



Stimulation of Children's Cognitive: Development of Ulok Tangga Tolu Media Dimensions Based on Batak Culture

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Abstract

This study addresses the lack of cultural recognition for children and limited educational game tools. It aims to develop a Batak culture-based three-dimensional ulok tangga tolu as an educational game to stimulate cognitive development in early childhood and assess its feasibility. The research employed a Research and Development (R&D) method using the ADDIE model, with data collected through questionnaires, observations, and documentation. Feasibility assessment from material experts, media experts, and teachers yielded percentages of 84.3%, 90.6%, and 91.18%, respectively, categorized as "very feasible." The trial with children showed a result of 94.01%. These findings indicate that the three-dimensional ulok tangga tolu is highly feasible and effective as a learning medium to enhance cognitive abilities in children aged 5-6 years.

Keywords: *Educational Game Tools; Children Aged 5-6 Years; Hobo Culture; Cognitive Ability*

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1. INTRODUCTION

Early childhood is in a golden age that really determines the development of various aspects, including cognitive, social-emotional, language, morals and character. Hurlock, (2019) states that cognitive development early in life is the main foundation for the ability to think, understand concepts, and solve problems. In line with this. Woolfolk, (2020) explains that learning that provides meaningful experiences will help children build an optimal knowledge structure. Therefore, the learning process for early childhood needs to be designed according to children's characteristics, namely through enjoyable, concrete activities that actively involve children.

One effective approach to early childhood learning is through educational games. Said dan Budimanjaya, (2015) states that learning strategies based on multiple intelligences can be implemented optimally through play activities because they are able to accommodate various children's learning styles. Widya, (2022) also explained that traditional games packaged as learning

media have educational value as well as playing a role in preserving local culture. Thus, games not only function as entertainment, but also as a means to stimulate children's development.

Based on the results of pre-research interviews conducted by researchers, cognitive development has a very important role for early childhood. In practice, various problems are still found in the learning process in PAUD. Learning tends to focus on calistung activities and does not fully utilize learning media that are interesting, concrete, and appropriate to children's developmental characteristics. This condition causes children to easily feel bored and less actively involved in the learning process, so that stimulation of cognitive development has not been achieved optimally (Deluma & Setiawan, 2023; Utami et al., 2025).

In addition, the integration of local culture in early childhood education is still relatively low. Regional culture is generally only introduced during certain moments, such as national holidays, which results in children having a limited understanding of the values, symbols, and wisdom of their own local culture. Several studies indicate that the lack of early exposure to local culture affects children's understanding of their cultural identity, while children are more interested in foreign cultures such as K-Pop and Bollywood, which they acquire from their environment and social media. Aghnaita et al., (2022) states that early childhood learning needs to be reconstructed so that it can instill identity and cultural values from an early age. Therefore, innovative learning media are needed that are able to stimulate the cognitive development of early childhood while simultaneously integrating local cultural elements in a concrete and interesting way through play activities (Rizkiyani & Sari, 2022).

The results of research conducted by Prihatini dan Mursid (2022) shows that the application of the giant snake and ladder game in developing early childhood cognition has been successful and is proven by the results of observations that have been made. Setiawati et al., (2019) proves that there is an increase in scores with the snakes and ladders game with the criteria of learning completeness, namely 75% were declared successful in the research. Apart from being influenced by the media, the success of increasing abilities with the snakes and ladders game is also influenced by the teacher's teaching ability. Astuti et al., (2019) shows that learning by doing activities through snake activities and playing with ladders can improve children's cognitive abilities, this is proven by cognitive improvements in each cycle. From the results of the three previous studies above, there are also similarities and differences with the research carried out, because the similarities lie in the initial media before it was developed, namely snakes and ladders, strengthening the theory of the snake and ladder game, as well as several aspects that can be developed, because the difference lies in the modification of the three-dimensional snake and ladder game based on Batak culture and the use of the game is equipped with a help card containing several questions about the media content.

Various studies have shown that snakes and ladders games are one of the effective media for enhancing the cognitive abilities of early childhood. Prihatini dan Mursid (2022) showed that the application of giant snakes and ladders games in developing early childhood cognition has been successful, as evidenced by the observations made by Astuti et al., (2019) who found that the snakes and ladders game can improve children's cognitive abilities. Ningtyas, (2018) proves that the game snakes and ladders can improve children's memory for number concepts. Research result of Ngadha et al., (2022) and Yahmi, (2022) indicate that the snakes and ladders game is effective in improving children's symbolic thinking abilities. Additionally, Yuliati dan Hartini, (2017) reported that the snakes and ladders game can enhance early counting skills, while Hayani, (2023) found that the environment-based snakes and ladders game can improve children's number recognition and problem-solving skills.

In addition to enhancing cognitive aspects, the snakes and ladders game also impacts the development of other aspects. Setiawati et al., (2019) stated that the snakes and ladders game plays a role in improving children's moral abilities. Aulia & Hibana, (2022) found that playing snakes and ladders can develop the social-emotional skills of early childhood. Natasha et al., (2024) also reported that the snakes and ladders game is effective in improving numeracy literacy for children

aged 5-6 years.

However, most studies still develop the snakes and ladders game in a two-dimensional and general form, without integrating local cultural elements as learning content. In fact, local culture plays an important role in shaping children's identity and character. Damanik, (2017) emphasized that culture and ethnic identity are important parts of individual identity formation. Eliza, (2017) developed a character education model based on local culture that has proven effective in shaping children's character.

The Three-Dimensional Ulok Ladder Media is an educational game consisting of three-dimensional snakes and a ladder board designed as an interactive learning media for early childhood, incorporating Batak cultural content in every component of the game. Arsyad, (2017) stated that learning media serves as a means to convey learning messages, making them easier for students to understand. Furthermore, Maulidia et al., (2023) explained that suitable learning media for early childhood education includes active involvement and concrete experiences. Therefore, the Three-Dimensional Ulok Ladder media was developed to provide concrete, engaging, and enjoyable learning experiences so that children can actively participate in the learning process. The advantage of this media lies in its three-dimensional shape, the use of contextual visuals with local culture, and direct integration with cognitive development indicators for children aged 5-6 years, such as the ability to recognize number concepts, think symbolically, solve simple problems, and follow game rules.

Recent studies further reinforce these findings. Ubaidillah et al., (2024) showed that the development of active snakes and ladders games can enhance cognitive abilities and creativity in early childhood. Rohmawati & Gudnanto, (2022) concluded that the snakes and ladders game is effective in improving children's cognitive abilities, especially in recognizing numbers and following game rules. Mustakimah, (2024) stated that the snakes and ladders game helps children understand learning concepts more easily due to its visual and interactive nature. Meanwhile, Winasari et al., (2025) reported that augmented reality-based snakes and ladders games have a positive impact on children's cognitive development through increased interest and engagement in learning.

Based on research from various previous studies, it is known that the snakes and ladders game has been widely developed as a learning media to enhance cognitive abilities, counting, symbolic thinking, and other developmental aspects in early childhood. However, most studies still develop media in a two-dimensional, general form, and have not integrated specific local cultural elements as learning content. Additionally, the development of snakes and ladders games that combine three-dimensional forms, local cultural integration, and direct correlation with cognitive ability indicators for children aged 5-6 years in a single learning media unit is still very limited.

Therefore, the novelty of this research lies in the development of the Three-Dimensional Ulok Ladder media based on Batak culture, specifically designed by integrating Batak cultural elements into the game components and directly relating to the cognitive development indicators of early childhood. This media not only serves as a means to stimulate cognitive abilities but also as a vehicle for the introduction and internalization of local culture from an early age, thus presenting an innovation that distinguishes this research from previous studies.

Based on the above description, the purpose of this research is to develop the Three-Dimensional Ulok Ladder media based on Batak culture as a suitable learning media for early childhood education and to determine the effectiveness of the media in enhancing the cognitive abilities of children aged 5-6 years. Additionally, this research aims to describe the responses of children and teachers to the use of the Three-Dimensional Ulok Ladder media based on Batak culture in learning activities.

2. METHODS

This research is a development research that uses a mixed approach, namely qualitative and quantitative. A qualitative approach is used to obtain preliminary data through observation and interviews regarding learning needs and characteristics of students. A quantitative approach is used to measure the level of validity and practicality of learning media developed through questionnaires. The use of a mixed approach aims to obtain a more comprehensive picture of the product development process and results (Sugiyono, 2023). The type of data in this study is in the form of quantitative data obtained from the results of the assessment of media experts and subject matter experts, as well as qualitative data in the form of suggestions and inputs. The data analysis technique used is quantitative descriptive analysis.

The development model used in this study is the ADDIE model. The ADDIE model was chosen because it has systematic and flexible stages in developing learning media (Hidayat & Nizar, 2021). In addition, the ADDIE model is widely used in the development of educational game media because it is able to produce products that are practical and suitable for use (Yuliana et al., 2024).

The ADDIE model consists of five stages, namely analysis, design, development, implementation, and evaluation. The analysis stage is carried out to analyze the learning needs and characteristics of students. The design stage includes designing media concepts, determining materials, and designing displays. The development stage is carried out by developing educational game media based on Batak culture and validating by one material expert and one media expert. The implementation stage is carried out through a practical test by one PAUD teacher. The evaluation stage is carried out by revising the media based on the results of validation and practicality tests. The flow of the research is presented in Figure 1.



Figure 1. ADDIE Model Development Stage Flow

This research was carried out at RA Al-Khairat Muara Sipongi, Mandailing Natal Regency, North Sumatra Province. The selection of the research location was based on the school's need for learning media with local culture as an effort to introduce Batak culture to early childhood.

The research instruments are in the form of material expert validation sheets, media expert validation sheets, and practicality questionnaires. The material expert validation sheet contains indicators of the suitability of the material with the learning objectives, clarity of the material, and the integration of Batak cultural content. The media expert validation sheet contains indicators of visual appearance, readability, illustration quality, and technical feasibility of the media. The practicality questionnaire contains indicators of ease of use, media attractiveness, and ease of application in learning. Data collection techniques include observation, interviews, and questionnaires. The questionnaire was compiled using a four-level Likert scale as presented in Table 1.

Table 1. Likert Scale Assessment

Alternative	Score
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

The results of the assessment are analyzed by calculating the score and converting it into percentage, then interpreted based on the validity criteria presented in Table 2.

Table 2. Expert Validation Assessment Categories

Interval	Criteria
81%-100%	Very Valid
61%-80%	Valid
41%-60%	Fairly Valid
21%-40%	Less Valid
0%-20%	Not Valid

3. RESULT AND DISCUSSION

The initial stage is the analysis stage. Implementation at this stage begins by analyzing the background or the need for the development of learning media based on the phenomena in the field (Aminah, 2018). Based on information obtained from the pre-survey at the research school, through a direct interview with one of the teachers, it is known that there is no use of learning media in the teaching and learning process and the lack of knowledge of children about their own regional culture. This is due to the limitations of teachers in making learning media, activities focus on Calistung, teachers only tell stories while children only listen. In addition, children are more familiar with k-pop culture and western songs at an early age. Therefore, the development of Batak culture-based learning media is needed to improve the cognitive of children aged 5-6 years. At this stage, data collection is carried out in the form of a questionnaire.

In addition to analyzing student needs, the concept analysis stage is carried out. At this stage, it is used to determine the content of the material in the media to be developed. Material analysis is done after knowing what material is not considered important to students but is very important for students to know. Based on the results of discussions with teachers, the researcher decided to develop a learning medium, namely a dimension game of ulok ladder tolu based on Batak culture which is presented contextually containing pictures, shapes, and ways of learning while playing.

The next stage is the design stage. After analyzing the problems and needs of students, the next stage is to prepare a media design by determining the content of the material, determining strategies and forms of media that will be used for the learning process (Azizah & Syarifah, 2021). The first activity was to design a game idea that aimed to introduce Batak culture to early childhood. The second activity is to give a name to the learning media that was developed, namely "Ulok Tangga Tiga Dimension Based on Batak Culture". The third activity is to prepare the materials needed in making media, including plywood, oil paint, brushes, glue shoot, cloth belts, devil glue, calendars, origami paper, markers, and cardboard to make dice with numbers 1 to 6 on each side. In addition, clay is prepared and shaped to resemble pawns and elements of Batak culture, such as traditional clothing, typical foods, traditions, and traditional musical instruments. The researchers also made drawing cards from used calendars covered with origami paper and were given questions about the child's cognitive development that were adapted to the learning media developed. All materials used are safe, harmless, and in accordance with the characteristics of early childhood. The fourth activity is to design how to play media so that children can get to know Batak culture as well as develop cognitive skills, such as recognizing numbers, simple counting, remembering, and solving problems through three-dimensional snake and ladder games. The layout of the game is designed using the Canva app to ensure an attractive and informative look.

The way to play this learning media is as follows. The activity began with praying together, then the teacher explained the rules and how to play the game to the child. Next, children play games in groups, where in one session consists of four children. To determine the first turn, each child is asked to roll the dice, and the child who gets the highest score has the right to start the game.

The child steps according to the number of dice obtained. For example, when the child stops at box number 3 which displays a picture of the traditional clothing of Batak Mandailing women, the child is asked to mention or explain the components contained in the picture. If the child is not able to answer, then the child is asked to take a question card and answer the available questions. An example of a question on a card, such as "At what number are you now standing?" Children who are able to answer questions on the challenge box do not need to take additional question cards. Answering questions on challenge boxes and question cards is a form of stimulation for aspects of children's cognitive development, because it involves activities of thinking, remembering, recognizing concepts, and solving problems in a simple way.

The challenges contained in each bottle cap include questions about Batak cultural elements, including the names of typical North Sumatran foods such as gomak noodles, Medan lontong, arsik carp, and Ambon bika; traditional musical instruments such as part-time gondang sambilan, hasapi, ogung, and flute; traditional clothes such as Ampu Mandailing, Bulang Mandailing, and Sortali Batak Toba; as well as Batak cultural traditions such as tortor dance, Nias rock jumping, and the use of ulos. The game is continued in turns by the next child until all children get the opportunity to play. The form of three-dimensional ladder ulaok learning media based on Batak culture can be seen in figure 2, figure 3, and figure 4.



Figure 2. Ulok Tangga Tolu Dimensi



Figure 3. Contents Components Ulok Tangga Tolu Dimensi



Figure 4. Quation Card

The third stage is the development of assessment instruments. The assessment instruments used were material validation instruments and media validation instruments (Table 3 and Table 4). Material and media validation instruments are given to Early Childhood Education Teacher Education (PG-PAUD) lecturers who understand the suitability of learning materials and media for early childhood

Table 3. Media Validity Data Ulok Tangga Tolu Dimensi

Aspects assessed	Value Obtained	Highest Score	Percentag E
Navigation	9	12	75%
Display	16	16	100%
Media presentation	15	16	93,7%
Innovation or development	18	20	90%
Total	58	64	90,6%

The average results of the validation of material experts provided by the validator using questionnaire data showed that the learning media in the form of "Ulok Tangga Tolu Dimensi" based on Batak culture to improve early childhood cognition developed by the researcher was included in the very feasible category, namely with a score of 90.6% The input from the material expert validator regarding the material contained in the media was that the material associated with early childhood was more narrow and that it was often seen in public and the selected material can be formed with clay into a three-dimensional shape. Because in introducing the cultural component to children, it needs to be gradual and in accordance with the portion of early childhood

Table 4. Material Validity Data of Ulok Tangga Tolu Dimensi Media

Aspects assessed	Value Obtained	Highest Score	Presentation
Content	18	20	90%
Sisterhood Elements	17	24	70, 83%
Islamic element	7	8	87,5%
Local Wisdom Element	12	12	100%
Total	54	64	84,3%

The average validation results of media experts provided by the validator using questionnaire data showed that learning media in the form of "Ulok Tangga Tolu Dimensi" based on Batak culture to improve early childhood cognition developed by the researcher was included in the very feasible category, with a score of 84.3%. Input from the media expert validator is that the layer of the media can be changed with plywood material, the color used can use brighter colors, the cards can be coated with origami paper and the writing can be typed to make it clearer, and the bottle caps can be varied in colors so that the media is more in demand by children.

The fourth stage is implementation, which is the stage of practicing the media made by the researcher as well as conducting media trials. This stage is carried out after the media product developed by the three-dimensional ladder is declared feasible by the validator, namely media experts and material experts. At the implementation stage, the dimensions of the three stairs media dimensions were tested on children aged 5-6 years in group B at the research school. This research directly introduces the three dimensions of the staircase that has been developed to teachers and students. Furthermore, the researcher distributed questionnaires to teachers and students, where students were represented by other teachers who served as observers, to find out responses regarding the feasibility of the learning media that had been developed.

The practicality sheet analyzed in this section is data on the practicality of the media dimension based on Batak culture ulok tangga tolu in which there is an aspect that is assessed, namely the feasibility of the media. What was assessed by school teachers who got a percentage of 92.18% from the practicality category of the three-dimensional media ladder modified by Sugiyono, namely the percentage that was in the interval of $80 < p \leq 100$. Data on the practicality of product trials can be presented in table 5.

Table 5. Data On The Practicality Of The Ulok Tangga Tolu Dimensional Media Product Trial

Aspects assessed	Score Obtained	Maximum Score	Percentage
Display	16	16	100%
Media presentation	14	16	87,5%
Benefits	29	32	90,62%
Total	59	64	92,18%

The effectiveness sheet analyzed in this section is in the form of data generated from the media trials of the dimensions of the three stairs related to materials developed in accordance with Batak culture. Of the 20 children of group B1, the effectiveness was declared complete with a percentage of 94.01%. The details are presented in table 6.

Table 6. Child Effectiveness Result Data

Aspects assessed	Score obtained	Maximum score	Percentage
Children can understand symbols	154	160	96,25%
The child understands his/her Identity	137	160	85,62%
Understanding cause and Effect	160	160	100%
Children can classify objects, colors and sizes	290	320	90,62%
Children can understand Numbers	312	320	97,5%
Total	1.053	1.120	94,01%

After the implementation stage in the form of a media trial, an evaluation stage was carried out. The evaluation process is an activity to assess whether the learning provided through the media successfully meets the expectations of initial development or not (Sugihartini & Yudiana, 2018).

Based on the stages of product implementation in the form of media trials, it can be assessed that the development of this media has been achieved, namely learning media in the form of "Ulok Tangga Tolu Dimensi" based on Batak culture developed by the researcher can introduce Batak culture and at the same time can stimulate aspects of early childhood cognitive development in PAUD. In addition, the Three-Dimensional Ladder media has been designed according to the suggestions of the Validators.

4. CONCLUSION

The development of the Batak culture-based ulok tangga tolu successfully achieved its research objectives. The media was designed to provide culturally relevant learning experiences that align with local wisdom and children's developmental needs. Its implementation supports early childhood cognitive development through interactive and safe learning activities integrated with the curriculum. Therefore, the media fulfills its intended purpose as an educational tool that introduces cultural values while facilitating effective learning for children aged 5–6 years.

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