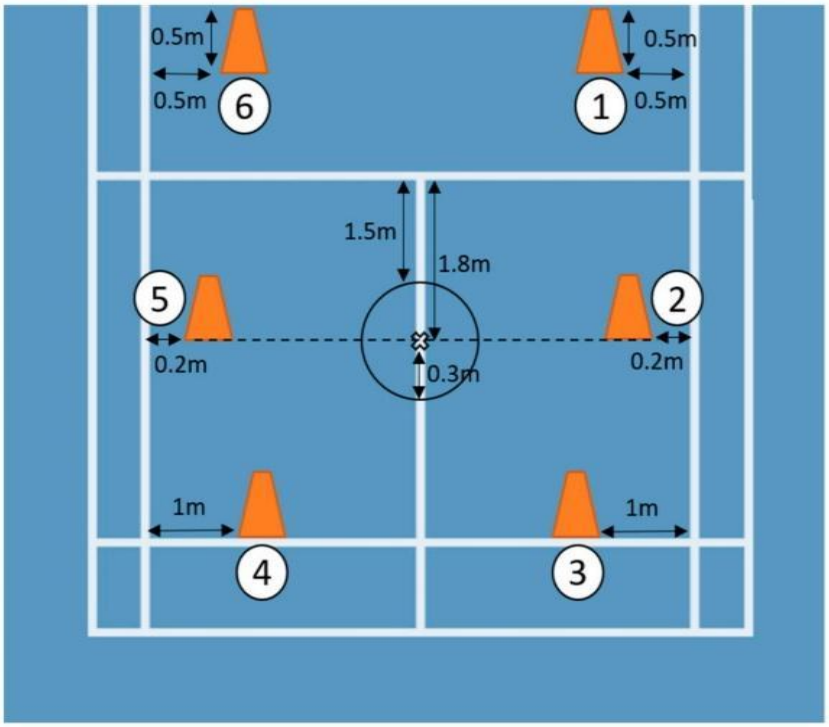
or speed in response to a stimulus [4]. However, in recent years it has been said that agility is not just the ability to change direction with speed but also some perceptual skills [5]. In the badminton game, there are several technical exercises that players must master, such as the technique of holding the racket, the technique of hitting the shuttlecock, and the footwork technique [6].

To get good footwork in badminton, a player needs to move agile from the middle to the sides of the field while maintaining balance [7]. It is also one of the determining indicators of a player's success on the field. That is why footwork technique in badminton is very important. Even in the training process, players need shadow training to train their footwork. The quality strokes of a badminton player result from good technique and footwork speed [8]. So it is important for badminton players to master foot agility well. At the same time, footwork speed will only be obtained if a player applies the technique correctly [9]. That's why at the time of footwork practice, there needs to be continuity between technique and speed in mastering the technique.

Badminton is one of the most popular sports in Indonesia. This can be seen from the number of regions and national championships held continuously [10]. In recent years, the trend in badminton has been more dominated by junior-age players [11], and the junior age for badminton players is 14 [12]. Even in some badminton clubs, many child athletes have grown and developed or are beginners who learn and practice with various goals; some are for achievement, health, or just for fun [12][13]. However, the skill test tools for junior and senior players are still the same in terms of procedures and norms in the test, so they are no longer valid.

Several similar studies have been conducted [14] which found the effect of badminton on anterior knee stability in badminton players aged 10-12. The results indicated that regular practice of badminton did not influence sagittal knee stability in youth players. Sadri [15] also conducted a study to explore the effect of contextual interference on the learning outcomes of badminton skills among children aged 10 to 12. Mukhametov [16] conducted a study that discussed the stages and methods of teaching children to play badminton. Basic badminton training in 10-11 Years Old Children (Through Exercise Training Approach). In addition to the research above, [17] have also conducted research that aims to determine and analyze the effect of developing an exercise model on basic badminton training in children aged 10-11 (through a drill practice approach) and making a product in the form of a model. [18], [19], and [20] also succeeded in developing test and assessment instruments for badminton athletes.

However, from the several studies above, there is a need to research the development of footwork test instruments that prioritize movement and speed techniques, as well as test norms that can be used for measuring and assessing junior badminton players in the field. With the assistance of several colleagues, Ya Lan Chiu, one of the researchers who conducted research on agility, was able to develop a badminton footwork measurement instrument.



Source: [21]

Figure 1. Ya Lan Chiu Footwork measurement

However, based on field analysis, there is still a discrepancy between the correct technique and the attitude of the testee during the test. For example, when the testee extends the racket using the right hand, but ends the move with the left foot, it becomes an inappropriate technique in badminton. So that researchers feel the need to develop a footwork test instrument that includes an assessment of motion techniques and agility of the players' movements. This test will also be equipped with norms that apply to junior badminton players. The results of this study are expected to create a test instrument development product that can be used for measuring footwork speed and technical assessment of junior badminton players.

2. Method

The method used in this research is the research and development method. The steps in this research refer to the development research model [1], which includes Research and Information Collecting, Planning, Develop Preliminary Form of Product, Preliminary Field Testing, Main Product Revision, Main Field Testing, Operational Product Revision, Operational Field Testing, Final Product Revision, Dissemination, and Implementation. For more details, see table 1.

Table 1. Research Steps

No	Stage Framework	Researcher Steps
1	Research And Information Collecting	Looking for findings and obstacles in the field about the weaknesses of the current test instrument
2	Planning	Discussion group forum with badminton experts consisting of academics, club coaches, and badminton players
3	Develop a Preliminary Form of the Product	The initial draft of footwork test instrument for junior badminton players
4	Preliminary Field Testing	Conducting initial field trials on a limited scale by involving as many as ten badminton players as subjects
5	Main Product Revision	Making improvements to the initial draft of the test instrument after the initial trial
6	Main field testing	Conducted the second trial involving 122 badminton players who are members of 10 badminton clubs
7	Operational product revision	Make repairs and refinement of the test instrument based on the results of a wider trial
8	Operational field testing	Validation test by expert judgment and statistical data processing using the help of the SPSS application
9	Final Product Revision	Final improvement of the test instrument product developed to produce the final product
10	Dissemination and Implementation	Disseminate footwork test instrument products and implement them in the field

Source: [22]

Based on table 1, the three badminton experts were involved in the Forum Group Discussion, including badminton academics, coaches and players. So that it can be seen more clearly in the expert visibility picture.

Figure 2. Expert Engagement

From the picture above, three experts in the field of badminton were involved in making the footwork instrument to provide an assessment and comment on the instrument being developed. In this study, the small-scale trial sample involved 10 badminton players aged under 14 years, while the large-scale trial involved 122 players. They are all players who are members of 10 badminton clubs domiciled in Central Java, Indonesia.

3. Result

Footwork Test Instrument Products Developed

The result of this research is a footwork test instrument product for junior badminton players. The purpose of this footwork test is to measure the footwork skill level of badminton players. For more details, see the test field image (Figure 3).

The side of the field is marked with a square shape that serves as a foothold for players. The size of the line for the front corner is 100 centimeters by 130 centimeters, and the size of the right and left side steps is 100 centimeters by 100 centimeters. The size of the back footing line is 100 centimeters by 115 centimeters, and the existing foothold is in the center of the field, measuring 115 cm by 115 cm.

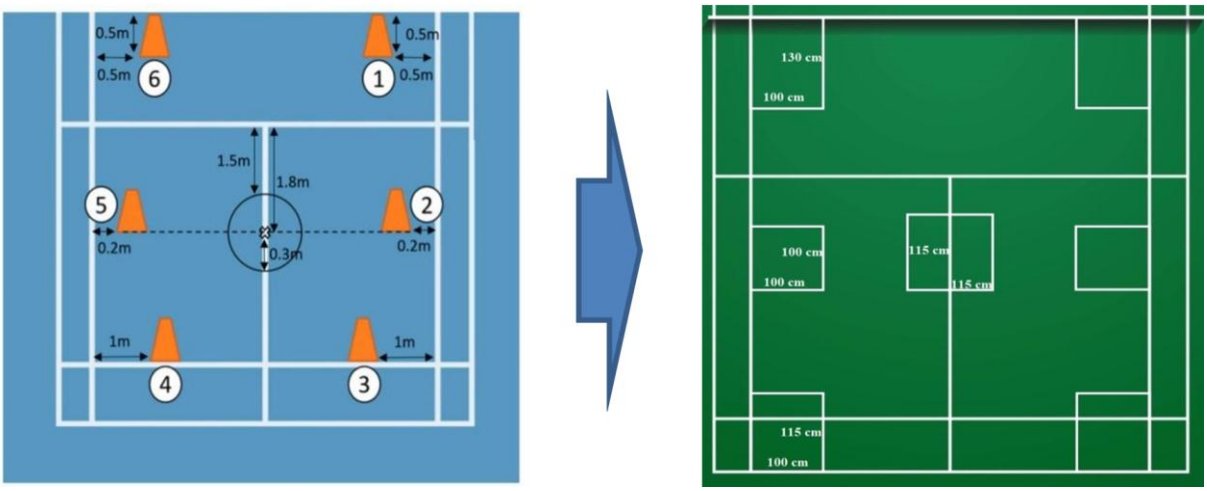


Figure 3. Footwork Test Field Modifications

Footwork Test Implementation Guidelines

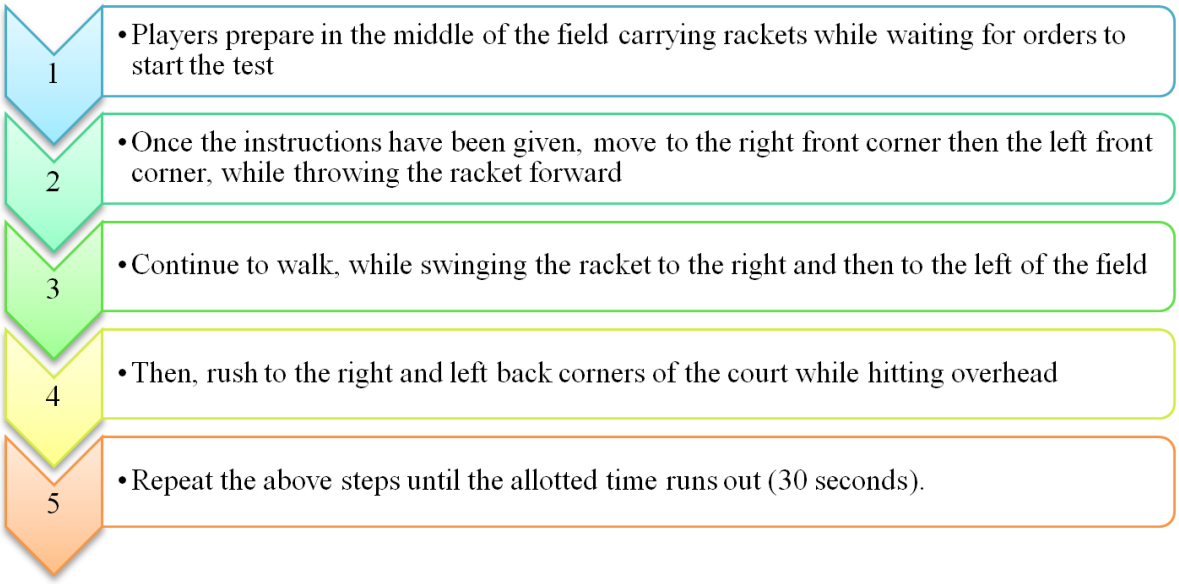


Figure 4. Test Implementation Steps

When the test was conducted, three assessors were on duty beside the field, including one person giving instructions to start and stop the test while holding a stopwatch. The second officer counts the number of times the player steps on the corner of the footing, both in the front, side and behind the field. At the same time, the third officer conducts a technical assessment using the assessment. To be clearer, please see the figure 5.

The figure 5 is the implementation of the instrument that has been developed with reference to the steps for carrying out the footwork test. The test was carried out for 30 seconds in the order that the testee stepped forward to the right, front left, middle right, middle left, then back right and back left. Scores are recorded when one of the testee's feet enters the line square, and does so using the correct technique. Technical assessment guidelines can be seen in the table 2.

Figure 5. Implementation of The Field

Table 2. Technical Assessment Instrument

Stage/Step		Evaluation	
		Thru	**false**
Preparation	Stand up and spread your feet shoulder-width apart	1	0
	Lift the heel of the foot a little	1	0
	Flex your knees	1	0
	Put your weight forward	1	0
Execution	Hold the racket in a handshake position	1	0
	Eyes fixed on the front	1	0
	Stepping with the dominant foot	1	0
	For the *backhand direction*, cross your legs to the left	1	0
	Reach with dominant arm and leg	1	0
Continuation	Always return to the center of the field after stepping to the corner of the field	1	0
	Repeat the three-step pattern in reverse on the *backhand side*	1	0
	Keep your balance and be ready to repeat	1	0
Score		12	

Source: [9]

Table 3. Footwork Test Norms

Age Category		Less	Fair	good	excellent
Under 15 Years	Male	< 21	21-22	23-25	26
	female	< 19	19-20	21-23	24
Under 12 Years	Male	< 18	18-19	20-22	23
	female	< 17	17-18	19-21	22

Table 2 is a technical assessment instrument for the testee. For each rating indicator, the player will get a value of 1 if he does it correctly and a value of 0 if he does not do it correctly according to the instructions given previously. The final score is obtained from both elements, where the first element is the assessment of agility and speed of players stepping into the corner of the field with a time of 30 seconds. At the same time, the second element is the attitude technique of implementation that the player does when doing the footwork test. The final score is the sum of the scores obtained in the first and second elements. Then the norm category can be seen in table 3.

Table 3 is the tested norm obtained from large-scale testing with a sample of 122 players with a maximum age of 15.

Footwork Test Instrument Product Validation

Based on the statistical data test that was processed using the SPSS application, and carried out on 20 test samples, the results of the instrument validity were 0.730 from an r-table score of 0.456 and a reliability of 0.910. So it can be said that the instruments developed proved to be "valid and reliable". Badminton experts also validated other test instrument products. In this case, the researcher involved three badminton experts, and these experts also acted as expert judgment. The three experts include badminton academics, badminton coaches, and badminton players. For more details, see the image below.

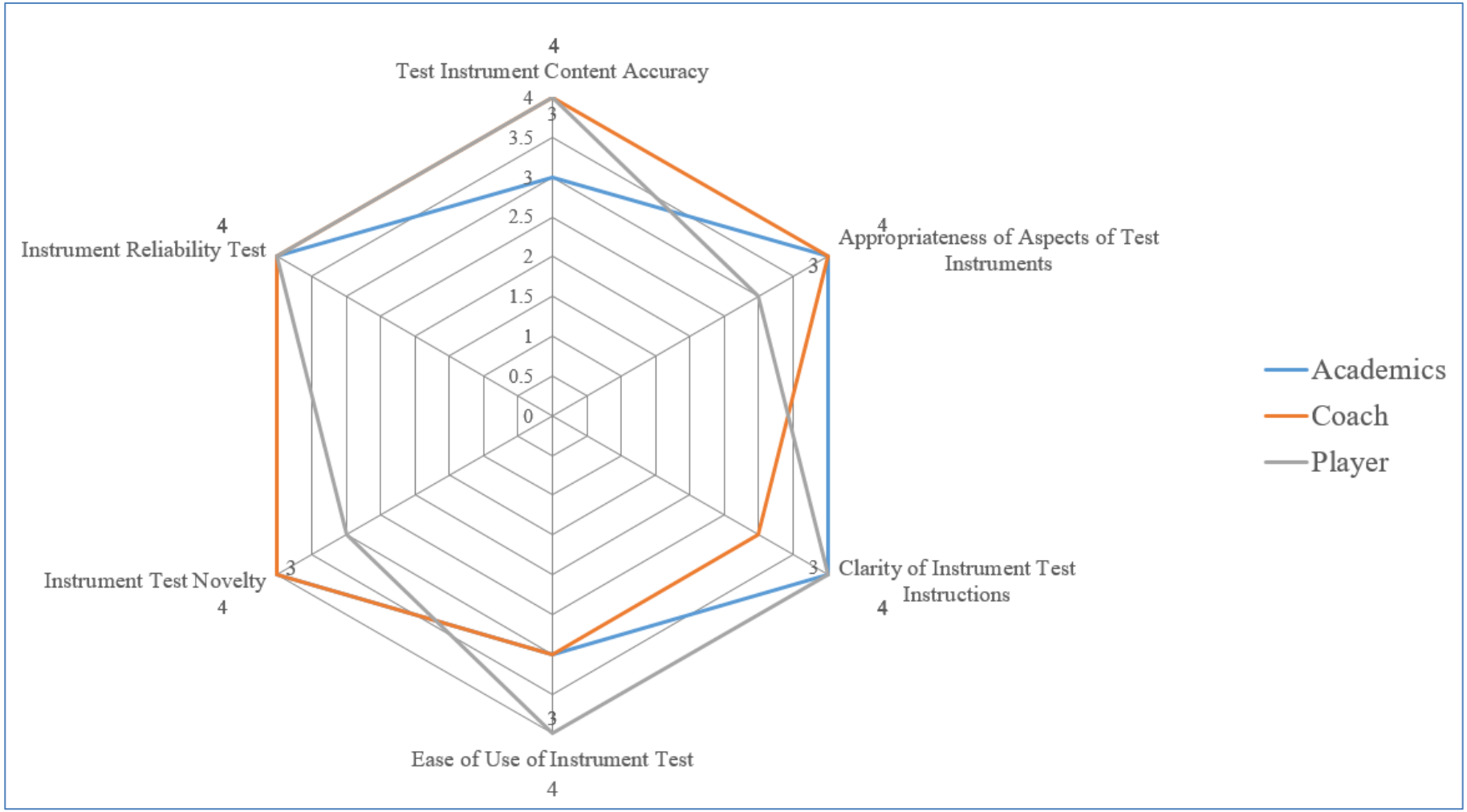


Figure 6. Experts Judgment

The picture above is obtained from an assessment questionnaire given by experts. Based on figure 6, for the accuracy of the test instrument content, academics gave 3 points, coaches gave 4 points, and players gave 4 points. While the suitability of the test instrument aspects, academics and coaches gave 4 points, and players gave 3. Then for the clarity of the test instrument instructions, academics and players gave a score of 4, and the coach gave a score of 3. For ease of use of the test instrument, academics and coaches only gave a score of 3, and players gave a score of 4. However, for the reliability of the test instrument, academics and coaches gave a score of 4, and players only gave a score of 3. As for the reliability of the test instrument, academics, coaches and players each gave a value of 4. So that if the calculation is carried out, it will produce an average score of 3.68 from a maximum score of 4, which indicates the category "good or appropriate to use" [23].

4. Discussion

This research produced development products in the form of test instruments for badminton footwork skills, as well as test norms for junior players. The purpose of the footwork test which was developed in line with the theory of [24] is to measure the level of skill and speed of footwork of badminton players. Based on the research (picture 1), the purpose of the move is divided into several parts, namely the front, mid and back lines, so that it is in line with Chao Chen's theory [25]. Badminton footwork to move around the direction can be divided into three categories: one is a volley step, two is a backward step, and three is a midfield move, a transverse move. So in the badminton footwork test instrument, there are 6 target points, as previously mentioned by [26].

The footwork test instrument that was developed is also a solution to the statement [27], the weakness of measuring instruments that are only results-oriented causes a lack of observation and assessment of the process in displaying good and correct movements. If analyzed, the test instrument that the researcher developed contains elements of agility assessment as well as elements of technical assessment. For example, in table 2, the steps that players must take are also the techniques that badminton players must carry out as described [9] so that if players do it correctly, they will get a high score. Moreover, test observers can also use the test implementation guidelines to make it easier for test officers, which can be seen in table 2. These test guidelines have been adapted to implementing the badminton footwork [26].

Based on the statistical data test that was processed using the SPSS application and carried out on 20 test samples, the results of the instrument validity were 0.730 from an r-table score of 0.456 and a reliability of 0.910. So it can be said that the instruments developed proved to be "valid and reliable" [5]. Meanwhile, according to experts' judgment of the accuracy of the contents of the test instrument, the average score is 3.66. Moreover, for the suitability of the test instrument aspect, badminton experts also gave an average score of 3.66. For the clarity of the instrument test instructions, the average value obtained is the same, namely 3.66. Then for the ease of use of the test instrument, the experts also gave a score of 3.66. On the reliability of the test instrument, badminton experts also gave an average score of 3.66. As for the reliability of the test instrument, the experts gave an average value of 4. So that if the calculation is carried out, it will produce an average score of 3.68 from a maximum score of 4 which means it shows the category "good or suitable for use" [23].

5. Conclusions

This research resulted in the development of a footwork skill test instrument product for junior badminton players. The footwork test aims to measure the skill level and footwork speed of junior badminton players. So that the test instrument developed has become a solution to the weaknesses of the existing measuring instruments. Because the test instrument that the researcher developed contains elements of speed assessment as well as elements of technical assessment.

Based on the statistical data test that was processed using the SPSS application, and carried out on 20 test samples, the results of the instrument validity were 0.730 from an r-table score of 0.456 and a reliability of 0.910. So it can be said that the instruments developed proved to be "valid and reliable". Meanwhile, according to the experts' assessment, the test instrument gets an average score of 3.68 from a maximum score of 4 which means it shows the category "good or suitable for use."

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