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Jump and Crawl Game Development to Stimulate the Balance of 5-6 Year Olds

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Abstract

Early Childhood Education is defined as one of the various fields of education starting at the age of 0 (from birth) to the age of 6 years which provides learning activities by taking into account the characteristics of the child. This research aims to produce an effective, efficient and interesting Jump and Crawl game product. This game is focused on stimulating the balance of children aged 5-6 years which is equipped with a guide book. This type of research is Research and Development (RnD) using the ADDIE model. Assessment criteria from the aspect of efficiency, effectiveness and attractiveness. The instrument of quantitative data analysis technique was obtained from the validity of the material and the validity of the game development. The results of accumulated validity from several experts yield a percentage of 90.3% which means it is very feasible to use. The trial used small and large groups with the criteria for assessing effectiveness, efficiency and attractiveness. Qualitative data were obtained from interviews with two kindergarten schools in Blitar Regency. Researchers found that the Jump and Crawl game had three eligibility criteria, namely interesting, effective, and efficient to stimulate the balance of children aged 5-6 years.

Keywords
jump and crawl game; balance; early childhood

I. Introduction

Early Childhood Education (PAUD) is defined by one of various specific educational domains, with an age range of 0-6 years (Law on National Education System No. 20 of 2003). This age is a process of providing learning that leads to the physical and mental preparation of children in various aspects of life. Early childhood is defined as an individual who undergoes a process of development and growth that is so significant and also rapid and is often identified with a certain developmental spike (Khairi, 2018). Children are also part of the young generation, as one of the human resources, which is the potential and successor to the ideals of the nation's struggle, which has a strategic role and has special characteristics and traits (Rizal, 2020). Children are the mandate of God given to parents. For this mandate, Allah obliges every parent to care for, nurture and educate children to become good, smart, noble children and to avoid things that are not good (Hendra, 2019). The process of providing learning activities needs to be adjusted to the characteristics that exist in children in all aspects of development (Refiani, 2019).

Developmental aspects in the realm of Early Childhood Education include aspects of religious and moral values (NAM), art, physical motoric, social and emotional, language and cognitive (Permendikbud No. 146 of 2014). One of the various aspects of development in early childhood that is important is related to the development of children's physical

motor skills. Physical motoric is the development of body movement abilities in children (Febrialismanto, 2017). Physical motor aspects in children are expected to develop well according to the stages of age. These aspects include fine and gross motor skills. Gross motor skills are defined as the ability to move which involves body movements and large muscles, for example, running, walking, tiptoeing, jumping, crawling, swinging,

Gross motor development can be seen from the child's ability to move including manipulative movements, locomotor movements, and also non-locomotor movements (Setyawan, et al., 2018). The three movements have different characteristics. Locomotor motion is a movement to move from one place to another. Non-locomotor motion is movement in place or stabilizing motion. While manipulative movements are movement skills such as catching, throwing and hitting. Basically, every child in this motor skill is not the same, it depends on the number of elements of movement that the early childhood has mastered. In the Jump and Crawl game, more emphasis is placed on the realm of locomotor motion such as jumping, tiptoeing and crawling.

Balance is one of the gross motor elements that shows an individual's skills in maintaining and also maintaining his body in several positions and movements (Yuliniarsi, 2014). Balance is defined as the ability or skill in maintaining the body when making movements (Hakim, et al, 2013). This balance is considered a relative ability or skill to carry out control of the body's center on the fulcrum (Nur, et al., 2019). Static balance is the ability to maintain balance in a fixed position so that it does not sway or collapse, meanwhile dynamic balance is defined by the ability or skill to maintain and control balance when moving so that when carrying out a movement it does not fall (Sujiono, et al. 2008). Balance is part of physical fitness. Physical fitness is the body's ability to carry out daily activities without causing significant fatigue (Santoso, 2016). The various factors that can affect the balance include the fulcrum, center of gravity and the line of gravity (Dhaenkpedro, 2010). In some of the definitions above, it can be concluded that this balance is defined as one of the various elements in gross motor skills that involve the ability to maintain the body on a pedestal in a static or dynamic state.

Balance is one of the elements that can support the level of achievement of children's development (Permendikbud No. 137 of 2014). Balance makes the child stay in a certain position when he is still in place or when doing a movement (Irfan, 2016). Balance needs to be trained with appropriate stimulation for child development. Balance exercises that are suitable for early childhood development are by referring to the combination of the Pediatric Balance Scale and the Sixteen Balance Scale (Meidian, 2015). Pediatric Balance Scale and Sixteen Balance Scale are criteria that can help stimulate balance in early childhood. The criteria for seeing indications of balance include, (1) jumping on one leg; (2) jump with 2 feet simultaneously; (3) walking up stairs without a handrail; (4) walk on a balance board; (5) tiptoe activity; (6) crawling activity. So it can be concluded that the child's balance ability is very important in maintaining the body in various movements and positions of the child.

Efforts to stimulate the ability to balance in children are not something easy and cannot be ignored, this is because they can contribute to the growth and development of children. Stimulation is very important in the stage of child development. Therefore, there are several things that must be observed (Kemenkes RI, 2016) namely (1) full stimulation with affection, (2) educators show a good attitude, (3) children are given age-appropriate stimulation, (4) stimulation is carried out with fun without any element of coercion, (5) give rewards or praise for the child's success in doing something, (6) stimulation aids are simple and easy to obtain, (7) educators provide an opportunity that is no different, be it

for girls or boys -man. Children with this stimulation allow them to carry out exploration in the existing environment. Play activities are one way that can stimulate children's balance abilities. Playing can make children have the power of imagination and exploration so that children do activities with a happy heart (Nurfa & Hasibuan, 2017). Indirectly, the child's balance ability becomes trained.

The results of interviews conducted in October 2021 at Arrohman Kindergarten in group B, the ability to balance in 6 children still often fell while doing play activities such as playing jumping frogs and imitating airplanes. The results of interviews conducted in October 2021 at Al-Hidayah Slumbung Kindergarten in group B, the balance ability of 5 children still often fell while doing play activities such as playing jumping frogs and imitating airplanes. When one leg lifts up and tries to imitate an airplane, the child still falls while resting on one leg. Likewise with playing jump frogs.

Based on the problems above, the researchers developed one of the play activities that can be used to stimulate children's balance, especially the ability to jump and crawl, namely using the Jump and Crawl game. Jump and Crawl is a modified jumping and crawling game with additional challenge instructions that can stimulate a child's balance. The word Jump in English has the meaning of jumping or jumping while the word Crawl has the meaning of crawling or crawling. Jumping is a sport that combines speed, flexibility, strength, accuracy, endurance and balance to get a long jump (Anto, 2019). Jumping activities are very important to stimulate a child's balance. Jumping activities that will be practiced by children include playing engklek and jumping according to the order of the letters. Crawling is defined as one of a series of stages for the growth and development of early childhood which is fundamental to the later phases. There are three types of crawling, including crawling using the belly, arms and legs attached to the floor (the belly crawl), crawling with the help of both feet and hands (the bear crawl), and crawling with the help of both hands, thighs and legs and also the stomach that is attached to the floor, but the legs and knees are not attached to the floor (the crab crawl), crawling using the arms and legs to form a bridge (the leapfrog crawl), and the last one is crawling with body weight on the knees and both hands (classic crawl), so that the knee does not stick to the floor (classic crawl) (Porretto, 2015). The game Jump and Crawl is in the form of a circuit consisting of several posts. Each post has a different challenge. The challenges include 1) children playing engklek by jumping on one leg, 2) children climbing stairs without a handrail, 3) children jumping on a letter board in sequence from letter A to letter M then continued on tiptoe from letter N to Z and the child enters the tunnel tube by crawling, 4) the child stands on one foot on the catwalk and walks forward on the catwalk with different heights then continues on all fours to arrive at the finish line. Some of the challenges in the Jump and Crawl game are focused on stimulating balance combined with jumping and crawling activities. Jump and Crawl games are expected to be a better alternative to stimulate children's balance. In the analysis of the problems listed above, researchers are interested in developing a game with the title "Development of Jump and Crawl Games to Stimulate the Balance of Children aged 5-6 Years".

II. Research Methods

This research is in the form of research and development (R&D). Research and development (R&D) is defined by useful research in order to carry out the development of products that are already available or later create a new product and of course the results can also be accounted for (Kantun, 2013). Research and development is defined by a method or step to get a new product and then carry out testing on the effectiveness of the product it produces (Haryati, 2012). Development is the process of designing or designing

everything by taking into account the potential of children (Majid, 2005). Research and development is an activity that begins with analysis to evaluation (Mulyatiningsih, 2016). Thus, research and development (R&D) is defined as a research method that can perfect a certain product that already exists. Jump and Crawl game is a modified product of a previous research. The researcher uses the ADDIE model development method (Analysis, Design, Development, Implementation, Evaluation) because this research and development model is more rational, simple and systematic. The ADDIE model is arranged sequentially and systematically according to user needs (Tegeh & Kirna, 2013). Besides that, This can also be used for several types of product development so it is very suitable for Jump and Crawl game development. The ADDIE model starts from analysis to evaluation. This ADDIE model is general in nature and is also based on this development research.

In the analysis phase, the researcher conducted interviews. Interviews were conducted with classroom teachers in two kindergartens. The two kindergartens include Arrohman Kindergarten and Al-Hidayah Slumbung Kindergarten. Problems obtained include Arrohman Kindergarten in group B, the ability to balance in 6 children still often falls while doing play activities such as playing jumping frogs and imitating airplanes. The interview was conducted in October 2021 at Al-Hidayah Slumbung Kindergarten in group B, the balance ability of 5 children still often fell while doing play activities such as playing jumping frogs and imitating airplanes. When lifting one leg imitating an airplane, the child still falls while resting on one leg. Likewise with playing jump frogs. Design or design stage, researchers do the planning by compiling product specifications Jump and Crawl game. This game is in the form of a circuit consisting of several posts in a row (Suharjana, 2013). Each post has a different challenge. The circuit design process can make it easier for researchers to convey story ideas and describe the design of the Jump and Crawl game. In this development stage, the researcher developed the initial product form, namely the Jump and Crawl game. The production process of Jump and Crawl Games includes: a) collecting tools and materials, as well as finding and printing the required writings and pictures, b) making footbridges, c) making mini ladders, d) making box boards, e) making guidebooks. Then proceed with validation activities to experts (game development experts and material experts) and revisions according to the advice given by experts in the validation sheet. This is in order to help the process towards the feasibility of a product. The implementation stage is the stage that is carried out to determine the results of the validity level of the product through the results of the analysis of test activities. There will be two stages of testing in this Jump and Crawl game, including large and small group trials. Small group trials were conducted on 7 experimental subjects aged 5-6 years (group B) at Arrohman Kindergarten, Blitar Regency. At this stage the teacher as a user will fill out a test sheet for the developed Jump and Crawl game product, in order to determine the feasibility of the game product and can provide input as well as suggestions for producing better development products. The trial on a large group of Jump and Crawl game development products will be tested on 16 children aged 5-6 years (group B) at Al-Hidayah Slumbung Kindergarten and Arrohman Kindergarten. At this stage the teacher as a user will also be given a test sheet on the product to find out the assessment of the Jump and Crawl game product that was developed if it is used on a larger scale.

The last stage of research and development of the Jump and Crawl game is the evaluation stage. This evaluation stage is in the form of formative evaluation, in which formative evaluation is carried out in order to obtain data from each stage which is intended to improve the results of game development. After carrying out the previous stages, researchers were able to obtain data about the success rate of the Jump and Crawl game development product. The data acquisition starts from the initial data collection to

the implementation stage. Then the data is reviewed and concluded systematically using formative evaluation, so as to get the results of research and development of games that are fun, effective,

In this research and development trial of the game is part of the implementation phase of the ADDIE development model. This game trial is intended to be able to understand the feasibility of the game developed when the game is used. In addition, product trials also aim to measure the extent to which the product is able to achieve the expected goals. Thus, in connection with this, product trials are an important step in order to determine the success of the application of the developed product. The product trial aims to test the feasibility of the product to be developed. Several stages in the trial of this product, including data analysis techniques, instruments to collect research data, types of data, test subjects, and also testing. The instrument used in the research and development of "Development of Jump and Crawl Games to Stimulate the Balance of Children aged 5-6 Years" is using a questionnaire and observation sheet. The data analysis technique used in the research "Development of Jump and Crawl Games to Stimulate the Balance of Children aged 5-6 Years" and the evaluation data of experts for product testing are qualitative and quantitative percentages. The questionnaire grid is as follows.

Table 1. Instrument Grid for Materials Expert

Criteria	**Indicator**
Effectiveness Aspect	
Conformity with the achievement of children's balance indicators at the age of 5-6 years	The suitability of the number of obstacles contained in the Jump and Crawl game
	Jump and Crawl game is expected to use technical or simple gameplay
Conformity with the achievement of the combined indicators of the pediatric balance scale and the sixteen balance test.	Jump and Crawl games can stimulate children to jump on one leg
	Jump and Crawl games can stimulate children to jump with 2 legs at the same time
	Jump and Crawl games can stimulate children to walk up stairs
	Jump and Crawl games can stimulate children to walk on a balance board (walking board)
	Jump and Crawl games can stimulate children to do tiptoe activities
	Jump and Crawl games can stimulate children to crawl

Table 2. Instrument Grid for Game Development Experts

Criteria	**Descriptor**
Efficiency Aspect	
The game can be used repeatedly	Jump and Crawl game can be used repeatedly
	Jump and Crawl game safety for kids
The use of games can save time, money and energy	Jump and Crawl game efficiency with learning time
	Jump and Crawl game efficiency with user/teacher power
	Efficiency of Jump and Crawl game at user required cost
Attractive Aspect	

Games can generate motivation and can attract children's attention	Jump and Crawl games can attract children's attention
	Jump and Crawl games can motivate children to learn
The game can be used interactively	The ability to play Jump and Crawl to create a sense of pleasure in children
	The ability to play Jump and Crawl encourages children to practice over and over

This observation is defined by a systematic observation process on human activities as well as physical settings, which means that this activity is continuously carried out, this is intended to answer various existing questions and also produce a new fact (Hasanah, 2017).

Table 3. Observation Grid

No.	**Indicator**
1.	**Effectiveness** 1. Children can jump on one leg 2. Children can jump on two legs at the same time 3. Children can tiptoe according to the order of the letter board 4. Child can walk up stairs without handrail 5. The child can walk forward on the catwalk without a handrail
2.	**Efficiency** 1. Children feel safe using the equipment used in the Jump and Crawl game. 2. Easy for kids to use Jump and Crawl
3.	**attractiveness** 1. Children are interested (enthusiastic) in using the Jump and Crawl game 2. Children feel happy so they focus on the game Jump and Crawl 3. Children play the game Jump and Crawl over and over

The data analysis technique used in the research "Development of Jump and Crawl Games to Stimulate the Balance of Children aged 5-6 Years" and the evaluation data of experts for product testing are qualitative and quantitative percentages. The data analysis technique uses the technique of (Akbar, 2013).

$$\mathbf{V} = \frac{\mathbf{TSe}}{\mathbf{TSh}} \mathbf{x\ 100\ \%}$$

Information:
V = Validity
TSe = Total empirical score (gain)
TSh = Total expected score
100% = Constant

Table 4. Percentage of Validity Criteria

No	**Value Achievement Criteria**	**Levels of Effectiveness, Efficiency, Attractiveness**
1.	81.00% - 100.00%	Very effective, efficient, attractive
2.	61.00% - 80.00%	Quite effective, efficient, interesting

3.	41.01% - 60.00%	Less effective, efficient, attractive
4.	21.00% - 40.00%	Ineffective, efficient, attractive
5.	00.00% - 20.00%	Very ineffective, efficient, interesting

IV. Discussion

The results of interviews conducted in October 2021 at Arrohman Kindergarten in group B, the ability to balance in 6 children still often fell while doing play activities such as playing jumping frogs and imitating airplanes. The results of interviews conducted in October 2021 at Al-Hidayah Slumbung Kindergarten in group B, the balance ability of 5 children still often fell while doing play activities such as playing jumping frogs and imitating airplanes. When lifting one leg imitating an airplane, the child still falls while resting on one leg. Likewise with playing jump frogs.

Based on the problems above, the researchers developed one of the play activities that can be used to stimulate children's balance, especially the ability to jump and crawl, namely using the Jump and Crawl game. Jump and Crawl game is a modified jumping and crawling game with additional challenge instructions that can stimulate a child's balance. The game is in the form of a circuit consisting of several posts. Each post has a different challenge. The challenges include 1) children playing engklek by jumping on one leg, 2) children climbing stairs without a handrail, 3) children jumping on a letter board in sequence from letter A to letter M then continued on tiptoe from letter N to Z and the child enters the tunnel tube on all fours,

Goals at the development stage have been generated (1) Jump and Crawl game; (2) Jump and Crawl manuals; (3) describes the implementation of the application of the Jump and Crawl game with three criteria, namely effective, efficient and attractive. Presentation of data from the results of the development of researchers obtained from the results of the validity test of material experts, game development experts, small group and large group testing. The following is a recapitulation of the results of expert evaluations and small and large group trials.

Table 5. Recapitulation of Expert Validity Results and Trials

No	**Criteria**	**Total Score**	**Maximum Score**	**%**
1.	Effectiveness	173	195	88.7
2.	Efficiency	88	96	91.6
3.	attractiveness	98	109	89.9
	Amount	359	400	270.2
	Average	119.6	133.3	90.06

Based on the results of the recapitulation of the validity test of material experts, the validity of game development experts, small group and large group testing with three assessment criteria namely effectiveness, efficiency and attractiveness, the percentage obtained with the overall result with a total score of 270.2% with an average of 90.06 %. The results of the data analysis reached very valid criteria, because they were in the range of 81.00% - 100%. Jump and Crawl games can be said to be very effective, efficient and interesting.

Jump and Crawl games can be done effectively, efficiently and interestingly according to the stimulation provided by the educator. Stimulation is an activity to stimulate the ability of children aged 0-6 years to develop optimally (Haryanti, et al.,

2019). As early as possible, every child needs to get stimulation at every opportunity, so that growth and development will develop optimally according to the stages of age. Stimulation has the aim of helping children to get optimal development according to age stages. Stimulation activities include exercise, speech, independent thinking and socializing (Sapitri, et al., 2018). Children are very happy with playing, what is in the child's mind is playing (Febriani, 2015). Playing activities can be done without coercion from any party. Play is a child's right that is owned during childhood (Ardini & Lestariningrum, 2018). Play is very important for the growth and development of children. Playing activities is something that must be done in order to achieve optimal development. Playing not only fills children's free time, but also plays as a place for children's learning media. Every form of play activity has a positive value. One of the positive values in playing is so that children have the opportunity to express something that the child feels while playing. Without playing children will experience problems both physically and mentally. From some of the definitions above, playing is a fun activity that will continue to be carried out by children. When the child is bored,

The game is a means used for playing activities in which there are agreed rules (Sumarsono, 2017). Games are used to play and provide opportunities for children to test their bodies, namely to see how well their bodies are functioning, besides playing can help children to instill self-confidence (Simatupang, 2005). Games can direct children to do fun activities for children so that they can develop aspects of child development. The Jump and Crawl game has a goal so that children get the right stimulation related to the element of balance. This game includes activities to jump and crawl through obstacles. Every time they pass an obstacle, the child performs several jumping and crawling movements as well as other variations according to the challenges in each post.

Efficient, effective and attractive obstacles can trigger children to play activities. The attraction is made so that children do not get bored in playing the Jump and Crawl game. Jump and Crawl games are carried out outdoors so that children are more interested and enthusiastic to test their bodies in playing. Jumping and crawling activities are expected to stimulate the balance of children aged 5-6 years. The Jump and Crawl game is also controlled by the sound of the whistle being sounded. If the whistle sounds then the child becomes a statue or stops to do activities. If the whistle sounds again, then the child continues to play and so on. The benefits obtained in playing Jump and Crawl game activities include (1) children are skilled in carrying out a coordinated movement, both in a balanced and controlled manner; the child is skilled at using head, hand, and foot movements in all the challenges in the game; (3) the child is skilled in carrying out a physical game with certain rules; Children are skilled in using their left and right hands in several activities. The Jump and Crawl game has 4 posts, the ways of using the game are as follows: (1) children play crank by jumping on one leg; the child climbs the stairs without a banister; the child jumps on the letter board sequentially from the letter A to the letter M then continues on tiptoe from the letter N to Z and the child enters the tunnel tube by crawling; The child stands with one foot on the catwalk and walks forward on the catwalk then continues on all fours to reach the finish line. This game consists of several equipment needed including an engklek pedestal, a mini ladder without a handle, a footbridge, a letter board, a tube and an instruction pad.

Based on the results of the study, this is in line with the balance ability of children aged 5-6 years who use a catwalk, some results were found including pre-action yielding a percentage of 55.64%, then in the first cycle it produced a percentage of 73.38% and in the second cycle experienced an increase with a percentage of 88.70%(Apriliana, 2013). It can be concluded that the balance stimulation process in children aged 5-6 years has increased. There is an increase in the percentage of 87.50% of children who succeed in the simulation

of balance exercises. This study proves that the provision of gross motor skills needs to be frequently stimulated, especially related to the ability to balance.

To improve the gross motor skills of children aged 5-6 years through the Challenge Board Game in Mutiara Ibunda Islamic Kindergarten Semarang, it has a relevant research discussion because it relates to the development of games to improve gross motor skills. The results of this study indicate that there is an increase in gross motor skills of children aged 5-6 years by 15.74% after being given Challenge Board Game activities(Khotimah, 2020). Improving gross motor skills through the traditional game of jumping frogs has a relevant discussion because it relates to one of the gross motor elements, namely balance. Body balance in some children of Group B RA Permata Insani Bengkulu is still not developing optimally. Therefore, the researcher used the traditional game of jumping frogs. The results of this game research can improve gross motor skills in children, especially in the realm of balance(Nasirun & Sham, 2016).

The weaknesses in this Jump and Crawl game include: (1) the game is only limited to those aged 5-6 years; (2) The trials conducted were limited to 16 children; (3) the game developed only focuses on gross motor aspects that lead to balance stimulation. From some of the weaknesses above, there are several suggestions including, (1)The use of games by each child should not be limited to children aged 5-6 years so that they can provide meaningful learning experiences, thus the learning objectives carried out can optimally be met; (2) future research, if this corona pandemic has ended and learning activities in schools can be carried out normally again, then this kind of research can be carried out on more research subjects; (3) future research is expected to add play activities covering all aspects of targeted development.

IV. Conclusion

This Jump and Crawl game is very suitable for use in playing activities for children aged 5-6 years. The eligibility criteria for the Jump and Crawl game product were obtained through the results of material validation, validation of game development experts, small group and large group testing. The results of the recapitulation of material expert validation and game development as a whole reached a very feasible or valid criterion with a percentage of 90.3%. Small group test consisting of 7 children with assessment criteria in terms of effectiveness with a score of 85.7%, 100% efficiency and 85.7% attractiveness. Large group trial consisting of 16 children resulted in effectiveness with a score of 86.25%, efficiency 100% and attractiveness 89.5%. The accumulation of small and large group trials resulted in a total score of 91, 15% which means it is very feasible or valid for children aged 5-6 years to stimulate the child's body balance. the results of the recapitulation of the validity of the material expert test, the validity of the game development expert, small group and large group testing with three assessment criteria namely effectiveness, efficiency and attractiveness, the percentage obtained with the overall result with a total score of 270.2% with an average of 90.06%. The results of the data analysis reached very valid criteria, this is because it is in the range of 81.00% - 100%. Jump and Crawl games can be said to be very effective, efficient and interesting. The weaknesses in the Jump and Crawl game include: (1) the game is only limited to children aged 5-6 years; (2) The trials conducted were limited to 16 children; (3) the game developed only focuses on gross motor aspects that lead to balance stimulation. From some of the weaknesses above, there are several suggestions including, (1)The use of games by each child should not be limited to children aged 5-6 years so that they can provide meaningful learning experiences, thus the learning objectives carried out can optimally be met; (2) future research, if this corona pandemic has ended and learning

activities in schools can be carried out normally again, then this kind of research can be carried out on more research subjects; (3) future research is expected to add play activities covering all aspects of targeted development.The results obtained from the data analysis of the Jump and Crawl game with the eligibility criteria are very interesting, effective, and efficient, thus the game can be used to stimulate the balance of children aged 5-6 years.

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