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### THE MEASUREMENT OF PHYSICAL ABILITY EARLY AGE CHILDREN BY ADOPTING JAPANESE INSTRUMENTS IN KLATEN

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#### Abstrak

*Kurikulum 2013 mempersyaratkan perlunya mengembangkan kemampuan fisik Anak Usia Dini (AUD), namun belum terdapat standar pengukuran pada rentang anak usia dini tertentu. Oleh karena itu perlu dikembangkan instrumen pengukuran dalam rangka menstandarisasi capaian kemampuan fisik AUD. Pusat Studi Jepang LPPM Universitas Sebelas Maret bekerjasama dengan HIMPAUDI Karangnom Kabupaten Klaten, Jawa Tengah mengupayakan untuk mengembangkan sebuah standar pengukuran perkembangan fisik dan kemampuan fisik AUD dengan mengadopsi instrumen pengukuran yang dipakai di Jepang. Kegiatan ini melibatkan 21 PAUD dan 70 instruktur yang berlatih untuk memperbaiki pemahaman konsep terkait perkembangan fisik dan kemampuan fisik AUD, sekaligus memperbaiki skill dalam melakukan pengukuran. Selain itu, dalam kegiatan tersebut, diperoleh data hasil pengukuran AUD berdasarkan lima indikator kemampuan fisik dan dua indikator perkembangan fisik. Hasil pengukuran memberikan gambaran tentang rerata perkembangan fisik dan kemampuan fisik AUD di Karangnom yang jika dibandingkan dengan peer mereka di Jepang, hasilnya lebih rendah. Rekomendasi penelitian ini adalah perlunya menguji kembali instrumen pengukuran dengan uji berulang dan multilokasi untuk mendapatkan nilai validitas dan realibilitas yang baik.*

#### Abstract

The Curriculum 2013 entailed the importance of developing the physical ability (PA) of early age children (EAC). In fact, the standard measurement or instrument to assess the PA of early childhood has not been formulated yet to be used in the whole country. Therefore, it is required to develop the standard instrument to measure the physical ability of children. The Center for Japanese Studies, Research and Community Services of Universitas Sebelas Maret, Indonesia collaboratively worked with HIMPAUDI (The Association of Early Childhood Education Indonesia) of District Karangnom in Klaten Regency to develop the standard achievement of Klaten's children based on the instrument of PA adopted from Japan. This program involved 21 ECE nurseries in Karangnom, and 70 instructors participated in the program. The activities were based on an action research aimed to change the mindset of related instructors on PA, connection between PA and cognitive development. It also trained the skills of instructors on measuring the PA. The program was conducted from July to September 2017. As the program ran, data of children' PA was also measured, and as the entry of database developed for Karangnom. There are five indicators of PA which represent the stability, locomotive, and manipulative movements, adapted from Japanese PA measurement. The results of database showed the average measurement of children' PA in Karangnom, and were compared to the Japanese peers, the achievement was lower. The instrument has to be validated and examined in the various regions and periods.

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## **INTRODUCTION**

Pre-school age children are children who are in the age ranging from 0 to 5 years also called the golden generation. At this time, the brain is growing very rapidly, at the age of 5 years, brain development reaches 85% with more than 100 million neurons connected (Miller & Cummings, 2007). This period is also called the sensitive period, because children will be very sensitive to various stimulus in its development aspects. Because of the importance of this period, it needs right attention and stimulation for an optimal development.

Aspects of children development include cognitive development, physical-motor, language, and social-emotional (Puspita, 2013). Every aspect of children development should be given the right stimulus, so the development is in accordance with the age. Every aspect of children development is related one another. All aspects of children development are growing rapidly at the age of 0-6 years. The development of the physical aspect could be seen from the physical growth of the children in the form of height and weight, while

the children's motor skills include walking, running, jumping, growth and child strength (Lightfoot, Cole, & Cole, 2013).

Related to the stimulation of various aspects of children development, early childhood education experts and instructors in Japan believe that child intelligence is not obtained through a number of cognitive treatments to train children's brain performance, for example by doing mathematical problems and memorizing foreign language vocabulary. But intelligence is gained through the provision of the same daily activities as children's activities at home, giving priority to varied learning experiences, training in child self-reliance, and training specifically the physical and physical abilities of children (Ramli, 2014).

The basic physical abilities that should be owned by early age children (EAC) based on age have been formulated by Gallahue and Ozmun (2006) i.e., early childhood aged 4 months to 1 year is categorized as having reflexive movement, or reflex movement, which is the most basic motor capability in humans. An example of

this movement is the movement or the baby's reflexes to sound, light, and touch. At the age of 1-2 years, children have rudimentary motor abilities, i.e. children begin to defend themselves, for example control head, neck, locomotor movement, manipulative, and movements.

When playing, children seem trying to hold the toy, and keep it always within reach. At the age of 3 to 7 years, children have a fundamental ability. In this age range, Gallahue and Ozmun also differentiate it into ages 2-3 years, 4-5 years, and 6-7 years. In this age range, children have the ability to master movements that require stability, locomotor, and manipulation. Visible activities include running, jumping, kicking, throwing, and walking on a beam that requires balance.

The achievement of aspects of children development can be reached through the assessment of children growth. To see if the gross motor development of children is in accordance with age, teachers will refer to the Curriculum 2013. But Curriculum 2013 only describes what capabilities a child should have at a certain age, without any standard

quantification measures. For example, in Curriculum 2013 on gross motor of 4-5 year olds, it was written "Make jumping motions, jumping, and running in a coordinated manner". This is certainly difficult to measure, because there is no measurement of how far the child jumps, how fast the child runs, and others according to age.

The standard of gross motor development of early childhood at the age of 0 year up to 6 years in Indonesia is regulated in Regulation of Minister of Education and Culture (Peraturan Menteri Pendidikan dan Kebudayaan/Permendikbud) Number 137 year 2014 on the curriculum of early childhood article 16, and clarified in Appendix section. Some standards of gross and fined motor performance of EAC at the age of 0-6 years have been described, but the quantification size of the capability is not explained.

In Japan, the recording of EAC progress is conducted through physical survey (*tairyoku*) and physical ability (*undouryoku*) of students from early childhood to primary school regularly per year. The government is in line with

educational experts who argue that physical development and physical abilities of children is the basis of attitude and cognitive development in the next phase of age.

Measurable motor and fine motor measurements need to be developed to detail the standard of motor skills in Curriculum 2013. The Japanese Studies Center, Institute for Research and Community Service, Universitas Sebelas Maret has conducted studies on several physical training models and measurement of EAC physical capabilities in Japan. Based on the results of the study since 2013, introductory activities of Japanese early childhood model have been implemented especially in EAC physical training. In 2017, the activities focused on introducing Japan's gross motor (physical) ability measurement system and applied it to ECE in Karanganom sub-district, Klaten district, Central Java.

The advantages of instruments measurement applied in Japan are based on longitudinal research results, more quantifiable in achievements and standards of measurement, and have been through validity testing and reliability for

long periods of time. The data measurement of five gross motor skills of early childhood students in Japan has been surveyed since 1966, so the Japanese government has data on the physical development of EAC from time to time used by the government as the basis for curriculum change in the early childhood (Sugihara, et al 2006) .

The activities of community service aim to 1) change the thinking of early childhood teachers who always consider the development of physical ability is less important and not related to cognitive development; 2) train the skills of ECE teachers in measuring physical development and physical capability of EAC; 3) gain results of rough measurements of physical development and physical capability of EAC in Karanganom. This article explains the results of the third goal achievement.

## **METHODS**

The method used in community service was the critical action research (Kemmis, 2009). Kemmis explains that action research is a simultaneous activity that can change the actors 'practices or actions, the actors' understanding of

their actions, and the conditions or circumstances in which they perform such actions. There are three types of action research, namely technical action research that serves to control changes in outcomes; practical action research that focuses on educating the perpetrators to be wiser and cautious in taking action; and critical action research that focuses on changes in previously under-standard actions and situations to meet the standards undertaken in the group.

By applying this method, the teachers were invited to be aware of the problem condition and the existing condition in each Early Childhood Education, learned the standard contents of Curriculum 2013, and next improved the knowledge and understanding of how to change the condition through a series of training by adopting the system from Japan. The measuring instrument was divided into two, namely EAC-rated physical capability instruments adapted from Japan (Table 1).

Children measured in measurement practice were chosen purposively by educators such as children in one study group or class. The EAC groupings were divided

into four groups; 2-3 years of age (equal to 24 months to less than 36 months), age 3-4 years old (36 months to less than 48 months), 4-5 years old (48 months up to less than 60 months), and 5-6 years old (60 months to less than 72 months).

There are 21 ECE institutions in Karanganyar sub-district spread in five clusters. Measurements were carried out in four clusters, involving representatives of instructors from each ECE who had attended the training organized by the LPPM UNS Team 2014-2016. The training that has been followed by the instructors was the training with the knowledge material about the development of learners thoroughly, knowledge about the relationship of physical development and brain development (cognitive), introduction of EAC physical training method in Japan, Japan Early Childhood Curriculum, EAC / workshop on physical measurement and physical capability of EAC adaptation from Japan.

Table 1. Measurement instruments for Japanese physical capabilities

No	Ind.	Notes	Measurement Unit
1	Running ability 25 m	The checking of the EAC ability to run the as far	time (seconds)

No	Ind.	Notes	Measurement Unit	No	Ind.	Notes	Measurement Unit
		as 25 meters, measured in seconds. Measurements: Above ground, start and finish marks are made within 25 m. The track is set 25 m in the right line, and 30 m on the left line. Running competitions are performed in boys' groups and girl groups, each with three people each time.				holding the body weight. Tool: Wooden beam or rack cabinet of 70-75 cm in height, installed within 30 or 35 cm. Above the beam, white tape is installed to mark the position of the hand which should not cross the marker boundary; stop watch. How: The children put their hands on the block, lift their body by leaning on both hands. The length of time used by each child to hold his body is measured by a stopwatch. Maximum size is 3 minutes, if passing the time, the child is asked to stop. Do not show the stopwatch to the child. Done once.	(minutes)
2	Jumping ability	On the floor or on the ground, a marker (tape) is placed for 2 m, and a measuring instrument is mounted. After the children jump, make a mark with the tape of children's leap distance, then it is measured. The children are given a chance to jump three times, and the best value will determine.	Jumping distance (cm), 3 times				
3	Throwing ball ability	Activity: ball throwing. Tool: tennis ball or softball ball (weight 136-146g, circumference 26.2-27.2 cm); a long gauge, in the field make the boundary line lengthwise per meter, up to 6 meters, and every 50 cm is marked. How to: Watch the children's hands and feet. The children throw with their right hand, then positions their left leg in front, and vice versa. The children throw twice, and the best value is used as a determinant	throwing distance (m), two times				
				5	Jumping on two legs with the same distance ability	Activity: jumping on feet above the block. Tool: wooden beam with size l= 10 cm, h= 5 cm, and w = 5 cm, 10 pieces; plastic black tape, on the floor is made a line along 4m 50 cm, and every 50 cm is marked with tape, and the wooden beam is placed in that position; stopwatch.  How: A child jumps like a rabbit, i.e. landing on two legs. The child's initial start stands 20cm from the first beam, then starts jumping on the beam, and up to 10 blocks. If a child fails to	time (minutes)
4	Holding	Activity:	time				

No	Ind.	Notes	Measurement Unit
		jump, e.g. falling, then jumping activities can be continued but with different time records. The time taken by a child to jump over 10 beams is measured with a stopwatch	

## RESULTS AND DISCUSSION

Measurements were made by involving the EAC with the age range divided into 2-3, 3-4, 4-5 and 5-6 years, and grouped by gender. In general, measurements of physical development, such as height, weight, range of hands, and height in a sitting position, could be done well because children tended to be arranged easily, and instructors were more trained.

However, the measurement of the physical ability of the children was rather difficult to implement because the children were not familiar with the rules of measurement, and in children of younger age, generally felt afraid and worried about what would be done and therefore they tended not to perform optimally. To improve the data, each early childhood education performed repeatable measurements beyond the measurement time with

the monitoring of the PSJ UNS TEAM.

## Physical Development

In weight measurement (Fig. 1), there were no significant differences between boys and girls at any age range. Based on the data, it was also known that the age of 2-3 years indicated an average body weight of 12.72 kg, age 3-4 years weighing 13.84 kg, age 4-5 years of 14.32 kg, and at the age of 5-6 years, the average the child's weight was 17.08 kg. The difference in weight by age is a common thing to happen.

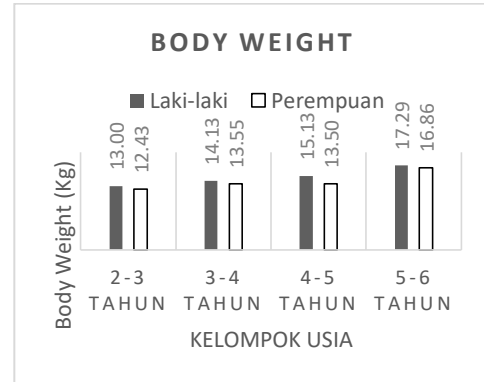


Figure 1. A Diagram of Children's Weight based on Age Range and Gender

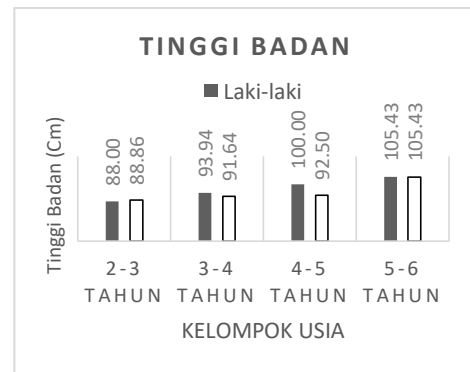


Figure 2. A Graph of Weight

Figure 2 is a graph of height, showing that there was no significant difference between boys and girls, except in the 4-5 years age range of male height with girl which was quite significant.

**Gross motor ability**

Figure 3 showed the ability to run as far as 25 meters which was calculated in seconds. The graph showed that the ability to run of children up to 3 years of age, girls exceeded the ability of boys, but at the age of 4 years more, boys have the ability to run better than girls. Based on the data obtained, the ability to run of children showed a negative linear relationship with the development of age.



Figure 3. The Graph of Running Ability

When compared to the achievements obtained by children 4 - 6.5 years old in Japan, the ability to run 25 meters EAC in Karanganom was lower. A 4-year-old boy in

Japan could run for an average of 8.13 seconds, age 5 in 6.52 seconds, and 6 years old in 6.26 seconds (Sugihara et al, 2006).

The ability to jump on two feet measured in centimeters indicated that the ability to jump of girls was better than boys (Figure 4). The ability to jump of children increased by age. When compared to the measurement of boys in Japan, by the age of 4 years, the median jump is 75.1 centimeters, the age of 5 years as far as 94.8 cm, and the age of 6 years as far as 112.4 cm.

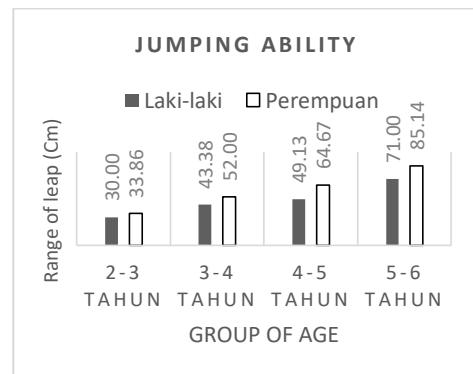


Figure 3. The Graph of Jumping Ability

The ability to throw a ball showed that there was no significant difference between boys and girls, but in the age range of 5-6 years, boys had better throwing ability than girls (Figure 5).



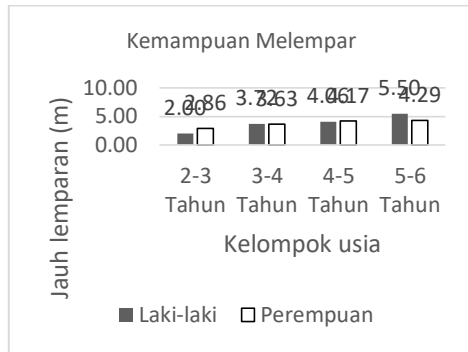


Figure 4. The Graph of Throwing Ability

Compared to their peers from Japan, a 4-year-old boy in Karanganom threw farther, i.e. 3.72 m, while in Japan it was as far as 3.3 m. However, at the age of 5 and 6 years, boys in Japan were superior (5.0 m and 7.0 m).

Figure 6 showed the ability to hold the body using the hand in seconds. In diagrams, seen at ages of up to 5 years, boys had better abilities than girls, but by the age of 5-6 years, girls' abilities were better than boys. These data were needed to be confirmed further by taking the same measurements on a number of children in the same age range.

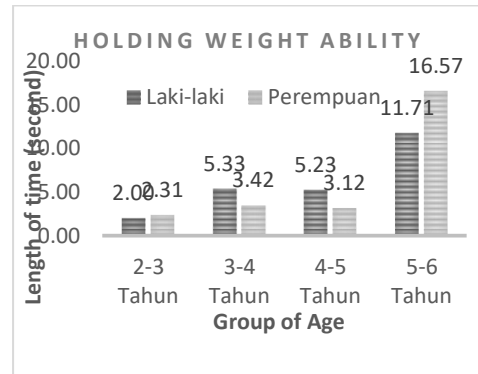


Figure 5. The Graph of Holding Weight Ability

A 4-year-old Japanese boy could hold the body for 16.0 seconds, 5 years old for 31.9 seconds, and 6 years old for 54.4 seconds. Compared to children's ability in Karanganom, the ability of EAC in Japan was very high. This was most likely because children measured in Karanganom were unaccustomed and also likely because the measured child's weight would affect their durability.

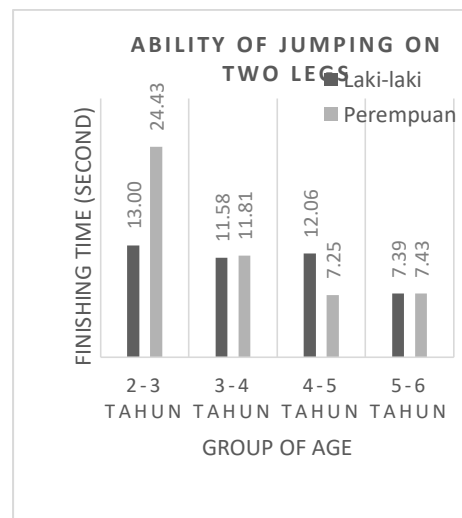


Figure 6. The Graph of Jumping on Two Feet Ability

The ability to jump on two feet of the same distance was measured in seconds. The ability between boys and girls did not differ significantly, except in the 2-3 years of age range. At the age of 2-3 years, girls had a better ability than boys (Figure 7).

Compared to the Japanese boys, the Karanganom EAC capability was lower. At the age of 4 years, Japanese children were able to jump in 8.46 seconds, 5 years age in 6.24 seconds, and 6 years age in 5.34 seconds (Sugihara, et al, 2006).

The results of the measurements have not been able to describe the actual ability of Early Childhood Education children in Kecamatan Karanganom, Klaten, Central Java. This is due to limitations of measured children data and less accurate measurement data in low-age children. Rough physical training activities at Early Childhood Education institutions in Karanganom need to be directed to structured physical skills training. Measurements that have taken place in Japan have been done for so long that each EAC has generally attended

a standardized physical skills training program.

## **CONCLUSION**

Based on data that has been collected and analyzed, it could be seen that the physical abilities between boys and girls in all age ranges were not significantly different. Compared to EAC peers in Japan at the age of 4 to 6 years, the gross motor abilities of children in Karanganom were lower. This was allegedly because the measurement was still not optimal and needed a longitudinal measurement to obtain valid and reliable data. In addition, the physical skills training of EAC in Karanganom needed to be more focused.

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