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Development of *Si Buyung* Gymnastics-Based Motion Learning Model to Improve Students' Basic Motion Skills: Aiken Validity

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Abstract The primary objective of this research was to create a model of Buyung gymnastics in gross motor learning in early childhood. **Methods**: This study included 5 material experts and 2 nationally licensed gymnastics experts, 2 early childhood education teachers, and 1 doctoral lecturer with early childhood evaluation and learning expertise. This study also made use of several documents. Development research was used in this study. This study was divided into three stages: (1) qualitatively analyzing documents in the form of a review of relevant literature, then conducting field observations and interviews to rationalize the problem so that it can be used to create a gymnastic model; (2) The researchers developed a *Si Buyung* exercise model to improve gross motor skills in kindergarten students and created a questionnaire to be handed to experts as an instrument; (3) After the *Si Buyung* model was created, the researchers validated it with five experts using the Delphi technique. **Result**: The computation results revealed that the total content validity of each statement item is more than 0.79, indicating that all statement items meet the criteria. An average of 0.84 was attained overall. **Conclusion**: Based on Aiken's validity, *the Si Buyung* exercise model for improving gross motor skills in early childhood has a good score, indicating that *the Si Buyung* exercise model can be applied in early childhood.

Keywords *Si Buyung* Gymnastics, Gross Motor Skills, Early Childhood, Development

1. Introduction

Physical education's major purpose is to promote a physically active lifestyle [1], [2]. According to experts, quality school Physical Education programs serve a fundamental purpose in enriching children's learning experiences [3]–[6]. Aside from attitudes and information, motor skills are crucial in this process [7]. Physical education helps students acquire motor skills and fundamental physical competence, as well as social, cognitive, affective, and behavioral skills and behaviors. It also helps students build lifetime patterns of physical activity [3], [8], [9].

Motor skills are necessary for participating in sports culture and developing a physically active lifestyle [10]. Motor performance is an important learning outcome in physical education, according to the majority of studies in school-based physical education research [11]–[13].

Physical activity engagement in early childhood is associated with beneficial health outcomes such as higher adiposity, cognitive development, bone, and skeletal health, and psychosocial and cardiometabolic health [14]. Physical activity guidelines in the UK, Canada, and Australia recommend that preschoolers should engage in at least 180 minutes of physical activity per day, with at least 60 of this being moderate to vigorous physical activity [15]–[17].

Crawling, walking, sprinting, balancing, throwing and catching balls, and climbing on playground equipment are some examples of gross motor abilities [18]. Gross motor skills in children must be enhanced at a young age since they play a vital role not only in the child's interaction process but also in supporting several other developmental processes [19]. The movement and coordination of one's muscles and body are referred to as motor abilities [20]. A sufficient degree of motor skills can contribute to a lifetime of happiness through physical activity, sports involvement, and a healthy lifestyle [21].

Various academics generally agree that there is a correlation between motor and cognitive abilities [22], [54], [55], [56]. According to research, children with well-developed gross motor capacities do better cognitively [23]–[26]. Furthermore, education, early childhood care, and developmental psychologists agree that motor and cognitive development overlap and are interrelated [27][57]. The correlation between motor development and cognitive development has provided support for the fundamental hypothesis of child development.

Based on the theory of "Piaget" motor and cognitive development is related to thinking through body movements [28]. Gross motor skills are positively related to physical activity and physical fitness and improve basic movement skills in children [29]–[31]. Based on the results of research that the tendency to perform physical activities that cause high neuromuscular impact, namely strength, can significantly support the development of gross motor skills, and limited capacity to perform movements with high neuromuscular impact can be associated with a lack of motor skills [32].

Indicators of general motor development for children aged 5 to 6 years demonstrate that children can engage in general motor development activities from a young age [33]. Through playing activities and children's motor development exercises, they can rotate their bodies regularly, conduct motions before running and jumping, and bend their hips, knees, and ankles.

Gymnastics is one of the sports that can help to improve overall athletic skills. Gymnastics is a sport that can be utilized to help children improve gross motor skills in the early years. *Si Buyung* gymnastics was employed by the researchers in this case. The gymnastics concept is created in the form of a story. The story in *Si Buyung* gymnastics can motivate children to exercise; for example, in gymnastics, the moves are said to mirror farmer work. The child will move in the manner of a farmer hoeing. Gross motor learning in kindergarten children is supposed to be attained through *Si Buyung* gymnastics.

Si Buyung exercise model for gross motor learning in Early Childhood Education will be developed in this study. The researchers' assumption in this model can be employed by teachers for gross motor learning in early childhood. The basic goals of gross motor learning can be reached, and teachers can be trained to be creative in changing learning, as well as function to aid children's growth and development. The development process, however, cannot be separated from the validation process. As a result, this research aims to evaluate the validity of the content of the *Si Buyung* model developed by researchers.

2. Materials and Methods

This is development research, which is an endeavor to create a design or a product [34]–[37]. This study included 5 document experts and 5 material experts. Two nationally licensed gymnastics experts, two kindergarten teachers, and one doctorate-level lecturer with expertise in early childhood evaluation and learning make up the material experts. The researchers conducted a qualitative analysis utilizing documents in the form of a review of relevant literature in the first stage, then conducted field observations and interviews to rationalize the problem so that it can be used to create a gymnastic model in the second stage. In the second stage, the researchers developed a *Si Buyung* exercise model to increase gross motor skills in kindergarten students, as well as a questionnaire that would be given to experts. After compiling the *Si Buyung* model, the researchers validated it to five experts using the Delphi technique in the third stage [38], [39] in which the researchers met with each expert one by one, presenting the results of the compiled model and the completed questionnaire prepared. The researchers validate the *Si Buyung* model to five experts using the Delphi technique in the third stage, after the *Si Buyung*

model has been compiled [38][39][53][54], namely the researchers meet the experts one by one by providing the results of the compiled model and the completed questionnaire arranged. The third stage discovered the results of 5 expert assessments in the form of suggestions and ratings on a Likert scale of 1-5, then the researchers improved on the obtained suggestions and performed a quantitative analysis using the Aiken formula [40], which was processed using excel application assistance. The Aiken formula is as follows:

$V = \sum s / [n (C-1)]$
$S = r – lo$
Lo = lowest value
C = highest value
R = numbers given by the rater

3. Results

Si Buyung gymnastics model is structured for gross motor learning in early childhood, especially in kindergarten children, including (a) students can express themselves with various movements of the hands, feet, and head according to the storyline and rhythm, (b) students can express in varied movements with agility and flexibility, (c) students can stand on one leg within 5-10 seconds, (d) students can walk on a line, (e) students can walk on tiptoe with a distance of 3 meters, (f) students can jump in place and walk backward, (g) students can jump 4 times forward.

A cassette and VCD to play the *Si Buyung* gymnastics song, a large field, and chalk to construct circles and signs are the materials needed to do the *Si Buyung* gymnastics. In this case, the teacher inspects the field conditions to ensure that the field used is safe, the teacher draws a circle with the chalk that has been prepared, the students are given instructions and are lined up according to the circular formation, students stretch their hands so they don't touch each other, and the teacher immediately turns on the boy's gymnastic music using the tape that is already available. The following are the outcomes of the *Si Buyung* model for improving gross motor skills in kindergarten students, based on qualitative analysis in the form of suggestions from 5 experts and quantitative assessment, The results are presented in tables 1 and 2 as follows:

Table 1. Design of the *Si Buyung* Gymnastic Model to Improve Gross Motor Skills

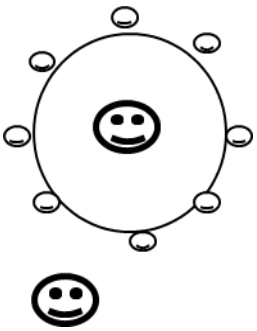
Storyline	Gymnastic movements	Measures	Formations
Warming up **Rhythm song 2/4 (Indonesian children's songs):** *Potong Bebek angsa* *Potong bebek angsa, masak dikuali, nona minta dansa, dansa empat kali, sorong ke kiri, sorong ke kanan, lala lala lala lala la la la* **Continuation of the *Potong bebek angsa* (Indonesian children's songs)** *Sorong ke kiri, sorong ke kanan, lala lala lala lala la la la* **The song of *naik Delman* (Indonesian children's songs):** *Pada hari minggu ku turut ayah ke kota, naik delman istimewa ku duduk di muka, ku duduk samping, pak kusir yang sedang bekerja, Mengendarai kuda supaya baik jalannya. Hai tuk-tik-tak-tik-tuk tik- tak-tik-tuk tik-tak-tik- tuk, tuk-tik-tak-tik-tuk tik- tak bunyi sepatu kuda*	The song of *Potong Bebek Angsa*: Students move to the rhythm of the song • Students run slowly in place to the rhythm of the song • Students make movements such as pushing to the left • Students make movements such as pushing to the right • Students move their bodies to the right and left with their hands above • Students make movements such as pushing to the left • Students make movements such as pushing to the right • Students move their bodies to the right and left with their hands above • Students run slowly in place as if they were riding a horse • Make jumps • Students run in place and end with a forward jump. • Students run in place and end with a forward jump	Warm-up exercises	 : teacher : student : circle line as a formation mark : tapes, VCDs and exercise cassettes

Table 1. continued.

<table>
<tr>
<td>Core exercise: Story theme: Farmer who is afraid of snakes

B.1.1 Stretching exercise
Mr. Tono always goes to the rice fields in the morning, and before he goes, he sees birds in front of his house. Mr. Tono prepared to take the hoe to the fields once he was pleased with watching the birds. Mr. Tono relaxed his hands first before bringing the hoe. Mr. Tono bends his body first so that his body feels fresh and strong for the walk from his house to the rice fields.

B.1.2. Relaxation exercises
On the way Mr. Tono saw a windmill, the windmill was spinning in the wind.

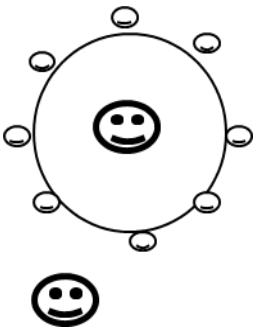
Continuation of the story: Farmer who is afraid of a snake

Mr. Tono continued his way to the rice fields after being happy with the windmills. Mr. Tono noticed a farmer herding ducks find food on his approach to the rice fields. The ducks go by, their butts wiggling.

B.1.3. Exercises for Strengthening
Mr. Tono arrived at the fields and immediately began hoeing his fields in preparation for corn planting. Mr. Tono promptly planted maize after finishing hoeing. Corn plants cover Mr. Tono's rice field.

Continuation of the story: Farmer who is afraid of a snake

B.1.4. Relaxation training
Mr. Tono was exhausted after a long day of hoeing and planting maize. He then raised and lowered his hands to dispel his tiredness.
Mr. Tono sought to stoop down and move his hands to relieve his aches</td>
<td>Neck stretching: (head up, down, to the right and left)
Hand stretching:
• Hands forward and palms bent down and up
• Right hand bent to the left, left hand bent to the right
• Stretching by twisting the body to the right, left, as well as down
• Rotate the hands back and forth like imitating a windmill movement
• Rotate the hands simultaneously forward and backward imitating the movement of a windmill
• Shake the hips to the right, left, forwards, and backward
• Students imitate the hoeing movement
• Students do the movement to plant corn
• Students move their hands above and then dropping hands down by bowing
• The position of the body bent and then moving the hands toward the inside of the body.</td>
<td>The core exercises are broken down into 5 parts, including: (1) body exercises, (2) balance training, (3) strength and agility training, (4) walking and running exercises, and (5) jumping and jumping exercises. Specifically, body training is divided into 4 exercises, namely stretching exercises, weakening exercises, strengthening exercises, and release exercises

B.1.1 to B.1.4 is included in body exercises.</td>
<td rowspan="2"> 

  : teacher
  : student
  : circle line as a formation mark
  : tapes, VCDs and exercise cassettes</td>
</tr>
<tr>
<td>B.2. Balance training
Mr. Tono ran home from the fields because it was getting late in the afternoon. Mr. Tono noticed a crane on his way. Mr. Tono observed a crane raising its leg. He noticed an airplane flying low after monitoring the cranes for a long.</td>
<td>• Students stretch both hands by lifting one of the legs by bending the leg, then the bent leg is straightened, done with the legs alternately
• Stretch the arms by bending the body and lifting one leg straight back, lifting the legs alternately.</td>
<td>(2) balance exercises,</td>
</tr>
</table>

Table 1. continued.

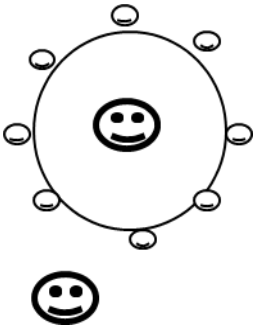
B.3. Strength and agility training Mr. Tono continued on his way. Mr. Tono passed by Mr. Haji Toyib's mango garden on the way. Mr. Tono began collecting mangoes on tiptoe after obtaining permission from Mr. Toyib. Mr. Tono may occasionally throw the mangoes he has chosen on the ground. Mr. Tono had to bounce up and down to reach some mangoes that he couldn't reach on his tiptoes. When Mr. Tono was able to pick up tall enough mangoes, he discovered that many mangoes had fallen. Mr. Tono then squatted to grab falling mangoes	• The movement starts from standing, tiptoeing, squatting, standing on tiptoe, standing straight Jumping movements like a frog (legs bent, refusal movement, and hands in front of face)	(3) strength and agility training	
B.4. Walk and run Mr. Tono continued his walk home after finishing his mangoes. Mr. Tono unintentionally witnessed a snake resting. Because he was terrified of snakes, Mr. Tono walked on tiptoe to avoid waking the snake, then stepped as wide as he could. Mr. Tono attempted to move backward and sideways to avoid the snake. Mr. Tono ran gently after passing the snake to get away from it. Mr. Tono took off quickly after a short distance.	Walk in a squat following the formation of the Way: • Walk on tiptoe • Wide step path • Walk forward and backward • Walk sideways right and left Run: • Run in place slowly • Run around the formation	(4) walking and running exercises	
B.5. Jumping exercises (on one leg and two legs) The route to the house is still long, and the road is also broken, with several potholes in the center of it. Mr. Tono jumped over the pothole in the road. It's not enough to jump, Mr. Tono also jumps using one foot so he can quickly pass through the holes in the road. After going through many obstacles on the way, Mr. Tono finally arrived home safely.	Jump: • Jumps like a kangaroo • Jump forward Hop: • Jumping with one leg (tiptoe), done with alternate legs	(5) jumping and jumping exercises	 : teacher  : student  : circle line as a formation mark  : tapes, VCDs and exercise cassettes
Cooling down **Rhythm song 3/4 *Naik-naik ke puncak gunung*** *Naik-naik ke puncak gunung* *Tinggi-tinggi sekali* *(2 X nyanyi)* *Kiri kanan kulihat saja* *Banyak pohon cemara* *Kiri kanan kulihat saja Banyak pohon cem*	• Move the hands up until they return to the sides of the body, followed by the tiptoes until they land again. When the hands are up it is followed by deep inhaling, and when the hands go down to the sides of the body followed by exhaling through the mouth Lean the body to the right, both hands up, right foot in front, and left foot back on tiptoe • Left leg bent, right leg straight sideways, and both hands bent on the thigh of the right leg • Lean body to the left, both hands up, left foot in front, and right foot back on tiptoe • Right leg bent, left leg straight sideways, and both hands bent on the thigh of the left leg	Cooling down	

Table 2. Results of content validity based on the Aiken formula for the *Si Buyung* Gymnastic Model

Item	Rater					S = r – lo					∑	n*(c - 1)	V=S/(n*(c-1))
	1	2	3	4	5	1	2	3	4	5			
1	4	4	5	5	5	3	3	4	4	4	18	20	0.9
2	5	5	5	4	5	4	4	4	3	4	19	20	0.95
3	5	5	4	4	5	4	4	3	3	4	18	20	0.9
4	5	4	5	5	4	4	3	4	4	3	18	20	0.9
5	5	5	5	4	5	4	4	4	3	4	19	20	0.95
6	4	5	4	5	5	3	4	3	4	4	18	20	0.9
7	5	5	5	5	4	4	4	4	4	3	19	20	0.95
8	4	5	4	5	5	3	4	3	4	4	18	20	0.9
9	5	4	5	5	4	4	3	4	3	4	18	20	0.9
10	5	4	5	4	5	4	3	4	3	4	18	20	0.9
11	5	5	5	4	5	4	4	4	3	5	20	20	1
12	5	5	5	5	5	4	4	4	4	4	20	20	1
13	4	4	4	5	5	3	3	3	4	4	17	20	0.85
14	4	4	4	4	4	3	3	3	3	3	15	20	0.75
15	5	4	5	4	4	4	3	4	3	3	17	20	0.85
16	5	4	5	4	5	4	3	4	3	4	18	20	0.9
17	4	5	4	4	5	3	4	3	3	4	17	20	0.85
18	4	4	4	5	4	3	3	3	4	3	16	20	0.8
19	4	5	4	4	4	3	4	3	3	3	16	20	0.8
Average													0.89

Based on the aforementioned aiken analysis, the following Aiken value has been determined: Item (1 *Si Buyung* gymnastics-based motion learning model is in accordance with basic competence receives a coefficient value of 0.90, item (2) *Si Buyung* gymnastics-based motion learning model is difficult according to the order in compiling the gymnastics and receives a coefficient value of 0.95, and item (3 *Si Buyung* gymnastics-based motion learning model is in accordance with the characteristics of category B kindergarten students and receives a coefficient value of 0.90, item (4) *Si Buyung* gymnastics-based motion learning model is safe to use and receives the coefficient value of 0.90, item (5) the tools used are economical and cheap with a coefficient value of 0.95, item (6) *Si Buyung* gymnastics-based motion learning model is declared to be fun with a coefficient value of 0.90, item (7) the tools used are practical to practice with a coefficient value of 0.95, item (8) *Si Buyung* gymnastics-based motion learning model is easy for kindergarten children and receives a coefficient value of 0.90, item (9) the motion learning model based on the little boy's gymnastics invites children to express various body movements and gets a coefficient value of 0.90, item (10) *Si Buyung* gymnastics-based motion learning model trains children's physical motor skills to get a coefficient value of 0.90, item (11) *Si Buyung* gymnastics-based motion learning model trains students' locomotor movements to receive a coefficient value of 1.00, item (12) *Si Buyung* gymnastics-based motion learning model trains non- locomotor students to get a coefficient value of 1.00, item (13) motion learning model based on *Si Buyung* gymnastics trains students' manipulative movements to get a coefficient value of 0.85, item (14) motion learning model based on *Si Buyung* exercise gets a coefficient value of 0.75, item (15) learning model motion based on innovative *Si Buyung* gymnastics gets a coefficient value of 0.85, item (16), item (16)*Si Buyung* gymnastics-based motion learning model effectively trains students' physical motor skills to receive a coefficient value of 0.90, item (17) *Si Buyung* gymnastics-based motion learning model invites children to make varied movements agile and receives a coefficient value of 0.85, item (19) children are able to make body movements coordinated, flexibility and balance get a coefficient value of 0.80. The content validity coefficient value of five (5) raters with five (5) answer categories is said to be good by Aiken (1980) if a minimum validity coefficient of 0.79 is obtained, and the

calculation results show that all validity of the contents of each statement item obtained more than 0.79, indicating that all statement items met the criteria. The overall average is 0.89.

4. Discussion

According to the findings of the preceding study, *Si Buyung* gymnastics contributes significantly to the development of children's gross motor skills. The findings of this study show that joyful exercise videos are both possible and beneficial as a learning medium for enhancing students' gross motor skills, according to researchers Hartini and Abubakar [41]. This is consistent with Wijayanti's findings that rhythmic gymnastics activities help improve children's gross motor skills [42].

The teacher is aware that *Si Buyung* gymnastics serves several purposes, including the development of children's gross motor skills coordination, the development of children's imagination abilities, and the training of children's strength, balance, and responsibility. Because children are very excited when prompted to execute exercises, *Si Buyung* gymnastics is ideal for the development of gross motor skills. The findings of this study back up the notion of [43] that gymnastics is a learning strategy for training children's motor development and causing feelings of pleasure in children, as well as a manner of motivating children to feel more at home in school. *Si Buyung* gymnastics is included in the category of rhythmic gymnastics which can be applied to early childhood learning to develop movement [44]. Furthermore, rhythmic gymnastics has a significant impact on gross motor development in early childhood because early stimulation through rhythmic gymnastics is beneficial [45]. *Si Buyung* gymnastics necessitates movement accompanied by music and narration to supply motor sensors with motion experience and to develop movement based on rhythm.

The development of Si Buyung gymnastics is carried out with a duration of 30 minutes. This is based on previous research showing that the positive impact of regular exercise leads to an increase in the operation of executive functions up to 30 minutes of exercise duration [46], [47]. Other evidence suggests that one exercise is enough to change mood during at least 30 minutes of exercise [48]. In addition, with such duration early childhood is encouraged by their physical education teacher to reach their full potential and improve skill levels, so many benefits are obtained when children participate in movement programs designed to maximize their motor skills [46].

To improve children's gross motor development, they are always encouraged to participate in physical activities such as dancing, gymnastics, and sports [49]. *Si Buyung* Gymnastics is here to create a space for youngsters to express themselves through movement. Because movement is a fundamental form of experience and communication, the *Si Buyung* gymnastics model is packaged in systematic exercises that will impact sensory, motor, social-emotional, cognitive, and individual skills, as well as a coherent integrated development experience [50].

Stimulating children through movement activities is critical for optimizing their growth and development. Learning physical activity in early life through *Si Buyung* gymnastics can have an impact on children's growth and development. *Si Buyung* gymnastics is capable of optimizing different domains in education, with the potential to educate the cognitive, affective, and psychomotor domains in the story form of *Si Buyung* gymnastics [51]. Gross motor skills in early childhood are the fundamental paradigm for the development of motor skills in general. Movement experience can improve motor sensory activity in employing muscles for movement; however, because early childhood has little experience with motion, a method, namely *Si Buyung* gymnastics, is required to stimulate movement based on rhythm [52].

Based on the description above, *Si Buyung* gymnastics can improve gross motor skills and have a favorable effect. The findings of this study provide scientific evidence that the motion learning strategy using *Si Buyung* gymnastics is one of the most effective strategies to build gross motor skills in children.

5. Conclusion

Based on the findings of the research described in the discussion section, it is possible to conclude that the motions performed in *Si Buyung* gymnastics are consistent with the characteristics of early childhood. *Si Buyung* gymnastic movements are adjusted to the curriculum's competency requirements and basic competencies, adapted to early children's growth and development, and adapted to the level of safety in carrying out school activities. *Si Buyung* gymnastic model is also appropriate for gross motoric learning in early childhood. The feasibility test was carried out based on the assessment of material experts, and the assessment of material experts revealed that *Si Buyung* gymnastics that was compiled was suitable for use as gross motoric learning for early childhood.

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