



DEVELOPMENT OF KINESTHETIC MOVEMENT IDENTIFICATION INSTRUMENTS FOR BADMINTON

Endang Sepdanius^{1ABCDE}, Muhamad Sazeli Rifki^{1BCDE} and Andri Gemaini^{1BCD}

¹Universitas Negeri Padang

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Corresponding Author: Endang Sepdanius, E-mail: endangsepdanius@fik.unp.ac.id

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Abstract

The purpose of this study was to develop an instrument to identify movements and produce recommendations for children who are predicted to be able to develop in badminton.

Materials and methods. The kind of this research is research and development consisting of (1) the Preliminary study stage, (2) the Expert validation stage, (3) the Acceptance test stage, and (4) the benefit test stage. The validation stage is carried out by three experts with assessment indicators of suitability, accuracy, convenience, and practicality. The acceptance test phase was obtained from the application of the instrument to the participants. The benefits test stage was determined by a retest test to determine the reliability of the instrument. Participants in the product trial consisted of two groups, namely the male group with 17 participants and the female group with 17 participants. The age of the participants was 6-7 years old. They were elementary school students who were in grade 2. Statistical analysis used a test-retest.

Results. The results show that the validation from badminton experts gives an assessment with a presentation of 97% in the very good category, the validation of talent identification experts is 98% in the very good category, and the validation from the coach is 97% in the very good category. For the acceptance test, 4 children (24%) in the first test were recommended, and 5 children (29%) in the second test were recommended. For girls, 2 children (12%) in the first test were recommended, and 3 children (18%) in the second test were recommended. For the reliability test, it was obtained 0.97 in the very strong category for boys and 0.91 in the very strong category for girls.

Conclusions. This instrument has been proven valid and reliable and can provide recommendations. The existence of this instrument can facilitate sports teachers and badminton coaches in identifying children's movements.

Keywords: development, kinesthetic movement, children, badminton.

Introduction

Indonesia is a reference in the development of world badminton to produce classy athletes. There have been many badminton athletes who were born and have proud achievements in international events and in the Olympic class. This success is certainly not born by itself but has a long journey. Starting from finding superior seeds in their respective regional clubs throughout Indonesia to forging talent by conducting training camps (Bradley et al., 2013). In finding the badminton trainee candidate, of course, based on the focus on inclusion (Bennie, 2021). Focusing on many factors, the point is that growth and maturity are the best

concepts in understanding the identification, selection, and development of young athletes (Gonçalves et al., 2012). In Indonesia to join the training camp, the athlete must pass a screening system, including regional selection for the province and national selection for the national level. However, this is done after the trainees have acquired the skills from the existing clubs. From this information, there is an empty in method to capture the kinesthetic movement abilities of participants at the children's level, so that this void becomes the problem that arise in badminton clubs in Indonesia.

The problems are very diverse, including the difficulty of the trainer in delivering the training program due to the ability of the trained children to absorb the training programs is different (Lorio et al., 2020). This difficulty was identified from the results of interviews that have been carried out that children's abilities are different in accepting and applying

the given training program. The trainer explained that the program that provided to the trainees was a program that was developed when they received the license of level 1 trainer from the Badminton World Federation (BWF). The essence of the problem is that the trainers do not yet know the level of ability of the trainees so the ability to accept the training program is different. What is the impact of all this? 1) The children who are less able to follow the instruction in training programs will feel bored with badminton training, 2) The children who have talent will be a problem if these talents cannot be found and maximized. 3) If these talents are not channeled with a good program, they will become underachievers, namely people whose achievements are below their maximum ability. Therefore, the trainer also acts as a facilitator in determining children who have good kinesthetic movement skills (Sepdanius et al., 2018). The results of this identification are recommended in the sport of badminton.

Talent is not only based on intelligence but also accompanied by willingness and productive performance (Bailey, 2017). To realize this giftedness, appropriate interventions are needed, namely interventions in differentiated programs (Mann et al., 2017). This differentiation program which is the embodiment of sports achievement needs to be prepared from the stage of the children's age (Komaini et al., 2022). Starting from the maturation of multilateral movements, determining the right sporting tendencies and training programs that are in accordance with the child's growth and development, greatly determine the achievements of athletes at the golden age (Fischetti & Greco, 2017). However, there are still many other factors that determine the success of children in the future to achieve achievements, namely intelligence, psychological and external factors such as derivatives from parents or environmental influences (Tod, 2014). The involvement of children in sports participation is another factor in creating outstanding athletes in the future (Križ, 2020). This involvement forms social relationships that affect the child's self-perception, achievement orientation, and motivated behavior patterns.

Several studies have proven that there are three categories in predicting a person's talent, namely cognitive/psychological abilities, physical profiles, and previous performance/experiences (Johnston et al., 2018). Of the three, it was identified that there is considerable variability related to the criteria that can be seen from the criteria for tasks, rules, activities, and motor skills required in different sports (Gonçalves et al., 2012; Özmen & Aydoğmuş, 2017). The importance of selecting talented athletes is done to predict the performance of athletes who are able to carry out training activities for a long time and are continuous. Conny Semiawan states that there are two key clues in observing and interpreting giftedness: 1) Giftedness is a special and external universal trait that is inborn and is the result of the interaction of environmental influences, 2) Giftedness is also determined by the needs and tendencies of the culture in which it belongs (Vater et al., 2017). Multi-faceted conceptualizations of talent are interpreted as: 1) Innate (i.e., derived from biological elements present at birth), 2) Multi-dimensional (i.e., consisting of capacities from a broad range of cognitive, physical, and psychological categories), 3) Emergency (i.e. involving interactions among factors that are multiplicatively coupled), 4) Dynamic (i.e., evolve across

developmental time due to interactions with the environment and random gene expression), and 5) Symbiotic (i.e., cultural and social factors will determine the highest scores of individual talents) (Baker et al., 2019). Therefore, physical and physiological growth and development in sports giftedness is closely related to sports performance (Pearson et al., 2006). Physical and physiological development can be improved over time with exercise (Chuckravanen et al., 2019). Then to support physical performance and skills when the process is running, it is determined by kinesthetic, psychological, genetic and environmental intelligence (Syväoja et al., 2021). These four indicators are very important to know in making it easier for prospective athletes to accept and apply the training program obtained so as to reduce the athlete's boredom and frustration in participating in strenuous training (Mason & Burn, 2023). Kinesthetic intelligence is closely related to a person's ability to develop movements so that they display movements that have maximum performance with different beauty from others (Koçak, 2019). There are five basic movements that need to be present to develop good kinesthetic movements, namely body coordination, agility, strength, balance, and eye coordination (Komaini et al., 2022). These five basic movements are interrelated with one another to produce efficient and effective movements. Just as agility is the result of a combination of speed, coordination, flexibility, and strength shown in badminton games (Bompa & Buzzichelli, 2015).

Materials and Methods

Study design

This kind of this research is research and development theory from Borg and Gall which has been modified into four major stages, namely (1) preliminary study stage, (2) expert validation stage, (3) acceptance test stage, and (4) benefit test stage. The validation stage was carried out by three experts, namely an expert in badminton, an expert in identifying sports talent, and a badminton coach. These experts assess the indicators of suitability, accuracy, convenience, and practicality. Five-scale assessment was used with each item and each indicator having 5 questions for the expert validation stage.

This instrument was directly applied to the participants for the acceptance test phase. Then the data obtained is converted to a scale of five except on the balance test. For balance, it must have a value of 2 from the implementation of dynamic balance for forward and backward movements (forward and backward). There are five tests in the Table: 1) Shuttlecock throw test; 2) Test catch shuttlecock; 3) Agility test (seconds); 4) Test bouncing ball (amount); 5) Balance test walking the block (forward and backward).

Table 1 above is the result of development which is arranged based on the classification of data using the interval class of values obtained. Except for the balance test, it is only determined based on being able or unable. The maximum total score that may be obtained by participants is twenty-two (22). However, what is included in the recommendation is a large value equal to 18 (≥ 18). At the trial stage, participants were asked to do the test twice. Then the first data and the second data were tested using the retest method to see the reliability of the instrument.

Table 1. Assessment scale for badminton talent identification instrument for children.

Items	Male	female	Score	Items	Male	female	Score
1) Shuttlecock Throw Test (meters)	5.7	4.1	1	3) Agility Test (seconds)	10.3	11.63	1
	5.8-6.0	4.2-4.7	2		9.5-10.2	11.05-11.62	2
	6.1-6.3	4.8-5.3	3		8.7-9.4	10.47-11.04	3
	6.4-6.6	5.4-5.9	4		7.9-8.6	9.89-10.46	4
	6.7	6	5		7,8	9.88	5
2) Test Catch Shuttlecock (Quantity)	1	1	1	4) Test Bouncing ball (amount)	10	8	1
	2	2	2		11-14	9-12	2
	3	3	3		15-18	13-16	3
	4	4	4		17-22	17-20	4
	5	5	5		23	20	5
	0	0	0	5) Balance Test walking the block (forward and backward)	Capable	Capable	1
					Not	Not	0

Participant

Participants in the product trial in this study consisted of two groups, namely the male group was 17 participants and the female group was 17 participants. The average age of participants is 6-7 years old elementary school students who are in grade 2. The reason for taking participants at this age is that participants have begun to be given an introduction to sports (Hastie et al., 2009) we examined the development of skill competence and tactical knowledge of 41 eighth-grade students (mean age 13.6 years. In addition, the school where the research was carried out had approved the implementation of the research in order to collect data.

Product Design

The product is designed based on kinesthetic motion, namely strength, body coordination, agility, eye coordination, and balance. Strength is represented by throwing the shuttlecock, body coordination is represented by catching the shuttlecock, agility is represented by agility movements, eye coordination is represented by bouncing the ball, and balance is represented by walking blocks.

Statistical Analysis

The expert validation stage uses data analysis techniques using the percentage of expert research results. For the acceptance test stage, descriptive analysis of the percentage of data obtained from the use of the instrument with the output is a recommendation for the value of the participants who have a large value equal to 18. For the usefulness test, see the results of the reliability of the instrument with the retest test

Results

Product

There are five items resulting from this development according to the kinesthetic motion for badminton, namely 1) throwing the shuttlecock, 2) catching the shuttlecock, 3) agility, 4) bouncing the ball, and 5) walking the block. The following shows the product and its implementation in Figure 1.

Figure 1 describes the sequence of implementation of the kinesthetic movement identification instrument starting from throwing the shuttlecock, then catching the shuttlecock, agility, bouncing the ball and walking the block. After the implementation, the value of the child's kinesthetic movement ability is then classified and processed to get a recommendation or not. This instrument is a battery test so it must be done sequentially. There are no rules for rest periods between test items. For the implementation and equipment needed can be seen in table 2.

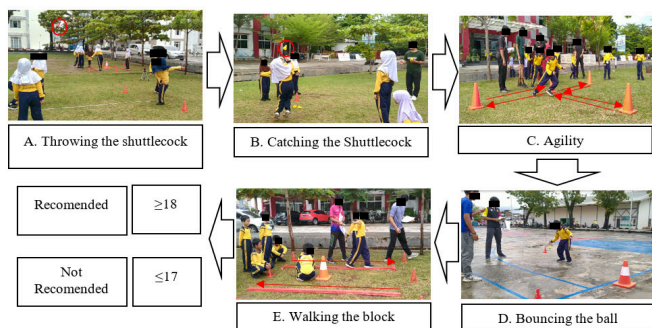


Fig. 1. The series of implementation of the kinesthetic motion test instrument for badminton
Source: Image from researcher Endang Sepdanius' private collection

Expert Validation

The following shows the validation results by badminton experts, expert in identifying sports talent and badminton coaches shown in table 3.

In table 3 it can be seen that the validators gave an assessment of which 97% of badminton experts were included in the very good category, expert in identifying sports talent rated 98% as very good and the coach assessed 97% in the very good category.

Table 2. Kinesthetic movement instrument product for badminton for children aged 6-7 years

Name	Equipment	Implementation
Throw shuttlecock	a. Shuttlecock weighing 4.74-5.50 gram b. Shuttlecock speed should be 75-79 c. 4 cones d. Meter	a. Testee stands in a circle to prepare to throw the Shuttlecock b. Testee throws Shuttlecock as far as possible c. Testee's throw is measured d. The throw is made 3 times e. The throw taken is the farthest throw
Catch shuttlecock	a. Shuttlecock weighing 4.74-5.50 gram b. Shuttlecock speed should be 75-79 c. 4 small cones	a. The tester is in the shuttlecock throwing position b. Testee is in a catch position c. The tester throws the shuttlecock at the testee with a parabolic throw d. Tester catches shuttlecock with two hands e. 5 shuttlecocks are thrown f. The points that are counted are the shuttlecocks caught
Agility	a. 4 large cones b. Stopwatch c. whistle	a. Place four cones at a distance of 2 meters from each cone as shown in Figure C. b. Testee getting ready in starting position on Cone A c. The testee starts running quickly towards cone B and then surrounds, returns to cone A then goes to cone C around, returns to cone A and goes to cone D around then finishes at cone A. d. It was done in 2 trials and the fastest time was taken
Bouncing Ball	a. 4 small cones b. Tennis ball c. stopwatch	a. The ball is in the strongest hand (right/left) b. The ball is reflected to the floor and then caught by the opposite hand. c. When caught by the opposite hand, it is counted as one. d. Done in 30 seconds.
Walking the Blockc	a. Two block boards with a length of 3 meters. The first board is 6 cm wide and the second board is 11 cm wide b. 1 large cone c. 4 small cones	a. The testee is in the starting position, on the signal forward the participant starts walking on the first available block. b. The assessment is carried out if the participant performs well without dropping one of the leg then it is considered "capable". If you drop one of your leg, it is considered "incapable". Participants must complete until the finish c. To retreat, participants start at the start and then do it backwards until they finish d. The assessment is carried out if the participant does well without dropping one leg then it is considered "Able", if dropping one leg it is considered "incapable". Participants must complete until the finish

Table 3. Questionnaire scores for the validity of kinesthetic movement by expert

Indicator	Expert		
	Badminton	Talent	Trainer
Suitability	25	24	25
Accuracy	24	24	25
Convenience	25	25	24
Practicality	23	25	23
Amount	97	98	97
Percentage	97%	98%	97%
Eligibility Level	Very good	Very good	Very good

Descriptive Data

Descriptive data obtained from participants using gifted instruments in kinesthetic movements are shown in table 4 for boys and table 5 for girls.

Based on table 4 the results of the kinesthetic movement test for boys, it was found that 4 children (24%) were given recommendations on the first test and 5 (29%) children were given recommendations on test 2.

Based on table 5 the results of the implementation of kinesthetic movement testing in girls, it was found that 2 children (12%) were given recommendations for the first test and 3 children (18%) were given recommendations for the second test.

Reliability

To determine the reliability of the instrument, a retest was carried out to obtain the results as shown in table 6.

Based on table 6, the instrument reliability for boys was 0.97 in the "very strong" category, while the instrument reliability value for girls was 0.91 in the "very strong" category.

Discussion

The success of movement in badminton can be identified from the beginning of growth (Werkiani et al., 2012). Children with good kinesthetic movement intelligence are expected to be able to undergo training programs in badminton well (Wang, 2021; Zubir et al., 2022). Children with good kinesthetic movements are able to receive the coach's instructions to be applied in the movement of sports (Hastie et al., 2009). Kinesthetic movements that lead to badminton

Table 4. Kinesthetic movement for boys on Test 1 and Test 2

Classification	Test 1			Test 2		
	Frequency	Percentage	Information	Frequency	Percentage	Information
18	4	24%	Recommendation	5	29%	Recommendation
17	13	76%	Not	12	71%	Not
Total	17	100%		17	100%	

Table 5. Kinesthetic movement for girls on Test 1 and Test 2

Classification	Test 1			Test 2		
	Frequency	Percentage	Information	Frequency	Percentage	Information
18	2	12%	Recommendation	3	18%	Recommendation
17	15	88%	Not	14	82%	Not
Total	17	100%		17	100%	

include throwing, jumping, catching, body balance when stepping forward and backward, and body coordination (Nugroho et al., 2021). These movements if done properly and the use of appropriate sports equipment can reduce the risk of injury (Hong et al., 2014). Badminton is identical to hitting the shuttle using a racket. With a good hitting technique, it has an impact on the accuracy of the stroke and the speed of the shuttlecock (Zhu, 2013). The phase in hitting using a racket is the same as someone throwing a throw, which requires flexibility and power (Tohidin et al., 2021). By identifying the child's ability to throw well, it becomes the basis for seeing good muscle activation for children (Sakura & Ohtsuki, 2000). With this identification, it is hoped that children will be able to apply good hitting techniques while in the training process. Furthermore, children with the ability to catch objects that are above their heads are the ability to coordinate their bodies to prepare themselves to catch an object (Junaid & Fellowes, 2006). The accuracy of the body in capturing this object is a benchmark that in carrying out manipulation movements using a racket, children are able to hit the shuttlecock well. The ability to catch is not only placing the hands but also involves placing the body position at the right time which involves the coordination of all bodies to get the degree of capture (Davids et al., 2000).

Agility is also important in badminton, changing directions in the shortest possible time is the hallmark of badminton (Ooi et al., 2009; Tohidin et al., 2021). A person is forced to move the body as quickly as possible in various directions in the shortest possible time so that the body position when hitting the shuttlecock is in a ready state (Mohammadi &

Fathi, 2018). The effectiveness of movement in moving determines the formation of badminton players on single or double courts (Alcock & Cable, 2009). In this movement for agility, participants must be in a balanced condition. Good balance is a picture of the body's physiology, both nerves and muscle abilities and other physical factors (De Oliveira et al., 2019). The ability of nerves to process information to keep the body in a balanced state is individualistic and not everyone has and is able to apply it well (Hrysonmallis, 2011). Although this balance can be obtained through physical exercise, it is also determined by confounding factors and maturation of children and individuals (De Oliveira et al., 2019). By detecting a good balance as early as possible, we can predict children who are able to carry out motion assignments in badminton training well.

Conclusions

The identification of kinetic motion in children makes it possible to recommend children to engage in sports. This identification is carried out to determine the child's basic movement ability to be adapted to the basic movement in certain sports. The dominant movements in badminton include throwing, jumping, catching, body balance when stepping forward and backward, and body coordination. Based on the badminton movement, an instrument was developed to identify the basic movements that have been proven to be valid and reliable. The instrument consists of five activities, namely throwing the shuttlecock, catching the shuttlecock, agility, bouncing the ball, and walking blocks. This instrument is an answer to the current problems found by coaches in badminton clubs in identifying children's abilities. The existence of this kinesthetic movement identification instrument can make it easier for sports teachers and badminton coaches to identify children and provide recommendations. The next research is to develop instruments from the psychological aspect for badminton for children aged 6-7 years.

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Table 6. Analysis of the test retest for boys and girls

	Male		Female	
	Test 1	Test 2	Test 1	Test 2
Min	4	7	7	11
Max	19	19	19	20
Average	12.8	13.6	14.55556	15.72222
Standard Deviation	4.89973	4.256483	2.955	2.270153
Variant	24.78333	17.98333	8.732026	5.153595
Reliability	0.97		0.91	

with the research theme “Development of Kinesthetic Movement Identification Instruments for Badminton.

Conflict of interest

The authors declare no potential conflicts of interest.

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РОЗРОБКА ІНСТРУМЕНТІВ ВИЗНАЧЕННЯ КІНЕСТЕТИЧНИХ РУХІВ ДЛЯ БАДМІНТОНУ

Ендан Сепданиус^{1ABCDE}, Мухамад Сазелі Ріфкі^{1BCDE}, Андрі Гемайні^{1BCD}

¹Падангський державний університет

Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 5 с., 2 табл., 24 джерел.

Мета цього дослідження полягала в тому, щоб розробити інструмент для визначення рухів і надання рекомендацій для дітей, які, за прогнозами, зможуть досягти успіхів у бадмінтоні.

Матеріали та методи. Це дослідження належить до типу дослідження та розробки, яке включає (1) етап попереднього дослідження, (2) етап експертної оцінки, (3) етап приймального випробування та (4) етап перевірки переваг. Етап оцінки проводять три експерти за показниками оцінки придатності, точності, зручності та практичності. Етап приймального випробування мав місце після застосування інструменту до учасників. Етап перевірки переваг був зумовлений повторним тестом для визначення надійності інструменту. Учасники випробування продукту склалися з двох груп, а саме: чоловічої групи із 17 учасників і жіночої групи із 17 учасниць. Вік учасників становив 6-7 років. Це були учні початкової школи, які навчалися в 2 класі. Для статистичного аналізу використовували тестування з повторним тестуванням.

Результати. Результати показують, що оцінка від експертів із бадмінтону дає оцінку з представленням 97% у категорії «дуже добре», оцінка експертів із визначення талантів становить 98% у категорії «дуже добре», а оцінка від тренера становить 97% у категорії «дуже добре». Для приймального випробування було рекомендовано 4 дітей (24%) у першому тесті та 5 дітей (29%) у другому тесті. Для дівчат було рекомендовано 2 дітей (12%) у першому тесті та 3 дітей (18%) у другому тесті. Для випробування на надійність було отримано 0,97 у категорії «дуже стійкий» для хлопців і 0,91 у категорії «дуже стійкий» для дівчат.

Висновки. Цей інструмент підтвердив ефективність і надійність і може забезпечувати рекомендації. Наявність цього інструменту може допомогти вчителям фізичного виховання та тренерам із бадмінтону визначати рухи дітей.

Ключові слова: розробка, кінестетичний рух, діти, бадмінтон.

Information about the authors:

Sepdanius, Endang: endangsepdanius@fik.unp.ac.id; <https://orcid.org/0000-0003-4989-30177>; Department of Health and Recreation, Universitas Negeri Padang, Jl. Prof. Dr. Hamka No.1, Air Tawar Bar., Kec. Padang Utara, Kota Padang, Sumatera Barat 25173, Indonesia

Rifki, Muhamad Sazeli: msr_rifki@fik.unp.ac.id; <https://orcid.org/0000-0002-8539-0655>; Department of Health and Recreation, Universitas Negeri Padang, Jl. Prof. Dr. Hamka No.1, Air Tawar Bar., Kec. Padang Utara, Kota Padang, Sumatera Barat 25173, Indonesia

Gemaini, Andri: andrigemaini@fik.unp.ac.id; <https://orcid.org/0000-0001-7102-311X>; Department of Health and Recreation, Universitas Negeri Padang, Jl. Prof. Dr. Hamka No.1, Air Tawar Bar., Kec. Padang Utara, Kota Padang, Sumatera Barat 25173, Indonesia

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