



## **Perceptual motor test for children 5-6 years old**

**Yudanto \*, Abdul Mahfudin Alim, Ahmad Nasrulloh**

Universitas Negeri Yogyakarta. Jl. Colombo No. 1, Yogyakarta 55281, Indonesia.

\* Corresponding Author. Email: [yudanto@uny.ac.id](mailto:yudanto@uny.ac.id)

*Received: March 31, 2020; Revised: September 1, 2020; Accepted: September 7, 2020*

**Abstract:** This research and development aims to produce perceptual motor tests for children aged 5-6 years. The development procedure adapted the Borg and Gall model, namely: (1) the preliminary study and planning stage, (2) the product development stage, (3) the expert validation stage, 4) the trial phase, and (5) product revision. The trial subjects used 10 children aged 5-6 years. The data used in this research are quantitative and qualitative data. Quantitative data were obtained from the results of the validation of the perceptual motor test draft and trials. Qualitative data obtained from the results of a questionnaire in the form of input and suggestions from material experts and practitioners. The data collection instrument used questionnaire guidelines. The questionnaire was used to get input from material experts and practitioners. The product can be said to be accepted and used must be tested for validity and reliability. Material expert validation test based on content validity and reliability testing using observation reliability with Alpha Cronbach. The results of the product developed show that perceptual motor tests for children aged 5-6 years are acceptable and in accordance with aspects of perceptual motor elements. The reliability test result was 0.930.

**Keywords:** Perceptual Motor Test, Child 5-6 Years

**How to Cite:** Yudanto, Alim, A.M., Nasrulloh, A.. (2021). Perceptual motor test for children 5-6 years old. *Jurnal Keolahragaan*, 9(1), 9-17. <https://doi.org/10.21831/jk.v9i1.30968>



### **PRELIMINARY**

Kindergarten education units, which provide education for children 4-6 years, are divided into two groups, namely TK A groups aged 4-5 years and Kindergarten B aged 5-6 years. Implementation of Kindergarten education, in principle focuses on laying the foundation towards growth and development in 6 aspects, namely: religion and morals, physical motor, cognitive, language, socio-emotional, and art, in accordance with the uniqueness and stages of development according to the age group passed during childhood early. Learning programs implemented in Kindergarten include: (1) religious learning and noble morals; (2) social and personality learning; (3) learning orientation and introduction to knowledge and technology; (4) learning aesthetics; and (5) physical learning, sports and health. Specifically in physical learning, sports and health, it aims to increase physical potential and instill sportsmanship and awareness of healthy and clean living. (Nurdiana, 2016). In accordance with the Kindergarten curriculum, physical or physical activity is the scope of physical learning programs, sports and health. Furthermore, Kozina et.al (2018) stated that physical activity is one part of psychomotor development.

In Kindergarten students, the form of physical activity that contains perceptual motor elements and is packaged in the form of play is very important. This is based on the findings of several research results, including: (1) there is a relationship between academic ability and perceptual motor skills, (Nourbakhsh, 2006); (2) the ability of spelling, reading, and mathematics of children aged 4-6 years is influenced by perceptual motor in terms of kinesthetic, visual, and auditory, (Dhingra et al., 2010); (3) cognitive skills of preschool children are influenced by physical activity programmed in a certain period, (Hosseini et al., 2011); (4) academic achievement is influenced by perceptual motor skills, children have good cognitive if supported by good perceptual motor skills, (Morales et al., 2011); (5) motor skills have a relationship with academic performance, in mathematics for grade 1 elementary school children, (Macdonald et al., 2020); (6) Perceptual motor has a relationship with basic motor skills in children aged 5-7 years, (Hyungmin & Johan, 2012); (7) the perceptual motor program intervention in children aged 6-7 years is effective in improving gross and fine motor skills as well as reading and



spelling abilities., (Botha & Africa, 2020); (8) the perceptual motor exercise program can develop agility, running, balance, coordination and strength abilities in children aged 8-11 years who experience High Function Autistic Disorder., (Azar & Akbar, 2018); (9) the perceptual motor program given to Kindergarten children aged 4-6 years can improve gross and fine motor skills,(Sajedi & Barati, 2014); (10)perceptual motor development can be developed optimally in children aged 3-6 years, (Johnstone & Ramon., 2011); (11)the involvement of perceptual motor elements in the task of motion, through a form of play, really needs to be done by the teacher, in order to attract and make students happy, (Ningrum & Sukoco, 2017); and (12) Perceptual Motor Training (PMT) has an influence on gross motor development of children aged 5-6 years. Motor improvement rough child can be seen from the child who is able to do a variety kinds of locomotor motion, manipulative motion, and balance with correct and directed, (Lukmawati et al., 2019).

Measuring perceptual motor skills from the start, especially in Kindergarten children, is very important to do. To determine the perceptual motor skills, especially in planting children, a perceptual motor test is needed. Various kinds of perceptual motor skills tests have actually been around for several years. Scott (1955) has developed a kinesthetic perceptual test to measure the ability to estimate distance by jumping while closing his eyes. Johnson (1966) also developed a kinesthetic test with obstacles that aims to estimate a person's position without using sight. All of the above experts developed measurement instruments by taking one part of the perceptual motor, namely kinesthetic. Meanwhile, the expert who developed a battery motor perception test was Braley with 15 different tests to pass. Meanwhile, Fisher (1970) developed a motor perception measurement instrument with 10 kinds of tests aimed at measuring the perceptual motor ability of elementary school children, (Rachman, 2004). Perceptual motor tests generally still do not cover the overall perceptual elements of motor, which include: understanding the body, understanding space, understanding direction, and understanding the structure of time. Perceptual motor tests for children aged 5-6 years containing all the perceptual motor elements are indispensable. For this reason, further development related to perceptual motor tests for children aged 5-6 years is needed.

## **METHOD**

### **Research and Development Procedures**

The development procedure is the steps that must be followed before producing a product. Borg and Gall, (1983)stated that basically the research and development procedure consists of two main objectives, namely developing a product (as a development function) and testing the effectiveness of the product in achieving its objectives (validation function). Research and development procedures or steps do not have to use standard steps that must be followed, but each developer can choose and determine the most appropriate steps for his research based on the conditions and constraints it faces. The procedure or steps used in this study use five main steps or procedures, namely:(1) the preliminary study and planning stage; (2) product development stage; (3) expert validation stage; (4) the trial phase; and (5) product revisions.

The preliminary study and planning stage were carried out by conducting an analysis related to problems related to children's perceptual motor skills and the measurement of perceptual motor abilities. Measuring perceptual ability requires the availability of perceptual motor tests. The previous perceptual motor tests generally did not cover the overall perceptual motor elements, which included: understanding the body, understanding space, understanding direction, and understanding the structure of time. Perceptual motor tests for children aged 5-6 years containing all the perceptual motor elements are indispensable and need further development.

The initial product development stage was carried out by analyzing the development objectives of the perceptual motor test, understanding the characteristics of children aged 5-6 years, analyzing and identifying the dimensions and perceptual elements of motor, and compiling the initial product of the perceptual motor test for children aged 5-6 years. Perceptual motor consists of components regarding body awareness, spatial awareness, directional awareness, and temporal awareness that is displayed through motion effectively and efficiently. The following are the dimensions and elements of perceptual motor abilities.

Table 1. Dimensions and elements perceptual motor skills.

No.	Dimensions	The elements
1.	Body awareness	Identify the body parts Body position.
2.	Spatial awareness	Space and object orientation.
3.	Directional awareness	Up. Get back. Ride. Down. Diagonal. Right. Left.
4.	Temporal awareness	Coordination. Relationships with other objects.

The validation used in the expert validation test is based on the validity of the content. Basically content validity indicates how far the test measures the entire subject area and the behavior to be measured. That is, the test must be comprehensive, relevant and not outside the boundaries of the measurement objectives.(Ngatman & Andriyani, 2017). Perceptual motor tests for children 5-6 years have been systematically arranged according to the preparation steps that refer to theoretical studies. The preparation is carried out starting from the description of the concept which is then formulated into a conceptual definition. The next step is to formulate the perceptual dimensions and elements of the motor that will be used in the perceptual motor test. The steps that have been taken above, have led to the validity of the content. To find out whether the content and substance of the physical activity materials used represent the content to be measured or targeted, validation is carried out by experts who have expertise in the fields of learning and motor development. Besides that, also involving two practitioners from kindergarten teachers to provide input related to the preparation of these perceptual motor tests. Thus, the content and substance of the compiled perceptual motor test items can be said to have met the requirements as a valid perceptual motor test.

The trial phase was carried out to get responses and product revisions, so that later the final product was produced in the form of a perceptual motor test for children aged 5-6. The trial was conducted on 10 children aged 5-6 years. Product revisions are made to improve the product before the end product is used. Revisions are made based on input from experts and practitioners.

### **Types of Data, Data Instruments, and Data Analysis Techniques**

The data obtained in this research and development is numerical and verbal data (written descriptive sentences). The numerical data were obtained from the use of the acceptability rating scale given to each expert and practitioner. Verbal data is obtained from suggestions, comments or criticisms written in expert and practitioner assessment instruments. The data collection instrument used questionnaire guidelines. Questionnaires are used to obtain or collect information from material experts and practitioners. Meanwhile, the data analysis techniques used in this research and development consist of two types, namely numerical analysis and verbal analysis. The numerical analysis uses the range obtained from the interpretation scale. Verbal analysis is carried out by grouping and compiling the results of input, suggestions, and criticism from experts and practitioners.

## **RESULTS AND DISCUSSION**

### **Result**

The research and development process as well as the trials resulted in a product in the form of perceptual motor test for children 5-6 years of age. Based on the dimensions and perceptual elements of motor, a perceptual motor test is compiled which consists of 6 (six) test items, namely: (1) standing on the block while touching the limbs, as instructed by the teacher with open eyes; (2) standing on the block while touching the limbs, according to the teacher's orders with their eyes closed; (3) jump and land on the line with two feet together, according to the teacher's orders with open eyes; (4) jump and land on the line with two feet together, according to the teacher's orders, blindfolded; (5) walking on the balance

beam; and (6) throwing a tennis ball into the basket. To get the final product in the form of perceptual motor test for children 5-6 years of age, a series of trial and error stages were carried out to assess the acceptability of the initial product design both theoretically and practically. Based on a series of tests that have been carried out, the results obtained are as follows:

#### Result of Expert Assessment of Learning and Motor Development

From the results of the overall calculation for perceptual motor test for children 5-6 years of age obtained an average value of 3.66 in the value range 0–4. Thus the results of the expert assessment of learning and motor development materials state that perceptual motor test for children 5-6 years of age is "good". These results illustrate that the product being developed is theoretically acceptable.

In addition to numerical data, judgments from material experts also produced verbal data (written descriptive sentences). Verbal data in the form of suggestions from experts related to Learning and Motor Development materials perceptual motor test for children 5-6 years of age that was developed. Input and suggestions from material experts are presented in table 2.

**Table 2. Inputs and suggestions for improvement from experts in Learning and Motor Development**

No.	Test Items	Expert input
1.	Standing on the block while touching the limbs, according to the teacher's orders with open eyes	The parts of the body that the child must show are added.
2.	Standing on the block while touching the limbs, according to the teacher's orders with your eyes closed.	The beam size for child stands is enlarged.
3.	Jump and land on the line with two feet together, as instructed by the teacher with open eyes.	-
4.	Jump and land on the line with two feet together, as instructed by the teacher with closed eyes.	-
5.	Walk on the balance beam.	When walking on the balance beam carrying the load.
6.	Throw a tennis ball into the basket.	The distance from the throw to the basket is shortened.

#### Practitioner's Assessment Results

From the results of the overall calculation for perceptual motor test for children 5-6 years of age obtained an average value of 3.88 in the value range 0–4. Thus the results of the practitioner's assessment stated that perceptual motor test for children 5-6 years of age is "good". These results illustrate that the product being developed is theoretically acceptable.

Apart from numerical data, the practitioner's assessment also produced verbal data (written descriptive sentences). Verbal data in the form of suggestions from practitioners related to perceptual motor test for children 5-6 years of age that was developed. Inputs and suggestions from practitioners are presented in table 3.

**Table 3. Practitioners' input and suggestions for improvement**

No	Test Items	Input from Practitioners
1.	Standing on the block while touching the limbs, according to the teacher's orders with open eyes	The beam size for child stands is enlarged.
2.	Standing on the block while touching the limbs, according to the teacher's orders with your eyes closed.	-
3.	Jump and land on the line with two feet together, as instructed by the teacher with open eyes.	The line for the student's landing is shortened
4.	Jump and land on the line with two feet together, as instructed by the teacher with closed eyes.	-
5.	Walk on the balance beam.	-
6.	Throw a tennis ball into the basket.	The distance from the throw to the basket is shortened.

#### Product Revisions

From the results of input from experts and practitioners to the test perceptual motor for children aged 5-6 years, then the next step is to improve according to the input obtained. Revised improvements can be seen in table 4.

Table 4. Product Repair Revisions of Experts and Practitioners

No	Test Items	Revised Revision
1.	Standing on the block while touching the limbs, according to the teacher's orders with open eyes	Adds the body parts indicated by the child
2	Standing on the block while touching the limbs, according to the teacher's orders with your eyes closed.	Enlarge the size of the beam for the enlarged child standing.
3.	Jump and land on the line with two feet together, as instructed by the teacher with open eyes.	The line for landing the child is shortened from 75 cm to 50 cm.
4.	Jump and land on the line with two feet together, as instructed by the teacher with closed eyes.	-
5.	Walk on the balance beam.	Adding the load with a 330 ml bottle of water when walking on the balance beam
6.	Throw a tennis ball into the basket.	Shortened the distance from 2.5 meters to 2 meters.

#### Test Results

Testing is an important step in constructing an instrument. Trials were carried out to obtain representative instruments that will be used in collecting research data. The purpose of the trial is to obtain the validity and reliability of the instrument which is the main requirement of a good instrument. The validity of the instrument shows the extent to which a measuring instrument is able to measure what should be measured, while the reliability of the instrument refers to the consistency or consistency of a measuring instrument in measuring certain characteristics. For the purpose of looking for validity, it is done by validating several experts, while searching for reliability is carried out based on the Inter Observer Agreement Reliability or Inter Raters Reliability.

The validity used in compiling the perceptual motor test was content validity. In essence, content validity refers to a systematic study of the content or material of measuring instruments to determine whether the measuring instrument includes a representative sample of the aspects to be measured. The perceptual motor skills instrument has been systematically arranged in accordance with the steps for arranging the instrument which refers to the theoretical study. The preparation is carried out starting from the elaboration of the concept which is then formulated into a conceptual definition and an operational definition. The next step is to formulate the dimensions and elements to then develop the instrument items that will be used in the measurement. With the steps that have been taken, it has led to the validity of the content. To find out whether the content and substance of the measure represent the content to be measured, validation is carried out by experts who have expertise in the field of learning and motor development. This is in accordance with Kerlinger's opinion that in essence, validation of content and substance is a form of assessment of the representativeness of the items of the instrument. Two experts validating the perceptual motor skills measurement instrument. Thus in content and substance the items of the perceptual motor ability measurement instrument that have been prepared can be said to have met the requirements as a valid instrument. This is in accordance with Kerlinger's opinion that in essence, validation of content and substance is a form of assessment of the representativeness of the items of the instrument. Two experts validating the perceptual motor skills measurement instrument. Thus in content and substance the items of the perceptual motor ability measurement instrument that have been prepared can be said to have met the requirements as a valid instrument. This is in accordance with Kerlinger's opinion that in essence, validation of content and substance is a form of assessment of the representativeness of the items of the instrument. Two experts validating the perceptual motor skills measurement instrument. Thus in content and substance the items of the perceptual motor ability measurement instrument that have been prepared can be said to have met the requirements as a valid instrument.

Instrument reliability refers to the consistency of a measuring instrument in measuring the same symptoms. This means that each measurement must have the ability to provide consistent measurement results. Perceptual motor test reliability testing was carried out with the Inter Observer Agreement, which is a way of determining the reliability of the instrument by using agreement or equality among several judges or independent observers. The scores obtained from the observations were analyzed using Cronbach's alpha for reliability testing. The results of the perceptual motor test reliability test results can be seen in table 5.

Table 5. Validity and reliability of perceptual motor tests

No.	Test Items	Reliability
1.	Standing on the block while touching the limbs, according to the teacher's orders with open eyes.	0.850
2	Standing on the block while touching the limbs, according to the teacher's orders with your eyes closed.	0.817
3.	Jump and land on the line with two feet together, as instructed by the teacher with open eyes.	0.898
4.	Jump and land on the line with two feet together, as instructed by the teacher with closed eyes.	0.794
5.	Walk on the balance beam.	0.817
6.	Throw a tennis ball into the basket.	0.891
7	The entire test item.	0.930

The results of the development of perceptual motor tests for children aged 5-6 years can be seen at the following address: <https://bit.ly/3gOHMk6>.

### Discussion

After going through a series of trial stages and a revision process, perceptual motor test products for children aged 5-6 years can be accepted theoretically and practically. The products developed are designed in such a way that they can be accepted and qualify as a test to measure the perceptual motor skills of children aged 5-6 years. The preparation of this test also considers the ease with which students can take the test as well as the ease in using the tools and facilities. The conceptual definition of perceptual motor ability is a person's ability to comprehensively understand the body, understanding space, understanding direction, quality of motion, and relationships with objects outside the body that are displayed through movement effectively and efficiently. Perceptual motor tests are structured based on perceptual motor elements, which include: body awareness, spatial awareness, directional awareness, and temporal awareness. Body awareness is the ability to recognize body parts and their benefits for movement. Body awareness, also known as body image or body schema, is the basis for efficient movement and overall understanding of motion. In the development of understanding the child's body, related to several things, namely: (1) identifying and knowing the location of the body parts; (2) understand its relationship to other parts of the body; (3) knowing how to use body parts; and (4) understand its use. In understanding the parts of the body and their functions, it is carried out in three stages, namely: (1) procedural understanding, when the child can show and understand the usefulness of the parts of his body. For example, the baby will reach out and hold objects with his hands; (2) recognition stage, where the child can remember the name of the limb. For example, if a child is assigned to show his hand, he will look at the hand or raise his hand; and (3) verbal identification, at this stage the child can respond to questions about the names of body parts and their uses. From this opinion, what is important for a child is a vocabulary of the names of the body parts. This is because as the experience of motion increases, so does the recognition of the body parts. Thus children will learn to identify parts of the body by their names, then understand their relationship to other parts, how to use them and the various abilities to move each part of the body. For example, if a child is assigned to show his hand, he will look at the hand or raise his hand; and (3) verbal identification, at this stage the child can respond to questions about the names of body parts and their uses. From this opinion, what is important for a child is a vocabulary of the names of the body parts. This is because as the experience of motion increases, so does the recognition of the body parts. Thus children will learn to identify parts of the body by their names, then understand their relationship to other parts, how to use them and the various abilities to move each part of the body. For example, if a child is assigned to show his hand, he will look at the hand or raise his hand; and (3) verbal identification, at this stage the child can respond to questions about the names of body parts and their uses. From this opinion, what is important for a child is a vocabulary of the names of the body parts. This is because as the experience of motion increases, so does the recognition of the body parts. Thus children will learn to identify parts of the body by their names, then understand their relationship to other parts, how to use them and the various abilities to move each part of the body.

Spatial awareness is the ability to adjust to the position between other people and other objects in a space or place, it is also the ability to know how much space or place the body uses when moving. Spatial awareness is an extension of understanding the body, which is the ability to move the body in a

space or environment without colliding. Directional awareness is the understanding of the body with respect to place and direction, consisting of two components of understanding, namely: (1) internal understanding to be able to move the body to the right and left side (laterality), and (2) external projection of laterality, this component is understanding which gives the dimension of space. Children who have this ability are able to carry out the concept of right-left, top-down, front-back motion, and various other motion combinations. Temporal awareness refers to the development of the time structure that establishes the coordination of movements between the eyes and limbs simultaneously in an effective manner. The terms eye-hand coordination and eye-foot coordination are the end products of understanding the structure of time. Children who develop an understanding of the structure of time are the process of learning how to harmonize their movements in a rhythmic manner and describe them in an appropriate and harmonious sequence or sequence. The terms eye-hand coordination and eye-foot coordination are the end products of understanding the structure of time. Children who develop an understanding of the structure of time are the process of learning how to harmonize their movements in a rhythmic manner and describe them in an appropriate and harmonious sequence or sequence. The terms eye-hand coordination and eye-foot coordination are the end products of understanding the structure of time. Children who develop an understanding of the structure of time are the process of learning how to harmonize their movements in a rhythmic way and describe them in an appropriate and harmonious sequence or sequence.

The perceptual motor test consists of 6 types of activities, namely: (1) standing on a block while touching the limb, according to the teacher's orders with open eyes, this test aims to measure body and space awareness; (2) standing on a block while touching the limbs, according to the teacher's orders with their eyes closed, this test aims to measure body and space awareness; (3) jumping and landing on the line with two feet together, as instructed by the teacher with open eyes, this test aims at body awareness, spatial awareness, and directional awareness; (4) jumping and landing on the line with two feet together, as instructed by the teacher with open eyes, this test aims at body awareness, spatial awareness, and directional awareness; (5) walking on a balance beam the test is aimed at body awareness, spatial awareness, and directional awareness; and (6) throwing a tennis ball into the basket at a distance of two meters. This test aims at time structure awareness, spatial awareness, and body awareness. This perceptual motor test has advantages over the previous perceptual motor test. Previous perceptual motor tests such as perceptual motor tests developed by Scott (1955) and Johnson (1996) have developed perceptual motor tests that only take one part of perceptual motor, namely kinesthetic. Compared to the perceptual motor test that has been developed, it includes all perceptual motor elements, namely: understanding the body, understanding space, understanding direction, and understanding the structure of time. This perceptual motor test is equipped with the tools and facilities used, implementation procedures, and methods of assessment, space consciousness, and body awareness. This perceptual motor test has advantages over the previous perceptual motor test. Previous perceptual motor tests such as perceptual motor tests developed by Scott (1955) and Johnson (1996) have developed perceptual motor tests that only take one part of perceptual motor, namely kinesthetic. Compared to the perceptual motor test that has been developed, it includes all perceptual motor elements, namely: understanding the body, understanding space, understanding direction, and understanding the structure of time. This perceptual motor test is equipped with the tools and facilities used, implementation procedures, and methods of assessment, space consciousness, and body awareness. This perceptual motor test has advantages over the previous perceptual motor test. Previous perceptual motor tests such as perceptual motor tests developed by Scott (1955) and Johnson (1996) have developed perceptual motor tests that only take one part of perceptual motor, namely kinesthetic. Compared to the perceptual motor test that has been developed, it includes all perceptual motor elements, namely: understanding the body, understanding space, understanding direction, and understanding the structure of time. This perceptual motor test is equipped with the tools and facilities used, implementation procedures, and methods of assessment. Previous perceptual motor tests such as perceptual motor tests developed by Scott (1955) and Johnson (1996) have developed perceptual motor

tests that only take one part of perceptual motor, namely kinesthetic. Compared to the perceptual motor test that has been developed, it includes all perceptual motor elements, namely: understanding the body, understanding space, understanding direction, and understanding the structure of time. This perceptual motor test is equipped with the tools and facilities used, implementation procedures, and methods of assessment, includes all perceptual motor elements, namely: understanding the body, understanding space, understanding direction, and understanding the structure of time. This perceptual motor test is equipped with the tools and facilities used, implementation procedures, and methods of assessment. The elements contained in the perceptual motor test correspond to research Smith (1970) that the perceptual motor program given includes: jumping into a circle, walking like an animal, touching and identifying body parts, climbing balance blocks, and manipulating the ball. Barnett et al., (2008) states that in learning in the form of moving space activities and the ability to change direction are elements in perceptual motor states that the perceptual motor components include: body awareness, spatial awareness, directional awareness, and temporal awareness.

### **CONCLUSION**

The results of the perceptual motor test assessment results from experts and practitioners are overall good and can be accepted both theoretically and practically. The research results have been compiled perceptual motor test for children aged 5-6 years. The perceptual motor test for children aged 5-6 years includes: (1) standing on top while touching the limbs, according to the teacher's orders with open eyes; (2) standing on the floor while touching the limbs, according to the teacher's orders with their eyes closed; (3) jump and land on the line with two feet together, according to the teacher's orders with open eyes; (4) jump and land on the line with two feet together, according to the teacher's orders, blindfolded; (5) walking on the beam; and (6) throwing a tennis ball into the basket.

The results of the development of this perceptual motor test are expected to provide benefits to Kindergarten teachers and parents to be used in order to determine the perceptual motor skills of children aged 5-6 years. As a follow up, it needs to be done for further development and it is necessary to formulate the norms of perceptual motor abilities.

### **REFERENCES**

- Azar, F. O., & Akbar, P. S. (2018). The Effect of Perceptual- Motor Training on Children ' s Development Motor Skills Aged B etween 8 to 11 with High Function Autistic Disorder ( HFA ). *Indonesian Journal of Applied Science in Physical Education*, 2(2), 1–11.
- Barnett, L. M., Morgan, P. J., van Beurden, E., & Beard, J. R. (2008). Perceived sports competence mediates the relationship between childhood motor skill proficiency and adolescent physical activity and fitness: A longitudinal assessment. *International Journal of Behavioral Nutrition and Physical Activity*, 5, 1–12. <https://doi.org/10.1186/1479-5868-5-40>
- Borg, W. R., & Gall, M. D. (1983). *Educational Research: An Introduction Fourth Edition*. Longman Inc.
- Botha, S., & Africa, E. K. (2020). The Effect of a Perceptual-Motor Intervention on the Relationship Between Motor Proficiency and Letter Knowledge. *Early Childhood Education Journal*, 0123456789. <https://doi.org/10.1007/s10643-020-01034-8>
- Dhingra, R., Manhas, S., & Kohli, N. (2010). Relationship of Perceptual Abilities with Academic Performance of Children. *Journal of Social Sciences*, 23(2), 143–147. <https://doi.org/10.1080/09718923.2010.11892823>
- Gallahue, D. L., Ozmun, J. C., & Goodway, J. D. (2019). Understanding motor development. In *Understanding Children's Development in the Early Years*. McGraw-Hill Higher Education -A. <https://doi.org/10.4324/9781315776347-5>
- Hosseini, S. S., Panahi, M., Naghilo, Z., & Ramandi, L. D. (2011). The Effect of Exercise Training on Perceptual Motor Skills and Physical Fitness Factors in Preschool Children. *Middle-East Journal of Scientific Research*, 9(6), 764–768.

- Hyungmin, P., & Johan, S. (2012). The relation between basic movement skills and perceptual-motor skills in 5 to 7 years old children. *European Journal of Neuroscience*, 4(1), 57–65.
- Johnstone, J. A., & Ramon., M. (2011). *Perceptual-motor activities for children : an evidence-based guide to building physical and cognitive skills* (USA). Human Kinetic.
- Lukmawati, L., Sriyanto, M. I., & Syamsuddin, M. M. (2019). Pengaruh Perceptual Motor Training (Pmt) Terhadap Perkembangan Motorik Kasar Pada Anak Usia 5-6 Tahun. *Kumara Cendekia*, 7(2), 175. <https://doi.org/10.20961/kc.v7i2.36386>
- Macdonald, K., Milne, N., Orr, R., & Pope, R. (2020). Associations between motor proficiency and academic performance in mathematics and reading in year 1 school children: A cross-sectional study. *BMC Pediatrics*, 20(1), 1–11. <https://doi.org/10.1186/s12887-020-1967-8>
- Morales, J., Gonzales, L. M., Guerra, M., Virgili, C., & Unnithan, V. (2011). Physical Activity, Perceptual Motor Performance, and Academic Learning in 9 to 16 Years Old School Children. *International Journal of Sport Psychology*, 42: 401-41.
- Ngatman, & Andriyani, F. D. (2017). *Tes dan Pengukuran untuk Evaluasi dalam Pembelajaran Pendidikan Jasmani dan Olahraga*. Yogyakarta: Fadilatama.
- Ningrum, N. F. M., & Sukoco, P. (2017). Pengembangan model permainan untuk meningkatkan perseptual motorik dan perilaku sosial siswa sekolah dasar kelas bawah. *Jurnal Keolahragaan*, 5(2), 171. <https://doi.org/10.21831/jk.v5i2.7905>
- Nourbakhsh, P. (2006). Perceptual-motor abilities and their relationships with academic performance of fifth grade pupils in comparison with Oseretsky Scale. *Kinesiology*, 38(1), 40–48. <http://connection.ebscohost.com/c/articles/21557865/perceptual-motor-abilities-their-relationships-academic-performance-fifth-grade-pupils-comparison-oseretsky-scale>
- Nurdiana, J. (2016). *Modul Guru Pembelajar Taman Kanak-Kanak Kelompok Kompetensi C*. Bandung: PPPPTK TK DAN PLB.
- Rachman, H. A. (2004). *Keterampilan Bermain Softball Siswa Sekolah Dasar*. (Disertasi). Jakarta: Universitas Negeri Jakarta.
- Sajedi, F., & Barati, H. (2014). The effect of perceptual motor training on motor skills of preschool children. *Iranian Rehabilitation Journal*, 12(19), 14–17.
- Smith, P. (1970). Perceptual-Motor Skills and Reading Readiness of Kindergarten Children. *Journal of Health, Physical Education, Recreation*, 41(4), 43–44. <https://doi.org/10.1080/00221473.1970.10611944>