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Exploring the efficacy of game-based learning models in enhancing children's gross motor skills

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Abstract

Stimulating children's gross motor development requires exciting and fun activities. However, the learning model of playing while learning still needs innovation in child development. This study aims to identify the use of game-based learning based on its syntax in the learning process of jumping movements to optimize gross motor in children aged 5-6 years. This research uses a qualitative approach with descriptive methods. The research subject is a teacher who teaches children aged 5-6 in Aulia Islamic Kindergarten, Surabaya. Data collection techniques using observation. The indicators are jumped using both feet and coordination by observing jumping according to the footing picture. The data analysis technique used data reduction, presentation, and verification. The results showed that the teacher's teaching model was almost based on game-based learning syntax. There is one syntax that the teacher does not apply because it does not follow children's learning principles. Children also looked excited, happy, and able to jump. Therefore, the game-based learning model is suitable for early childhood institutions because children can stimulate gross motor skills in jumping exercises, stimulating meaningful learning. Subsequent research could investigate the long-term effects of diverse game-based learning models on retaining children's gross motor skills across different age groups and abilities.

Keywords: *game-based learning; gross motor skill; early childhood education; syntax learning process.*

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A. INTRODUCTION

The 0-6 years age needs to be optimized for growth and development. This period is called the golden age because children experience rapid growth and development. During the Golden Age, children's physical and mental development can be optimized (Nuraeni et al., 2019). Therefore, the aspects of development based on the Minister of Education regulation no 146 of 2014 include religious and moral values, physical-motor, cognitive, language, social-emotional, and art need to be stimulated optimally.

Physical-motor development lays the foundation for other aspects, such as children's cognitive, social, and emotional development (Botha & Africa, 2020; Lopes et al., 2012). Veldman et al. (2019) state that there are positive impacts on gross motor skills, such as increased cognitive ability, fitness, better cardiorespiratory health, higher self-esteem, and increased physical activity and weight status. So that gross motor maturity is not only done a few times but every day. Gross motor is the body movement ability that involves large muscles or all limbs. Based on Minister of Education regulation no. 137 of 2014 section 10 concerning the early childhood education curriculum 2013 states that gross motor skills include the ability to move the body in a coordinated, flexible, balanced, agile, locomotor, and non-locomotor manner and follow the rules.

Primary Health Research results in 2013 shows the percentage of children with gross motor developmental disorders in Indonesia was 12.4%. Meanwhile, according to the United Nations Children's Fund (UNICEF), 1,375,000 children under the age of five experience fine motor and gross motor disorders per 5 million developmental delays. According to data from the World Health Organization (WHO), many countries have various developmental problems in children, including gross motor delays; the incidence rate in the United States ranges from 12-16%, Thailand 24%, Argentina 22%, and Indonesia reaches 13-18% (Hidayat, 2011). Therefore, it is essential to improve children's gross motor skills because gross motor skills are a skill that helps children perform daily activities such as jumping, running, walking, and standing on one foot (Bambang, 2008). In addition, if gross motor development is not achieved following the age stages of the child, it will lead to disorders or abnormalities in its development. One of the diseases that can cause disruptions in gross motor development is meningitis (Sahara et al., 2021). Meningitis is an inflammation of the brain and spinal cord lining associated with stiff neck fever (Kemenkes RI, 2019).

Activities requiring movement are needed to overcome the emergence of disorders or problems in children's gross motor development. A fun movement activity for early childhood is play. That aligns with Fjørtoft (2004) statement that play can improve motor development. Play is an activity that children do to fulfill their needs and bring pleasure or satisfaction (Istiarini, 2014; Trinova, 2012). Play makes children feel a variety of emotional states that may arise, such as pleasure, excitement, tension, satisfaction, and possibly disappointment (Mutiah, 2012). Learners who engage in game-based practice can work collaboratively with their teachers and families in an academic environment where their behavioral problems are often reduced. Teachers need to encourage children to interact with each other positively (Hewi & Shaleh, 2020). Moreover, social and emotional well-being

aligns with a holistic approach to teaching and learning, where children explore various elements of their identity (including social and emotional) through play and relationships (Garvis & Pendergast, 2015). Therefore, teachers must establish a learning model to optimize children's developmental skills, especially their gross motor skills. A suitable learning model is one way to achieve this goal.

One of the learning models that can be used for early childhood is Game-based Learning (GBL). Game-based learning not only provides "learning by doing" but can also increase and maintain learners' motivation to learn (Plass et al., 2015), which, according to pedagogical studies, is one of the most important factors that encourage learners to continue learning (Paas et al., 2005). As a pedagogical method, GBL uses play to teach knowledge and skills in an active and experiential play environment (Jaccard et al., 2022; Kolb, A. Y., & Kolb, 2005; Shaffer et al., 2005; Wiggins, 2016). Existing research has found a positive impact of GBL on learner activity, motivation, and behavior (Barbosa & de Ávila Rodrigues, 2020; De Freitas, 2018; Law, 2019; Vu & Feinstein, 2017). Overall, research on GBL suggests that learners' motivation is positively affected when positive affective states such as pleasure and excitement are present (Barbosa & de Ávila Rodrigues, 2020).

Learning models have different characteristics, undoubtedly affecting each model's advantages and disadvantages (Anggraini et al., 2021). The advantage of GBL is that it makes learning more fun and motivates students to increase their concentration (Hafeez, 2021), besides memory, socio-emotional skills, simulation, and skill achievement can trigger children's interest in learning (Lopez et al., 2023). However, GBL also has disadvantages. For learners, GBL may consume much time, and the game session length is difficult to predict (Boghian et al., 2019). In addition, some learners may feel uncomfortable as a result of competition, visibility, and comparison of game results (Domínguez et al., 2013; Šćepanović et al., 2015). However, in addition to generating positive emotions such as fun and excitement, mild confusion and frustration during GBL sessions can promote learning. Positive pressure can increase motivation and determination to succeed (Shute et al., 2015).

GBL requires learners to learn with a play approach because games have a purpose: to have fun. Game-based learning also makes all learning fun so that the teaching-learning process between teachers and students becomes more informative, creative, and innovative (Dewi & Listiowarni, 2019). Game-based learning creates an interactive, challenging, and fun learning experience. In addition, game-based learning activities in the classroom can increase the interaction of positive social relationships between learners and between learners and teachers (Papanastasiou et al., 2022). Learning with the GBL model, learners are expected to participate actively rather than passively, and GBL can make learners feel meaningful achievement and progress and provide immediate feedback (Kiili, 2005). Unlike learning using GBL, general or conventional classroom learning does not provide meaningful experiences for children. One of the most significant differences between GBL and traditional classroom learning environments is that learners rarely feel like playing in the latter (Lu & Lien, 2019). Hsiao & Chen (2016) used an interactive movement GBL approach to improve preschoolers' ability to learn word-related colors and improve their coordination and agility related to their motor skills.

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Based on the initial observation at Aulia Islamic Kindergarten in the group B1 class, it was found that the teacher used the GBL learning model. Researchers also observed activities that use the GBL learning model, where the teacher has designed the implementation by adjusting the existing conditions. The activity is the "Lompat Kaki" game to stimulate children's gross motor skills in jumping movements. The teacher applied the GBL learning model to optimize children's gross motor skills in jumping movements; it was found that children felt joy and enthusiasm when the teacher applied the GBL learning model. This happy feeling makes children able to play well. However, the game activities using the GBL learning model applied by the teacher are still several stages, not the syntax steps. However, syntax is a critical element of learning. It is supported by the statement of Joyce et al. (1992) that there are five elements in learning: syntax, reaction principles, social systems, support systems, instructional impact, and accompanying impact.

Research conducted by Festiawan (2020) shows that the traditional GBL learning model improves children's basic motor skills and can be used as an alternative, more effective learning process than conventional learning. Another research result shows that applying game-based learning with origami media significantly helped Kindergarten children's self-confidence and creativity (Maharani et al. 2020). However, this study focuses on identifying game-based learning (GBL) use based on its syntax in the learning process**.** in enhancing children's gross motor skills in children aged 5-6 years.

B. METHOD

This research uses a qualitative approach with descriptive methods. Qualitative research intends to understand the phenomena experienced by research subjects, such as behavior, perceptions, motivations, and activities. The descriptive method is used to describe or analyze a research result but is not used to make broader conclusions (Sugiyono, 2013). The research subject is a teacher who teaches children aged 5-6 in Aulia Islamic Kindergarten at Dukuh Bulu, Surabaya. Researchers aim to identify the use of GBL based on its syntax in the learning process to optimize 18 children's gross motor skills in the ECE unit.

The data collection technique used in this research is observation. Observation systematically records phenomena, behavior, objects seen, and other things needed to support the research (Sarwono, 2006). The data analysis technique in this study used the model of Miles & Huberman (1992), an interactive model in which three streams of activities co-occur: data reduction, data presentation, and conclusion drawing/verification. The data collection instruments in this study are in Table 1, adapted from Sulistyo et al. (2021).

Table 1. Gross Motor Skills of 5-6 Years Old Children

Variable	Sub-variables	Indicator
Gross motor skills of 5-6 years old children	Jump	Jump using both feet
	Coordination	Jumping according to the footing picture

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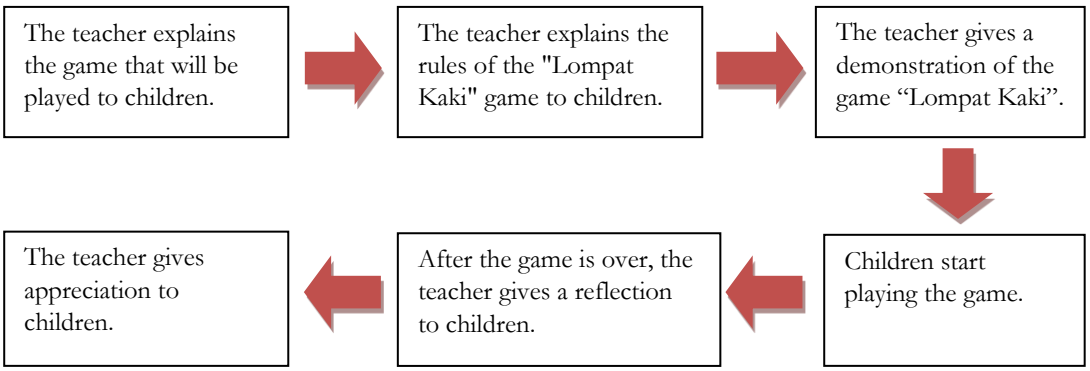
C. RESULT AND DISCUSSION

1. Result

The results showed that teachers in group B1 made teaching modules as a reference in implementing learning. The teacher applies the game "Lompat Kaki" in the core activity. The game uses colored pictures of footprints; the game is played by all children in group B1 by dividing two teams, namely the yellow and blue teams, each of 9 children. Nevertheless, although divided into sections, the teacher said this game still needed to be completed.

The researcher observed the learning activities carried out by the teacher using the GBL learning model. The following is a chart of the stages of the learning activities of the "Lompat Kaki" game carried out by the teacher.



Picture 1. Game flow chart "Lompat Kaki"

The teacher uses media in the form of a puzzle mat that has been attached to a picture of footprints to optimize jumping movements. Using media as a footprint picture puzzle mat is intended as a teaching aid by the teacher, and the media is safe for children. The footprint picture puzzle mat is placed in different directions so children can perform various jumping movements, such as left, correct, and forward. Doing various jumping movements can indirectly stimulate children's gross motor skills optimally.

In the GBL learning model, the teacher demonstrates playing "Lompat Kaki" to optimize children's gross motor skills. The teacher gives a demonstration of the game so that children can follow the game properly. Figure 2 below is a clear picture of the game's atmosphere using the GBL learning model.

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Picture 2. The teacher gives a demonstration of playing the game "Lompat Kaki"

Before the game begins, the teacher demonstrates and explains how to play the "Lompat Kaki" game so that children know how to play it. The demonstration shown by the teacher to the children is that the teacher makes a jumping motion according to the direction of the footprint picture. If the picture of the footprints points to the left, then the teacher jumps to the left, and if the picture points to the right, then the teacher jumps to the right. While doing the demonstration, the teacher also conveyed the game's rules, such as not being allowed to leave the footprint picture puzzle mat. Children can be seen paying close attention when the teacher demonstrates the game. After children listen and pay attention to how to play, picture 3 is an activity when children play the game.

Picture 3. Children is playing the game "Lompat Kaki"

The observations made by researchers showed that children were impatient to start playing after the teacher demonstrated how to play "Lompat Kaki." Then the teacher started the match or game "Lompat Kaki," and the children were enthusiastic and excited when the game started. Even when the teacher asked the children to play the game one more time, the children were happy and willing to play the game. The game is carried out in turns so that each child's gross motor skills in jumping movements can be stimulated. All the children jumped with both feet. In addition, children can perform coordination movements based on the footprint direction picture; if the footprints are facing left, the child faces left and then jumps; if the footprint direction picture is facing right, the child faces right and then jumps; and if the footprint direction picture is facing forward, the child faces forward and then jumps.

When the game is over, the teacher gives appreciation to the children and explains the game's purpose to the children. About the implementation of the learning process using the GBL model, the teacher asked the children about their feelings after playing the "Lompat Kaki" game. The following is the interaction between the teacher and the children:

"Kids, how did you feel while playing earlier? Are you happy or not?" (Group B1 teacher)
"Happy!" (children group B1)
"Was it fun?" (Group B1 teacher)
"Fun!" (Group B1 children)

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From these interactions, children in group B1 feel happy and satisfied, so they are enthusiastic about participating in learning using the GBL model that the teacher has designed.

The teacher also asked the children questions:

"What game did we play earlier?" (Group B1 teacher)
"Lompat Kaki!" (some children group B1)
"Jumping!" (answers some other children in group B1)
"That's right, the name of the game is "lompat kaki" by doing jumping movements. Which direction did we jump to?" (Teacher of group B1)
"To the front" (some children in group B1)
"Left" (some children in group B1)
"Right" (some children in group B1)
"Great kids, your answers are all correct. We jumped to the left, to the right, and the front. So the most important thing about the game is that the children can do the jumping movements, obey the rules, and have fun while playing. You did great!" (Group B1 teacher)

Based on the interview result, it can be underlined that the teacher conducted a reflection with the children at the end of the activity. The review is in the form of appreciation and reinforcement. Gratitude is done by the teacher in the form of praise to children for being able to do jumping movements and obey the rules of the game. At the same time, the reinforcement done by the teacher is about the game's name with jumping movements and the direction of the jumps that the children have done.

2. Discussion

There are five elements in learning: syntax, reaction principle, social system, support system, instructional impact, and accompanying impact (Joyce at al., 1992). The following are the syntax (stages) in the game-based learning process (Samudera, 2020): (1) Selecting games based on the topic. At this stage, according to the case of the teaching material, the teacher chooses the fun or games that will be used in learning. Because the more appropriate the round is selected, the better the learning results will be obtained; (2) Explanation of concepts. At this stage, the teacher presents the material as an introduction to help students better understand the core material used as game material. In addition, the teacher explains the game to be played; (3) Rules. At this stage, the teacher explains the rules that students must follow during the game and the technicalities of playing the game or games: (4) Playing the game. At this stage, students will play the game or games using the media provided by the teacher beforehand; (5) Summarising knowledge. At the end of the game, students will summarise the knowledge or record the key points explained by the teacher during the game; (6) Reflecting. Students reflect on the learning outcomes that have been achieved.

The teacher prepares the teaching module as a reference for the learning process, and when applied, it is almost by the syntax or steps of the GBL. Teachers arrange teaching modules with themes or topics of material that children will teach, which is

included in Syntax 1 (S1). The teacher explains the game being played, although the teacher needs to deliver the material as an introduction (S2). The teacher also explains the rules of the "Lompat Kaki" game to the children (S3). After delivering the game, the teacher demonstrates how to play to the children first; then, the children start playing the game (S4). When the game ends, the teacher gives the child a reflection (S6). Syntax 5, which should summarise knowledge, was not applied by the teacher because early childhood children still cannot write like adults. The principle of learning children using a fun play that does not make them feel pressured. Play is an activity that children do to fulfill their needs and bring pleasure or satisfaction (Istiarini, 2014; Trinova, 2012).

GBL is a suggested learning model to increase children's interest and motivation to learn (Chen & Law, 2016; Erhel & Jamet, 2013; Sun, 2013). It is evident because when the teacher introduces the game activity "Lompat Kaki," which will be carried out using the GBL model, children seem to feel enthusiastic, excited, and cannot wait to carry out the game. So, children's motivation will increase and persist. Based on pedagogical studies, this is one of the most important factors that encourage students to continue learning (Paas et al., 2005).

Game-based learning activities in the classroom can also enhance positive social interactions between students and between students and teachers (Papanastasiou et al., 2022). The positive interaction is in the form of communication by using polite and easy-to-understand language, looking into the eyes of the interlocutor, providing opportunities for each child to carry out the activity, and the teacher providing demonstrations clearly and in order. The existence of positive interactions can achieve learning success.

GBL creates not only positive interactions but also experiential learning. Therefore, as a pedagogical method, GBL uses games to teach knowledge and skills in an active and experiential game environment (Jaccard et al., 2022; Kolb, A. Y., & Kolb, 2005; Shaffer et al., 2005; Wiggins, 2016). The existence of an authentic experience can make children get meaningful learning that will affect their future.

Learning that uses the GBL model using games as a basis show that it can increase and bring out positive things, such as learning motivation, feelings of joy, student creativity, and children's desire to carry out learning. It aligns with Prensky's (2001) statement that games can fulfill basic learning needs by providing fun, intense engagement, structure, motivation, ego gratification, adrenaline, creativity, and social and emotional interaction. Children learn through games and enjoyable play experiences with materials, objects, peers, and adult support that help children to develop optimally (Anggraini, 2021). The principle of children's learning is through games that provide real experiences so that feelings of pleasure and motivation will arise and their development can be optimally stimulated.

However, the condition of GBL that uses matches and comparison of results makes learners feel uncomfortable (Šćepanović et al., 2015). In group B1, children were divided into two teams with a total of 9 children per team; at the end of the game, the yellow team

managed to finish the game first, which was marked by the child in the back row having made a jumping motion and returning to his row. The blue team, on the other hand, was a little late in finishing the " Lompat Kaki " game. Therefore, the yellow team felt victorious by cheering and jumping, while the blue team, who saw this, looked disappointed and just watched the yellow team. Even though before the game started, the teacher had told the children that the game was not competitive, At the end of the game, the teacher gave appreciation to each team and explained that the game was not contested and that the most important thing was that the children could do the jumping movements.

Jumping movement is one of the skills in gross motor development. Gross motor development skills provide the foundation for acquiring complex skills used in performing activities related to physical fitness, health, and sports (Bardid et al., 2016; Viegas et al., 2021). Gross motor development skills that use large muscles include walking, jumping, running, and moving the arms (Santrock, 2007). Physical activity is necessary to grow and develop gross motor skills (Asmuddin et al., 2022). Therefore, activities that can improve gross motor skills are physical activities that require large muscles.

Based on observations of the teacher's learning process, it was found that all children can perform jumping movements in the "Lompat Kaki" game using the GBL learning model. Teachers provide opportunities and involve children directly by practicing and doing themselves in learning. The teacher gives the child one try, so the child wants to try and is fearless in carrying out the game. The development of gross motor skills in kindergarten is identical to learning through play, so the stimulation must also be carried out through a learning process designed using games that create comfort and convenience for early childhood (Lestari & Ratnaningsih, 2016). The stimulation provided with a pleasant learning atmosphere can help children follow learning well so that their gross motor skills can develop optimally.

The learning results show that teachers using a well-constructed GBL learning model can increase children's motivation, enthusiasm, and satisfaction in learning. It can help children to optimize their development, especially in the aspect of gross motor skill development. Children can perform jumping movements through the GBL learning model applied by the teacher in achieving learning objectives, namely gross motor skills in jumping activities. A well-constructed game-based learning model can improve children's motor skills (Abdillah, 2019). At the same time, the results of research by Festiawan (2020) show that the traditional GBL learning model improves children's basic motor skills and can be used as an alternative learning process more effectively than conventional learning.

D. CONCLUSION

The teacher applied the game-based learning (GBL) model based on syntax and can stimulate children's gross motor skills in children aged 5-6. There is one GBL syntax that the teacher does not apply because it does not follow children's learning principles. Children feel

motivated, happy, and enthusiastic when playing, so they are willing to carry out GBL-based gross motor learning activities. All children in group B1 can do jumping movements so that their gross motor skills are well-stimulated. The long-term impact of game-based learning models on children's retention of gross motor skills across age groups and capacities might be the subject of future study. Thus, data regarding GBL in optimizing children's gross motor skills can be better studied.

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