



## Innovative Bamboo Bowling Game to Improve Motor Skills in Early Childhood

Anak Agung Ayu Mega Laksmi Febriantari<sup>1\*</sup>, I Made Gede Anadhi<sup>2</sup>, Ida Bagus Komang Sindu Putra<sup>3</sup> 

<sup>1,2,3</sup> Pendidikan Guru Pendidikan Anak Usia Dini, Universitas Hindu Negeri I Gusti Bagus Sugriwa, Bangli, Indonesia

### ARTICLE INFO

#### Article history:

Received June 11, 2023

Accepted November 10, 2023

Available online December 25, 2023

#### Kata Kunci:

Bowling Bambu Inovatif, Kemampuan Motorik, Permainan

#### Keywords:

Innovative Bamboo Bowling, Motoric Ability, Game



This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

Copyright © 2023 by Author. Published by Universitas Pendidikan Ganeshha.

### ABSTRAK

Kurangnya alat permainan edukasi untuk memberikan stimulasi pada aspek motorik kasar anak menjadi salah satu keterbatasan guru. Penelitian ini bertujuan untuk menciptakan permainan bowling bambu inovatif untuk meningkatkan kemampuan motorik kasar anak. Metode penelitian menggunakan metode pengembangan pendekatan ADDIE. Data dikumpulkan dengan observasi, wawancara dan kepustakaan. Subjek penelitian terdiri dari 3 ahli dalam bidang yang relevan. Alat yang digunakan untuk menganalisis hasil penelitian adalah kuesioner. Penelitian ini dianalisis secara kualitatif deskriptif dan kuantitatif dengan menggunakan rumus validasi isi Lawshe, yang dikenal sebagai Content Validity Ratio (CVR). Dari hasil penilaian pakar, nilai CVR yang diperoleh adalah 0,99 dan nilai CVI sebesar 0,99. Seluruh pakar media memberikan nilai CVR sebesar 0,99. Oleh karena itu, Bowling Bambu Inovatif dianggap valid. Berdasarkan temuan ini, Bowling Bambu Inovatif cocok untuk digunakan dalam kegiatan pembelajaran anak usia dini dalam pengembangan motorik kasar pada anak usia dini dapat memiliki tujuan yang berfokus pada meningkatkan keterampilan fisik dan kognitif anak-anak dalam lingkungan yang menyenangkan dan bermanfaat. Implikasi penelitian ini dapat menjadi dasar untuk mengembangkan program intervensi atau kegiatan stimulasi motorik kasar yang lebih efektif dan terarah.

### ABSTRACT

The need for educational game tools to stimulate children's gross motor skills is one of the limitations of teachers. This research aims to create an innovative bamboo bowling game to improve children's gross motor skills. The research method uses the ADDIE approach development method. Observation, interviews, and literature collected data. The research subjects consisted of 3 experts in relevant fields. The tool used to analyze research results is a questionnaire. This research was analyzed descriptively and quantitatively using Lawshe's content validation formula, the Content Validity Ratio (CVR). From the results of the expert assessment, the CVR value obtained was 0.99, and the CVI value was 0.99. All media experts gave a CVR value of 0.99. Therefore, Innovative Bamboo Bowling is considered valid. Based on these findings, Innovative Bamboo Bowling is suitable for early childhood learning activities in developing gross motor skills and can have goals that focus on improving children's physical and cognitive skills in a fun and beneficial environment. The implications of this research can be the basis for developing intervention programs or gross motor stimulation activities that are more effective and targeted.

## 1. INTRODUCTION

Teachers have a very important role in developing learning through creativity in creating APE (Rekysika & Haryanto, 2019; Widayati et al., 2020). Educational Game Equipment (APE) is play equipment for young children that can improve children's growth (Fitriana, 2022). At the Early Childhood Education level, all play activities listed in APE require teachers to develop creativity in order to create their own. Therefore, teachers, especially teachers at PAUD institutions, must be able to design their own games and be as imaginative as possible to support the success of the learning process (Iman et al., 2020; Lisa et al., 2020). APE that is made independently, apart from being able to reduce procurement costs, also has the potential to be more suitable to the characteristics of the target, both in terms of students, their respective

\*Corresponding author.

E-mail addresses: [ayumegalaksmi@gmail.com](mailto:ayumegalaksmi@gmail.com) (Anak Agung Ayu Mega Laksmi Febriantari)

locations, and the availability of locally available materials (Abadijah & Sidik, 2022; Umah & Rakimahwati, 2021). A PAUD educator needs to improve his creative abilities so that he can create educational game tools (APE) independently (Widayati et al., 2020). The willingness of APE which is supported by teacher competence is very influential in the success of the learning that will be carried out (Hmaida & Suyadi, 2021). These two things must complement each other as indicators of the success of the learning process in a PAUD educational institution (Rahmawati, 2016). The success of learning activities in PAUD that children must achieve in a day is very dependent on the management of various activities by the teacher or teacher (Hidayatullah et al., 2021). In playing, children can create new ideas and express these ideas through creative activities (Priyanto, 2014). These activities must be tried as closely as possible to stimulate all aspects of early childhood development and growth (Hidayati, 2017). Increasing the diversity of APE, teacher competency and activity management are the keys to successful stimulation in PAUD (Iman et al., 2023).

However, Widya Pasraman Gurukula Bangli Pratama Kindergarten has limited APE in implementing learning outside the classroom. Some of the APEs that are owned are types of APE that are generally used in the classroom, such as blocks and puzzles. Meanwhile, activities outside of class are very often carried out. In learning activities outside the classroom, it can be seen that the teacher only provides movement and sports activities. Based on the results of observations, it appears that children are happier doing activities outside the classroom if they are assisted by the play equipment provided. The results of an interview with one of the teachers stated that additional APE was really needed to increase the variety of activities outside the classroom. Based on this phenomenon and looking at the potential resources that exist in the school environment, carry out research on the development of APE with explore and create bowling sport. Apart from that, based on observations made at the Pratama Widya Pasraman Gurukula Bangli Kindergarten, there are children experiencing delays in their gross motor development, difficulty in coordinating their body movements in carrying out physical activities that involve coordination between hands and feet, such as walking, jumping, or throwing a ball, their ability to carry out activities that involve fine motor skills, such as writing or drawing, the ability to hold small objects or put objects into small holes. This can affect their ability to carry out daily activities, such as buttoning clothes or tying shoelaces. So, it is very important to carry out this research in addition to adding outdoor APE that is not yet available in kindergartens, as well as a medium to stimulate children's motoric development.

The solution to overcome this problem is by using games. APE Innovative Bamboo Bowling game is a type of game that adopts and innovates the sport of bowling into a game tool made from modified bamboo base materials. Bowling is a sporting or recreational activity in which players attempt to knock over a arranged arrangement of pins by throwing a bowling ball over a special lane (Abadijah & Sidik, 2022; Aulina, 2018; Ertanti, 2020). Bowling is a form of sport or game that is played by throwing a ball using your hands and rolling it (Susanthi, 2013). This innovative bamboo bowling game is played by rolling or throwing the ball using your hands like a real bowling sport. It's just that the balls and bowling pins used in sports will actually be innovated in such a way as to suit the existing needs of the Pratama Widya Pasraman Gurukula Kindergarten. The way to play the innovative APE Bamboo Bowling Ball is the same as the actual sport, namely by rolling or throwing it towards five pins which have been arranged to form a pattern according to each child's creativity. APE and this game are an alternative medium for stimulating children's gross motor skills outside the classroom. The appropriate bowling game to improve the gross motor skills of group B children at Mutiara Hati Kindergarten is to follow the steps. Players warm up before starting the game. Players line up neatly outside the track to determine the order of play. Players pick up the bowling ball using both hands. The player carries the bowling ball while jumping over the pattern on the bowling track with one foot and two feet to maintain body balance. The player's initial position before throwing is standing upright and holding the ball using both hands. The player stands straight facing the pin to be thrown with the player's feet positioned right on the line of play to get ready to throw the ball. The ball is placed directly under the body, then the body leans forward and bends slightly to get a balanced body position. Players swing the ball back and forth in rhythm before throwing the ball using one hand to train hand flexibility. Players coordinate their eyes and hands in throwing the ball using one hand to hit the target pin in front of them. The player places the pin back in the starting position using both hands and the game is repeated according to the agreed game rules. Then the player repeats playing steps number 6 to playing steps number 10 3 times (Abadijah & Sidik, 2022).

Previous research findings that a modified bowling game can improve learning outcomes for Gross Motor skills in class III students at SD Negeri 17 Dangin Puri for the 2017/2018 academic year (Aulina, 2018). The use of a modified bowling game in introducing number concepts can provide significant results (Mustika & Suyadi, 2022). There is an influence of bowling on the gross motor skills of autistic children at Kindergarten Mentari School Sidoarjo (Abadijah & Sidik, 2022). Bowling games with recycled materials can motivate children to better recognize and understand numbers or numbers 1-10 so that it has an impact on

children's initial ability to count. Apart from that, bowling games with recycled materials can also develop other aspects of development in children such as physical motor development and children's interest in learning (Anggreini & Dewi, 2020; Kholida et al., 2020). Based on several studies, it can be concluded that the use of APE has an important role in the success of stimulation in PAUD. This research can contribute to the development of more natural and environmentally friendly learning media for early childhood. Apart from that, this research can also provide new alternatives in improving fine motor and cognitive skills in early childhood. The aim of this research is to create an innovative bamboo bowling game to improve children's gross motor skills. It is hoped that this development research can become a new medium that helps teachers in implementing outdoor learning activities which also provide the benefit of further stimulation for children's gross motoric aspects that are not yet well developed.

## 2. METHOD

The research carried out was development using the ADDIE model. The development model used is the ADDIE model which consists of analysis, design, development, implementation and evaluation stages. This model was chosen because its development is systematic and based on learning design theory. The research population includes all PAUD in Bangli Regency. The research sample consisted of one kindergarten institution, namely Pratama Widya Pasraman Gurukula Bangli Kindergarten. The research subjects consisted of three material experts who understand the concept of PAUD and two learning media experts. Data collection methods include observation, interviews, and questionnaires. A questionnaire was used as an instrument to collect data, and the contents of the questionnaire are listed in Table 1, Table 2, and Table 3.

**Table 1. The Questions and Indicators**

No	Interview Questions	Indicator
1.	How do children interact with each other during the game? Do they help each other or collaborate?	Children's Cooperation and Interaction
2.	Do any children show significant progress in ball throwing and aiming skills?	Children's Physical Skills
3.	What do you think about using this game for motor development in early childhood?	Engagement and Interest
4.	Do you have suggestions for improvements or variations in this game to further enhance children's motor development?	Cooperation and Social Interaction

**Table 2. The Material Expert Trial Grid**

No	Aspect	Indicator
1.	Material	Compliance with cognitive development indicators, learning objectives, implementation of cognitive values through questions on cards, and user characteristics.
2.	Image Illustration	The suitability of the image illustrations with the values of geometric concepts, supports the achievement of learning objectives, and is easy to understand
3.	Guide and Information	Contains systematic steps, providing explanations to users

**Table 3. The Learning Media Expert Trial Grid**

No	Aspect	Indicator
1.	Consistency	Consistency practicality and media size.
2.	Format	Layout, clarity of presentation of information, attractiveness of appearance
3.	Organizing	Use of sentences on cards, suitability to the child's characteristics
4.	Design	Design Use of image illustrations, image resolution, color contrast, appropriate size and type of letters

Questionnaires filled out by respondents were used to collect data which was then tabulated. After the data has been tabulated, analysis is carried out descriptively qualitatively and quantitatively. Qualitative descriptive analysis techniques were used to process data from the assessment of Innovative Bamboo Bowling learning media by media expert tests and material expert tests by PAUD teachers in Bangli Regency.



Meanwhile, quantitative analysis techniques are carried out by grouping and describing validator suggestions and input listed in the expert test questionnaire. The results of this data analysis are then used as a basis for revising the development product, namely Innovative Bamboo Bowling learning media. Apart from that, data analysis techniques are also used to process data obtained through questionnaires to see the validity of the media. Validation of Innovative Bamboo Bowling learning media was carried out using the Content Validity Ratio (CVR) analysis method.

### 3. RESULT AND DISCUSSION

#### Result

The design and development of this innovative bamboo bowling game uses the example of ADDIE. Bamboo bowling game development mechanism. First, starting from the analysis stage, the analysis stage is the initial stage in development research. There are three important things that must be analyzed in depth, namely needs analysis, curriculum analysis, and analysis of the characteristics of children and their environment. which consists of a needs analysis, it is known that teachers have difficulty finding learning media that can be applied to cultivate children's development in PAUD. The existing media so far is still public and does not focus on child development content. Analysis of the characteristics of children and the environment shows that early childhood is in the concrete pre-operational stage, as a result, the activities provided must involve real objects. Apart from that, young children learn through playing, so this game media must fulfill elements of fun, be simple for children to use and be meaningful. Early childhood in this case interacts in an environment that is charged with the surrounding environment. Based on short interviews with teachers and principals in the school environment, examining problems and looking at children's needs in accordance with current conditions, it is known that the school is in an environment that lacks the completeness of educational games both indoors and outdoors. This is a new idea for schools, especially at the Pratama Widya Pasraman Gurukula Bangli Kindergarten in the Bangli area, to provide learning activities based on indoor and outdoor. However, the problem is that teachers are still limited in their knowledge of the concepts of managing indoor and outdoor play activities and it is quite difficult to put this into a game. This is also supported by the limited media (educational game tools) that they do not yet have. Based on this description, it is necessary to develop modified games so that educational game tools are needed as a game that supports the level of gross motor physical development which is of course easy for young children to understand through fun games. Research on the use of bamboo bowling for gross motor development in early childhood could have goals focused on improving children's physical and cognitive skills in a fun and rewarding environment. Acknowledging and addressing these limitations will help strengthen the validity and reliability of the research and produce stronger and more reliable findings regarding early childhood gross motor development through bamboo bowling. Bamboo trees that can be used are presented in [Figure 1](#) and [Figure 2](#).



**Figure 1.** The Bamboo Trees Around the School Environment



**Figure 2.** The Bamboo Trees that Can Be Used to Make APE

Children with their needs. The suitability of the curriculum used is based on the 2013 curriculum and the level of physical motor development of children according to their age. Innovative bamboo bowling was designed taking into account observations and interviews conducted so that the game was created according to the development of children aged 5-6 years at the Pratama Widya Pasraman Gurukula Bangli

Kindergarten. Children's Achievement Level Standards in the 2013 Curriculum emphasize the physical motor aspects of children, both gross and fine motor skills, which include various coordinated movements in a controlled, balanced and agile manner, carrying out activities that show children are able to make coordinated eye, hand, foot and head movements in imitation. various regular movements, skillfully using the right and left hand in various physical activities (for example: throwing and catching a ball), and carrying out activities that show the child is able to play physical games with rules. Assessment of early childhood characteristics is carried out to adapt the child's progress to the conditions of the school and home environment. In the development of Innovative Bamboo Bowling, the developmental characteristics of children aged 5-6 years were considered with a focus on the progress of physical motor development, both gross and fine motor skills, which are embedded in the Widya Pasraman Gurukula Primary Kindergarten. The expected achievement standards are in accordance with the 2013 curriculum implemented by the school. The content of the game and the game tools are built based on the concrete pre-operational stage described by Jean Piaget, children learn from concrete objects. Children learn to adapt to the surrounding environment and adapt to applicable social norms.

In the design stage, this game is designed in detail and in detail to develop physical motor development, both gross and fine motor skills. This makes it easier for teachers to guide children in playing. APE's attractive and large display makes it easier for children to understand the messages contained in the game. The questions regarding geometric concepts in the game are very appropriate for the development of children aged 5-6 years. Things to do at this stage are choosing the form/design of educational game media. The design in question includes determining the size, type and composition of images in the innovative bamboo bowling educational game media design. This media is packaged and designed as attractively as possible in line with the characteristics of early childhood. Innovative bamboo bowling is made from bamboo that has been cut into five parts and then given black and gray base colors coated with number stickers for number recognition. The geometric image pieces are made using origami paper and laminated, then given a base and adhesive made from coconut fiber to cover the bamboo pins. The question cards relate to the concept of geometry as an introduction to geometric shapes made from printed HVS paper, along with balls made from rattan. To make it easier for teachers, how to play this bamboo bowling game will be explained in a guidebook or instructions. Research on the use of bamboo bowling for early childhood motor development has the potential to provide significant implications and contributions to several fields of science and practice. Research on bamboo bowling for early childhood motor development could make a wide range of scientific, practical and environmental contributions, with the potential to impact children's development and the way we understand their interactions with the world around them. The product design is presented in [Figure 3](#) and [Figure 4](#).



**Figure 3.** The Innovative Bamboo Bowling Design



**Figure 4.** The Innovative Bamboo Bowling Game Guidebook

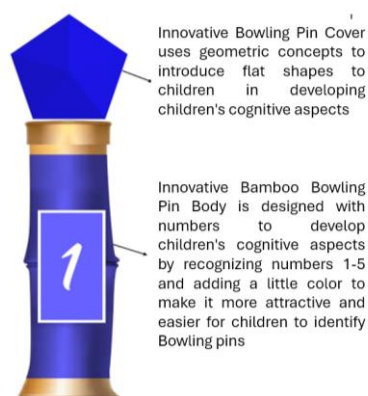
Geometry skills are one of the signs of mathematics. Geometry can be explained as the knowledge of shape and space. Geometric knowledge is applied as a guide in the actions of comparing and grouping in the late sensorimotor and preoperational stages (Hasni & Amanda, 2022). Introducing geometry to children by introducing geometric shapes and characteristics without counting elements. Geometry concepts will be made in the form of symbols and pictures that describe the parts of geometric shapes with the aim of introducing geometric shapes from an early age. Innovative Bamboo Bowling Game adapted to STTPA

cognitive values in children aged 5-6 years. The implementation of geometric concepts for children's cognitive development is presented in Table 4.

**Table 4. Implementation of Geometry Concepts for Children's Cognitive Development**

Draft Geometry	Question On The Pin	Implementation Of Values
Geometry/Question Cards	<ol style="list-style-type: none"> <li>How many types of geometry does your child (you) know? Try to mention!</li> <li>What happens if a pin with a triangular cap falls?</li> <li>What does your child (you) feel when you succeed in knocking down a bowling ball with a rectangular cover?</li> </ol>	<ol style="list-style-type: none"> <li>Classifying objects based on shape.</li> <li>Solve simple problems in everyday life.</li> <li>Apply experiences in new contexts.</li> </ol>
Number	<ol style="list-style-type: none"> <li>How many Pins are there?</li> <li>How do you arrange the numbers on Bowling pins?</li> <li>How did the child (you) drop the pin? Try to explain!</li> </ol>	<ol style="list-style-type: none"> <li>Say the symbols for numbers 1-10.</li> <li>Sort objects from small to large or vice versa.</li> <li>Present various kinds of objects both in the form of pictures and writing.</li> </ol>
Color	<ol style="list-style-type: none"> <li>What colors does your child (you) see on the pin?</li> <li>If your friend chooses the same color, which color will your child (you) choose?</li> <li>What does your child (you) think about the yellow pin versus the green pin?</li> </ol>	<ol style="list-style-type: none"> <li>Classify objects according to color.</li> <li>Demonstrate a creative attitude in solving problems.</li> <li>Recognize differences based on color or size.</li> </ol>

Development stage, this stage explains the development of products that are designed in their actual form. Before development, data is collected from various sources to determine the design of the product that will be developed according to what is needed in the field. Researchers conducted initial observations & interviews with school principals and class teachers. Based on the results of observations & interviews, there are several things that form the background for the development of the product that will be made, namely from the dimensions of increasing motor and cognitive values, its connection with the game of bamboo bowling because the Pratama Widya Pasraman Gurukula Bangli Kindergarten is in the Bangli area which is close to bamboo forests and it is hoped that product development can adapt to children's characteristics with a fun game approach through educational game media/tools (APE). The product development process for the Innovative Bamboo Bowling game is equipped with pictures in accordance with the Geometry concept, then the question section is available on the question card to provide children with an indirect understanding of the material through the game. Picture illustrations that are in accordance with the concept of Geometry, namely various simple geometric shapes according to children's characteristics, include picture illustrations that are easy for children to understand. On the bamboo pin there is a geometric image on the bamboo coated in basic colors of black and gray along with number stickers covering the bamboo pin for number recognition to make it interesting for children along with a rattan ball. Illustrations that have been produced can be found in Figure 5 and Figure 6.



**Figure 5. The Innovative Bamboo Bowling Pin Design for Developing Children's Cognitive Aspects.**



**Figure 6. The Bowling ball made from rattan, development of children's fine motor skills.**



Validation of the material expert in this research is the PAUD Teacher at Kindergarten Pratama Widya Pasraman Gurukula Bangli. Material expert validation data is obtained based on product simulations that are brought, then instruments are given that have been tested for validity, then the teacher gives an agreement and disagreement rating on each statement item consisting of material content, design and learning and guidebook. Based on the results of the material expert's validation, the data obtained was processed and processed quantitatively using the Content Validity Ratio (CVR) analysis method (Lestari, 2021). CVR is a content validity approach to determine the suitability of items to the domain which is measured based on the judgment of experts and validators. The results obtained are based on data from three validators of 1 (0.99) with a CVI value of 1 (0.99), meaning that all statement items are stated to agree with a good CVI value, then at the end of the instrument the validator also provides a note stating that products that have been developed are in accordance with the material available in kindergarten, especially for children aged 5-6 years, where this suitability is also supported by standards for the level of achievement of the development of motor and cognitive values for children aged 5-6 years. Geometry concepts related to children's daily lives are very suitable to be included in the questions contained in the Innovative Bamboo Bowling pin. Validation by media experts was also obtained through the product displayed and then given an instrument with statements of agreement and disagreement consisting of aspects of design, coloring and graphics as well as the appearance of the manual.

Based on the validation results of the bamboo bowling game media, it is still in the good range. At the end of the instrument there is also a note that requires attention, namely that in the coloring section it is hoped to match the bamboo pins with the geometry and use brighter colors so that they look more attractive to children. Apart from that, bright colors are very important so that children's cognition can develop and be able to easily identify the color, place a little bamboo in the color area to make it appear that the basic material for the game comes from bamboo. The rest of the validators responded well to the media (APE) with a display that was appropriate and attractive to the characteristics of children aged 5-6 years. There are no changes in terms of product revisions. The input provided on the material presented on the product is in accordance with children's motoric and cognitive development as stated in the STTPA. Apart from that, material based on Geometry Concepts is very important for teachers to apply in daily activities. The products developed by researchers really support and increase the availability of educational game tools that can help raise material about cognitive development through Geometry concepts. The product review by a team of media experts has been completed and after going through validation and evaluation based on input, there are several revisions that need to be made to the Innovative Bamboo Bowling section. One revision is to adjust the color between the pins and the geometry, giving bright colors to make it attractive. The results of the product revision are presented in Figure 7.



Figure 7. The Results of Revision of Innovative Bamboo Bowling Products

## Discussion

This bamboo bowling game media is suitable for application in PAUD learning. Playing is a fun activity that involves being directly involved in it. Playing is an activity that cannot be separated from children (Christianti, 2007). Playing is a means for children to explore their unexplored world to be touched and understood, from what they make to what children can do, it indirectly has a significant influence on children's development (Handayani et al., 2022; Kristiana et al., 2017; Pratiwi Wiwik, 2017). An activity in early childhood that can be carried out through fun and active games contains important values to stimulate all children's abilities (Amami, 2018; Rahayu & Fujiati, 2018; Setya Dewi & Ganing, 2022). The Innovative Bamboo Bowling Game is a game that uses "bamboo pins" which have been determined by researchers and

combined with other activities based on the concept of Geometry. Geometry is a part of mathematics that discusses points, lines, planes and space (Dinayusadewi & Agustika, 2020; Laily et al., 2019). The introduction of geometric concepts in kindergarten includes the introduction of circle, triangle and quadrilateral shapes. In introducing geometric shapes, teachers can present learning through play activities (Afni et al., 2021). Learning is structured by paying attention to children's development so that they can understand these concepts easily and have fun. Apart from that, learning also involves experiences that are already familiar to children.

This basic concept can foster children's introduction to types of geometry. A simple implementation will be able to provide children with an understanding of the introduction of simple geometric concepts in the form of flat shapes (Susilowati et al., 2020). Children's geometric concepts can improve problem solving skills, besides that geometric skills are part of mathematical skills that are useful in solving everyday life problems (Shakespeare & Anonymous, 2017). So that children can understand geometric concepts from an early age. (Naili Sa'ida, 2021). To develop children's cognitive aspects through the concept of Geometry, educators understand that children need help from the environment and an educator in developing learning media in their development process (Jawati, 2013). In providing learning assistance, educators must pay attention to the characteristics of early childhood development and use fun activities and interesting media so that children can more easily receive information and play an active role in building their knowledge (Nurrita, 2018). One example of an innovative and useful activity is bamboo bowling, which can be a bridge of help for children. By implementing this innovative bamboo bowling game, educators can help children absorb information more easily.

This innovative bamboo bowling game reinforces the concepts that teachers have taught orally. By using the innovative bamboo bowling game, early childhood learning will become more fun and teachers can present the material in the right way. Students will learn well if the learning content has been explained and presented in an appropriate way (Maulidita & Sukartiningsih, 2018; Saputra & Putra, 2021). This can have a positive impact on student learning progress. Therefore, children will be able to represent every activity given with clear and correct examples, so that they can master every lesson through games that can stimulate their abilities and development from various aspects. The bamboo bowling game is an interesting innovation in stimulating children's gross motor skills. No research has been found that specifically discusses bamboo bowling games for stimulating children's gross motor skills. Therefore, the following discussion will be based on research related to bowling in general. Research on bowling to stimulate children's gross motor skills shows that this sport has a positive impact on the development of children's gross motor skills (Aulina, 2018; Susilowati et al., 2020). Bowling can improve children's gross motor skills, such as body movement coordination, balance and muscle strength (Kharisma & Arvianto, 2019; Lestari & Puspitasari, 2021; S. et al., 2020).

This finding is strengthened by previous research findings stating that bowling has an important impact on gross motor development in children (Aulina, 2018; Fara et al., 2020). Bowling can improve children's gross motor skills, such as the ability to walk, run and jump (Sopiyati, 2021; Sutini, 2018). The findings from this research provide an important contribution to the development of knowledge regarding the stimulation of children's gross movements. This research shows that bowling can be an effective way to improve children's gross motor skills. This study has several limitations, such as limited sample size, short research duration, or the use of methods that do not cover all aspects of children's gross movements. Therefore, it is recommended to conduct further research with a larger sample size, longer research duration, and involving a wider variety of gross movement stimulation methods. In addition, research can also involve a control group to compare the effectiveness of bowling with other methods in improving children's gross movement skills. The implications of this research can be the basis for developing intervention programs or gross motor stimulation activities that are more effective and targeted.

#### 4. CONCLUSION

The development of bamboo bowling game media is suitable for application in Early Childhood Education learning as shown by the results of expert validation. The use of natural resources owned by the school environment has been successfully used as an innovative learning medium. Through the results of this research, teachers have additional APE media to carry out outdoor learning activities.

#### 5. REFERENCES

- Abadiah, S. A., & Sidik, S. A. (2022). Permainan Bowling Modifikasi Meningkatkan Pemahaman Instruksi Sederhana Anak Autis. *Jurnal Educatio FKIP UNMA*, 8(4), 1374–1380. <https://doi.org/10.31949/educatio.v8i4.3695>.



- Afni, R. N., Mulyana, E. H., & Rahman, T. (2021). Pengembangan Media Pembelajaran Berbasis Android Untuk Memfasilitasi Pengenalan Bentuk Geometri Pada Anak Usia Dini. *Jurnal PAUD Agapedia*, 5(1), 22–34.
- Amami, S. (2018). Desai Game Edukasi Berbasis Android pada Materi Logika Matematika. *Jurnal Nasional Pendidikan Matematika*, 2(2).
- Anggreini, R. K., & Dewi, N. R. (2020). Development of Ludo-Science Media with a Somatic Auditory Visual Intellectual (SAVI) Approach to Train the Activeness and Conceptual Understanding. *Jurnal Penelitian Dan Pembelajaran IPA*, 6(2), 241–267. <https://doi.org/10.30870/jppi.v6i2.8677>.
- Aulina, M. (2018). *Mengembangkan permainan bowling untuk meningkatkan kemampuan motorik kasar anak kelompok b di tk mutiara hati tahun ajaran 2017/2018*.
- Christianti, O. M. (2007). *Anak dan Bermain*.
- Dinayusadewi, N. P., & Agustika, G. N. S. (2020). Development Of Augmented Reality Application As A Mathematics Learning Media In Elementary School Geometry Materials. *Journal of Education Technology*, 4(2), 204. <https://doi.org/10.23887/jet.v4i2.25372>.
- Ertanti, D. W. (2020). Model Bowling Monster Untuk Meningkatkan Motivasi Belajar Siswa Sekolah Dasar. *Awwaliyah: Jurnal Pendidikan Guru Madrasah*, 3, 72–88. <http://ejournal.iai-tabah.ac.id/index.php/awaliyah/article/view/595>.
- Fara, F., Wondal, R., & Mahmud, N. (2020). Kajian Penerapan Permainan Bowling Berbahan Bekas Pada Kemampuan Berhitung Permulaan Anak. *Jurnal Ilmiah Cahaya Paud*, 2(1), 72–81. <https://doi.org/10.33387/cp.v2i1.2036>.
- Fitriana, D. (2022). Meningkatkan Perkembangan Kognitif Anak Usia Dini Melalui Alat Permainan Edukatif (Ape). *JCE (Journal of Childhood Education)*, 5(2), 580. <https://doi.org/10.30736/jce.v5i2.726>.
- Handayani, P., Sujarwo, S., & Khoiriyah, M. A. (2022). Media Video Games Wordwall dan Lembar Kerja untuk Kemampuan Mengbilang dan Motivasi Anak. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(6), 6523–6536. <https://doi.org/10.31004/obsesi.v6i6.3152>.
- Hidayati, A. (2017). Merangsang Pertumbuhan Dan Perkembangan Anak Dengan Pembelajaran Tematik Terpadu. *Sawwa: Jurnal Studi Gender*, 12(1), 151. <https://doi.org/10.21580/sa.v12i1.1473>.
- Hidayatullah, S., Syihabuddin, S., & Damayanti, V. (2021). Analisis Kebutuhan Media Literasi Berbasis Digital pada Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(3), 1190–1196. <https://doi.org/10.31004/obsesi.v6i3.1183>.
- Humaida, R. T., & Suyadi, S. (2021). Pengembangan kognitif anak usia dini melalui penggunaan media game edukasi digital berbasis ICT. *Aulad: Journal on Early Childhood*, 4(2), 78–87. <https://doi.org/10.31004/AULAD.V4I2.98>.
- Iman, N., Irfan, A. Z., Syarafuddin, H. M., & Endriani, A. (2020). Pelatihan Teknik Pembuatan Alat Permainan Edukatif (APE) Berbasis Bahan Bekas di PAUD Merpati Ampenan. *Jurnal Pengabdian Kepada Masyarakat Cahaya Mandalika*, 1(2), 73–77.
- Jawati, R. (2013). Peningkatan Kemampuan Kognitif. *Journal of Chemical Information and Modeling*, 53(9), 1689–1699.
- Kharisma, G. I., & Arvianto, F. (2019). Pengembangan aplikasi android berbentuk education games berbasis budaya lokal untuk keterampilan membaca permulaan bagi siswa kelas 1 SD/MI. *Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran*, 9(2), 203. <https://doi.org/10.25273/pe.v9i2.5234>.
- Kholida, A., Sutarna, I. W., & Suryadi, S. (2020). Pengembangan Alat Permainan Kartu U-Kids (Uno Kids) Untuk Menstimulasi Kecerdasan Logis-Matematis Anak Usia 5-6 Tahun. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, 11(2), 76–87. <https://doi.org/10.17509/cd.v11i2.24854>.
- Kristiana, I., Nurwahyunani, A., & Sulistyia Dewi, E. R. (2017). Pengaruh Model Pembelajaran Tgt Menggunakan Media Puzzle Terhadap Pada Materi Sistem Ekskresi Siswa Kelas Viii Mts N 1 Semarang. *Bioma: Jurnal Ilmiah Biologi*, 6(2), 78–92. <https://doi.org/10.26877/bioma.v6i2.1740>.
- Laily, A., Jalal, F., & Karnadi, K. (2019). Peningkatan Kemampuan Konsep Matematika Awal Anak Usia 4-5 Tahun melalui Media Papan Semat. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 3(2), 396. <https://doi.org/10.31004/obsesi.v3i2.214>.
- Lestari, S. D., & Puspitasari, I. (2021). Aktivitas Permainan Estafet Bola Modifikasi untuk Meningkatkan Keterampilan Motorik Kasar Anak Usia 3-4 Tahun. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(2), 752 – 760. <https://doi.org/10.31004/obsesi.v6i2.1024>.
- Lisa, M., Mustika, A., & Lathifah, N. S. (2020). Alat Permainan Edukasi (APE) Meningkatkan Perkembangan Motorik Halus pada Anak Usia 4-6 Tahun. *Jurnal Kesehatan*, 11(1), 125–132. <https://doi.org/10.26630/jk.v11i1.1584>.
- Maulidta, H., & Sukartiningih, W. (2018). Pengembangan Media Pembelajaran Interaktif Berbasis Adobe Flash Untuk Pembelajaran Menulis Teks Eksposisi Siswa Kelas III SD. *Jurnal Pendidikan Guru*

- Sekolah Dasar*, 6(5), 681–692.
- Mustika, N., & Suyadi. (2022). Pengaruh Alat Permainan Edukatif Kartu Bergambar Terhadap Moral dan Agama Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 6(3), 2052–2060. <https://doi.org/10.31004/obsesi.v6i3.1889>.
- Nurrita. (2018). Kata Kunci : Media Pembelajaran dan Hasil Belajar Siswa. *Misykat*, 03, 171–187.
- Pratiwi Wiwik. (2017). Konsep Bermain Pada Anak Usia Dini. *Manajemen Pendidikan Islam*, 5, 106–117. <https://core.ac.uk/download/pdf/228816306.pdf>.
- Priyanto, A. (2014). Pengembangan Kreativitas Pada Anak Usia Dini Melalui Aktivitas Bermain J, No. 02 November. *Jurnal Ilmiah Guru "COPE" Pengawas SMA Dinas Pendidikan Yogyakarta*, 2(02), 42.
- Rahayu, S. L., & Fujiati. (2018). Penerapan Game Design Document dalam Perancangan Game Edukasi yang Interaktif untuk Menarik Minat Siswa dalam Belajar Bahasa Inggris. *Jurnal Teknologi Informasi Dan Ilmu Komputer*, 5(3), 341. <https://doi.org/10.25126/jtiik.201853694>.
- Rahmawati, L. (2016). Ketersediaan Alat Permainan Edukatif (Ape) Di Taman Kanak-Kanak Se-Kecamatan Ngampilan Yogyakarta. *Pendidikan Guru PAUD S-1*, 494–502. <https://journal.student.uny.ac.id/index.php/pgpaud/article/view/2124>.
- Rekysika, N. S., & Haryanto, H. (2019). Media Pembelajaran Ular Tangga Bilangan Untuk Meningkatkan Kemampuan Kognitif Anak Usia 5-6 Tahun. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, 10(1), 56–61. <https://doi.org/10.17509/cd.v10i1.16000>.
- S., T. S., Nasirun, M., & D, D. (2020). Aplikasi Gerak Lokomotor Sebagai Media Untuk Meningkatkan Kemampuan Motorik Kasar Pada Kelompok B1. *Jurnal Ilmiah Potensia*, 5(1), 1. <https://doi.org/10.33369/jip.5.1.16-24>.
- Saputra, I. M. P., & Putra, D. K. N. S. (2021). Pengembangan Media Pembelajaran Multimedia Interaktif dengan Model Hannafin and Peck pada Muatan IPA Kelas IV. *Mimbar Ilmu*, 26(1), 88. <https://doi.org/10.23887/mi.v26i1.32085>.
- Setya Dewi, I. G. A. B., & Ganing, N. N. (2022). Multimedia Interaktif Berbasis Game Edukasi Dua Dimensi Pada Muatan Bahasa Inggris Materi Pengenalan Kosa Kata. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 6(1), 81–87. <https://doi.org/10.23887/jppp.v6i1.45896>.
- Shakespeare, W., & Anonymous, \_ . (2017). 2 (1.2). *The New Oxford Shakespeare: Critical Reference Edition, Vol. 1*, 5(April 2018), 294–310. <https://doi.org/10.1093/oseo/instance.00168151>.
- Sopiyati. (2021). Upaya Meningkatkan Kemampuan Motorik Kasar Melalui Kegiatan Melompat Dengan Menggunakan Media Tali Karet Gelang Pada Kelompok A Di TK Pertiwi Dahlia Desa Sambirejo Kecamatan Gabus Kabupaten Pati Semester I Tahun Pelajaran 2019/2020/. *Journal of Industrial Engineering & Management Research*, 2(6), 73–80. <https://doi.org/10.7777/jiemar.v2i6.230>.
- Susilowati, E., Fathonah, N., Astutik, E. P., Hadi, S., & Prayitno, L. L. (2020). Pendampingan Bunda PAUD dalam Pembuatan Alat Permainan Edukatif (APE) Sederhana untuk Pengenalan Konsep Bangun Datar. *Jurnal SOLMA*, 9(1), 131–142. <https://doi.org/10.29405/solma.v9i1.4714>.
- Sutini, A. (2018). Meningkatkan Keterampilan Motorik Anak Usia Dini Melalui Permainan Tradisional. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, 4(2), 67–77. <https://doi.org/10.17509/cd.v4i2.10386>.
- Umah, K. K., & Rakimahwati, R. (2021). Perkembangan Kreativitas Anak Melalui Permainan Pasir Ajaib di Taman Kanak-kanak. *Aulad: Journal on Early Childhood*, 4(1), 28–36. <https://doi.org/10.31004/aulad.v4i1.86>.
- Widayati, J. R., Safrina, R., & Supriyati, Y. (2020). Analisis Pengembangan Literasi Sains Anak Usia Dini melalui Alat Permainan Edukatif. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 5(1), 654. <https://doi.org/10.31004/obsesi.v5i1.692>.