



Development of Smart Board Spinner Media as a Stimulation of Numeracy Skills for 5 to 6 Year Old Children

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Abstract

Children have difficulty mastering the concepts of addition and subtraction as well as number recognition if they have poor numeracy skills and are not stimulated with learning aids. This is the reason for conducting research on the development of learning media. This research aims to present the findings of the development of the learning product "Smart Board Spinner" which offers numeracy teaching to children aged between five and six years. This research applies the ADDIE model. There are five stages in the model, namely analysis, design, development, implementation, and evaluation. The validity test results of media experts and material experts respectively obtained results of 88.8% and 93.42%. Small group trial validators got a score of 92.5% and large group trial validators got a score of 96.25%. All scores obtained show high validity. The research results show that the numeracy learning media "Smart Board Spinner".

Keywords: Numeracy Skills; Children Aged 5-6 Years; Smart Board Spinner

1. Introduction

Education is an effort made by humans that aims to develop knowledge in shaping personality, attitudes, behavior, morality and social skills. In reality, early childhood education consists of several forms of activities and interactions designed to stimulate children's interests and abilities. These activities can include play, learning and social interaction, all of which are structured in such a way as to support the development of the whole child. Since the beginning, humans have been equipped with various potentials that can be developed so that later they can carry out their human roles productively and effectively in facing the future. Early childhood, which takes place between the ages of 0 to 6 years, is often referred to as the "golden age" because it is during this time that children learn and develop very quickly. Therefore, the future development of children is strongly influenced by the introduction and implementation of early childhood education commensurate with their maturity and readiness (Arifudin, 2016). Preschool education is also the main foundation for the development of children's personality which includes aspects of physical ability development, character building, cognitive function, language, social and emotional, art, creativity, independence, and discipline.

Cognitive development refers to the process of improvement and progress in the ability to think and understand. It includes various aspects such as problem solving, decision making, and understanding abstract concepts. Cognition, which is the result of a combination of a child's maturity and environmental influences, describes how children acquire, process and interpret information from their environment (Novitasari, 2018). Cognitive abilities that need to be developed early on are numeracy skills. The purpose of introducing numeracy early on is to help humans solve everyday problems (Patria & Iriyanto, 2014). Numeracy is a fundamental

ability that includes understanding and using number concepts and operations in various real-world contexts, including the family environment, the learning process at school, and social interactions in the community (Cahayani, 2022). In stimulating numeracy skills, of course, there are challenges for parents and teachers at school. To facilitate the development of numeracy skills can be provided through the creation of interesting learning media for children.

Media is not only useful for conveying overall learning material, but can also be used to communicate specific parts of learning, provide reinforcement, and increase student motivation (Kurnia & Guslinda, 2018). The existence of numeracy learning media that is well utilized will facilitate and attract children's attention in learning to recognize numbers 1 to 10 (Wijaya & Iriyanto, 2015). The use of teaching aids with learning materials that are commensurate with the needs of children will maximize their potential (Ayu, et al. 2020) Learning media for early childhood needs to pay attention to various principles, namely the media made must be flexible, safe for children, can arouse children's imagination and must be produced according to the level of child development.

Researchers interviewed a number of kindergartens in Blitar Regency, showing that there are some children who have not mastered numeracy skills. The results of observations also show that children's ability to master numeracy learning (recognizing the concept of numbers with objects around them) is still lacking, mentioning the results of subtraction and addition 1 to 10 is still low. Some children still have difficulty showing numbers with their fingers even though they understand the concept of numbers. Children's ability to count is certainly motivated by various factors, namely, the lack of learning media at school so that children only learn to count using their fingers, as well as learning that focuses on LKS so that children always focus on books. In fact, the existence of learning media will make it easier for teachers. This is in line with the opinion of (Setyaningrum & Iriyanto, 2014) that the existence of learning media or props will make it easier for teachers to deliver math learning materials and can increase children's memory of the content being taught.

Based on the results of these interviews, problems in an institution are caused by several factors from parents and from within the child. The absence of interesting media makes it difficult for children to understand concepts and is not enthusiastic in learning numeracy. Of these weaknesses, the most dominant is the lack of teacher creativity and the absence of learning media that stimulates children in the development of numeracy skills, especially in the ability to recognize number concepts and counting concepts. Previous research on learning media development has shown promising results. Such as research from (Bopo, et al. 2023) which makes children's counting smart board media and the results show that the media made is very effective, very interesting, very efficient, and very valid for children. In terms of novelty, smart board spinner media are made differently related to materials and materials. Similarly, research (Prawastiningtyas, 2015) made counting apron media for children and the results of the media were able to improve children's counting concepts.

Based on previous research and problems that exist in the institution, researchers have the idea to create numeracy media that is different and more interesting for children. The numeracy learning media produced is the "Smart Board Spinner" which contains material for the introduction of numeracy for children aged 5-6 years related to the introduction of colors, the introduction of geometric shapes, the introduction of numbers 1 to 10 and the introduction

of the concepts of addition and subtraction. Researchers create media that is safe and can be used many times. This research aims to create a development product in the form of Smart Board Spinner numeracy learning media to stimulate the numeracy skills of children aged five to six years.

2. Method

2.1 Research Method

This research is a development research or Research and Development (R&D) that applies the ADDIE development model which has five stages (Tengeh and Kirna, 2013). This research uses ADDIE because it has advantages such as systematic steps. Evaluation is carried out at each stage to ensure that the resulting product meets the requirements and is feasible in the context of its use. ADDIE is one of the systematic learning design approaches described by Tengeh and Kirna (2013). This is consistent with the views of Angko & Mustaji (2013), who suggest that the ADDIE model is still relevant due to its flexibility in various conditions and its adaptability. This model is also widely recognized and provides structured guidance for developing instructional interventions as well as evaluation and revision at each stage. In line with Puspasari's (2019) opinion, the ADDIE model development research is designed to provide information that aims to teach skills.

Based on this description, the conclusion related to the ADDIE model is a relevant and effective model to be utilized in a development study. ADDIE model Research and Development (R&D) research also has systematic steps to make it easier to design or develop Smart Board Spinner media. The following are the research steps of the ADDIE model stages when presented in the form of images.

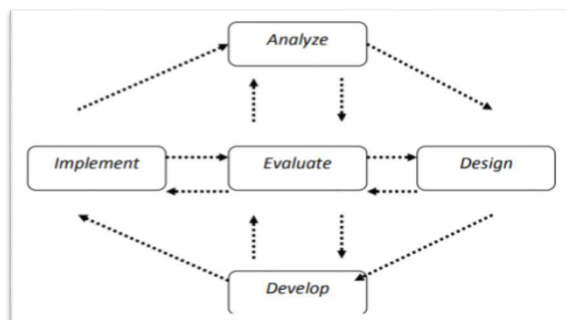


Figure 1. Stages of ADDIE Model (Tengeh and Kirna, 2013)

2.2 Location and Time of Research

The research location in this study is in three kindergarten institutions in Blitar Regency for children aged 5 to 6 years. The three institutions are Al-Hidayah 02 Kanigoro Kindergarten, Dharma Wanita Gembongan Kindergarten, and Dharma Wanita Gembongan 04 Kindergarten. This research was conducted from April to May of 2024.

2.3 Subject of Research

Large and small group trials were conducted in this study. 9 subjects participated in the small group trial at Al-Hidayah 02 Kanigoro Kindergarten. Meanwhile, there were three institutions namely Al-Hidayah 02 Kanigoro Kindergarten with a subject of 19 children, Dharma Wanita Gembongan 02 Kindergarten with a subject of 11 children, and Dharma Wanita Gembongan 04 Kindergarten with a subject of 11 children who conducted a large group trial.

2.4 Data Collection Technique

The data collection methods used in this research are interviews, observations and questionnaires. Questionnaires were used to evaluate the validity and ease of use of the media that had been created. The feasibility and usability of the media developed in this study were assessed using a questionnaire. A team of experts including material experts and media experts will assess the feasibility of the media produced through a validation questionnaire. Interviews were conducted to obtain information from teachers. Meanwhile, observation was carried out in a structured manner, which refers to the observation of the subject or object of research by focusing on the specified elements. Observation aims to observe and pay attention to children's learning interactions when using smart board spinner learning media.

2.5 Data Analysis Technique

The data obtained in this study are qualitative data and quantitative data. During the testing phase, expert validation and user validation produced quantitative data. The collected data was analyzed through quantitative data processing, using the information obtained from the previously prepared questionnaires. Furthermore, quantitative data processing was used to check the collected data. The information collected from the expert validation questionnaire and user validation will then be analyzed using the percentage method based on the predetermined formula. The formula that researchers use to determine the percentage results uses the following formula:

$$P = \frac{\sum TSe}{\sum TSh} \times 100\%$$

Description :

P = Validity (Media experts, Material experts, and Users)

Tse = Total empirical score (acquisition)

TSh = Total expectation score

100% = constants

Table 1. Percentage criteria for validity

Value Achievement Criteria (Validity)	Validity Level			
	Overall	Effectiveness	Efficiency	Attractiveness

81,00%- 100,00%	Verry Worthy	Very Effective	Verry Efficient	Very Attractiveness
61,00%- 80,00%	Enougth Worthy	Effective Enough	Quite Efficient	Quite Attractiveness
41,00%- 60,00%	Less Worthy	Less Effective	Less Efficient	Les Attractiveness
21,00%- 40,00%	Not Worthy	Not Effective	Not Efficient	Not Attractiveness
00,00%- 20,00%	Very Unworthy	Very Ineffective	Very Inefficient	Very Unattractiveness

Source: Akbar (2013) Modification

3. Results and Discussion

3.1 Analyze Stage

In this Research and Development (R&D) study, the first stage is analysis. The purpose of the analysis stage is to identify problems and needs in the field. From December to January 2024, observations and interviews were conducted at three institutions. Researchers found problems related to the lack of numeracy skills, namely there are some children who do not understand numeracy concepts related to addition and subtraction. There are two institutions that have this problem because there is no learning media that stimulates children regarding the concept of simple addition and subtraction. Through observation, the institution focused on commonly used media, namely books.

Based on interviews conducted, many educators experience a lack of learning media and a lack of variety of numeracy media used by teachers. This supports researchers to make new innovations by creating an interactive product that allows each child to be actively involved and build children's understanding of the concept of number recognition and the concept of addition and subtraction without a limited number of resources such as books. Alternative problem solving carried out by researchers is to create a smart board spinner learning media that contains material related to the introduction of number concepts and simple addition and subtraction concepts and is made colorful which attracts children's attention.

3.2 Design Stage

Entering the product design or design stage, the following stages were carried out.

1. Determine the scope of material to be used

The scope of the material to be discussed contains the introduction of the concept of numbers 1- 10, introducing the concept of simple addition and subtraction to children. In the media there are simple addition and subtraction questions that will be answered by children using ice cream sticks. In addition, in the media there is also material related to the sequence of numbers 1-10.

2. Design on smart board spinner media

The smart board spinner media is made from plywood board. Before making the media, the researcher made a design from the Canva application. Furthermore, the media will be made by researchers in accordance with the previous design. The smart board spinner media is designed to be colorful to make it interesting for children and stimulate children to recognize colors.

3. Guidebook design

The media guidebook is made to make it easier for teachers as media users to use the media correctly. This smart board spinner media guidebook contains product specifications, product manufacturing purposes, and how to use the product. The guidebook was created using the canva application and printed using art paper.

4. Draft validation instruments and user questionnaires

In this stage, researchers made a survey of validation tools and questionnaires for users (teachers), material experts and media experts. The questionnaires were designed with the aim of evaluating the validity and ease of use of the media that had been developed. There were two questionnaires utilized, namely a validation questionnaire to evaluate the product and a questionnaire to collect responses from users. The questionnaire covers three main aspects, namely effectiveness, efficiency, and attractiveness of the learning media.

3.3 Development Stage

The smart board spinner learning media was created by modifying the smart board into an interactive counting smart board in which there is a wheel board made from a spinner. The wheel board is made colorful and contains addition and subtraction problems. The media is 90 × 60 cm in size made of plywood board painted black, while the wheel board is made of circular plywood covered with fabric plywood in the shape of a circle covered with flannel. Inside the media there are cups and ice cream sticks that children will use to answer the questions. The making of this media also pays attention to the ergonomic aspects of the product. As a multidisciplinary science, ergonomics must be applied to product design as a basic framework, while other considerations such as anaitic factors, economics, and others can improve the ergonomic function of a product (Syafe'i, 2018). The five aspects of product ergonomics are Comfort, Usability, Safety, Flexibility and Aesthetic.



Figure 2. Media Smart Board Spinner

The smart board spinner media that has been developed then enters the development stage which will be validated. Expert validation is an important foundation in revising the design being developed. At this stage of development, four experts were involved, consisting of 2 media experts and material experts each. The validation resulted in quantitative validation data from the material experts and obtained an empirical score of 128 and the expected score of 144. The score was then calculated using the percentage formula and obtained a percentage result of 88.8%. Based on the results obtained and the validator criteria table with the results of the data analysis, the criteria reached 81%-100% (Akbar, 2013). Then the smart board spinner learning media has a very worthy qualification.

The acquisition of quantitative data for media expert validation has an empirical score of 142 and an expected score of 152. Then the score is calculated using the percentage formula and gets a result of 93.42%. Based on the results obtained and the validator criteria table, the results of the data analysis reached the 81%-100% criteria (Akbar, 2013). Then the smart board spinner learning media has very worthy qualifications. Figure 3. Shows the validation data from media experts and material experts. Based on these two gains, it can be concluded that the media product "Smart Board Spinner" is very worthy or very valid.

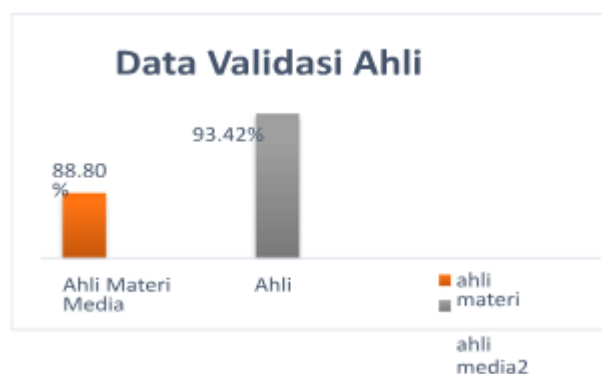


Figure 3: Expert Validation Result Data

3.4 Implementation Stage

Small group as well as large group trials were conducted at the implementation stage.

1. Small group trial

Small group testing was carried out with the aim of assessing the feasibility of products that have been made and finding shortcomings in products that will be used in learning for children aged 5 to 6 years, especially Kindergarten group B. This test involved 9 subjects from grub B at Al-Hidayah 02 Kanigoro Kindergarten. During the small group trial, the instrument sheet was assessed by the user. Based on quantitative data, the small group trial sheet obtained a score of 74 with an expected score of 80. The score was then calculated using the percentage formula and obtained 92.5%. Based on the results and the user validation criteria table, it is concluded that the smart board spinner media is very feasible, because it is in the range of 81.00% - 100%.

2. Large group trial

The last stage of the trial was the large group trial. This stage is a trial stage to determine whether the smart board spinner media product is worth developing and identifying the shortcomings of the product so that it is suitable when used to teach numeracy to children in kindergarten group B aged between five and six years. This large group trial was conducted in 3 institutions, namely Al-Hidayah 02 Kanigoro Kindergarten with 19 children as subjects, Dharma Wanita Gembongan 02 Kindergarten with 11 children as subjects, and Dharma Wanita Gembongan 04 Kindergarten with 11 children as subjects. The research was conducted in April-May 2024. In the large group trial, the teacher as a user used the media according to the pandun book that had been made.

After conducting the large group trial, the user or teacher then fills in the large group trial sheet in the form of a questionnaire to determine the validity level of the smart board spinner learning media. Three aspects, namely effectiveness, efficiency, and attractiveness of learning media are included in making a questionnaire or questionnaire as a consideration of media suitability. The questionnaire consists of 20 question items with details of 6 question items on the effectiveness aspect, 7 question items on the efficiency aspect, and 7 items on the attractiveness aspect. Based on the validation results, the empirical score was 230 and the expected score was 240. The score was then calculated using the percentage formula and obtained a percentage of 96.25%. Based on the percentage results and the user validation criteria table, the percentage is in the range of 81.00% - 100%, so the smart board spinner media is declared very feasible or very valid.

Based on the results of the description and the number of percentages obtained, the data on the results of the implementation stage are presented in the following figure:



Figure 4. User Validation Result Data

3.5 Evaluation stage

The final stage in the smart board spinner media development research process is the evaluation stage. This stage aims to ensure the benefits and shortcomings of the media created. At the evaluation stage, the smart board spinner media was carried out through instruments, observations and interviews with educators from 3 institutions, namely Al-Hidayah 02

Kanigoro Kindergarten, Dharma Wanita Gembongan 02 Kindergarten, and Dharma Wanita Gembongan 04 Kindergarten. The implementation of trials to children was carried out during class hours. Based on observations made in the field, it appears that the use of smart board spinner media is not optimal because there are some children who do not understand the use of media so that they are not fully independent. The use of this media will be effective if children are guided by the user (teacher). In this evaluation stage, revisions were made based on suggestions from several expert users in the implementation stage.

4. Conclusion

Smart board spinner is feasible in improving numeracy skills of children aged 5 to 6 years old. The conclusion drawn is based on the validation obtained from material experts, media experts, and users, the results show a high level of suitability, ranging from 81.00% to 100%. The validation results refer to three main aspects: effectiveness, efficiency, and attractiveness. All of these aspects are considered very feasible based on the predetermined validation criteria. With a percentage that reaches a range of 81.00% to 100%, smart board spinner media can be considered very feasible in stimulating the numeracy skills of children aged 5 to 6 years. smart board spinner which is used to stimulate numeracy skills is proven by trials at school. The feasibility of smart board spinner learning media has also been proven through small group and large group trials to 43 subjects in three different schools. The results showed an increase between pretest (before media) and posttest (after media) scores which was very significant in all schools. The smart board spinner media helps children understand the concept of numbers 1 to 10 and the concept of addition and subtraction operations. can be generalizing findings according to research problems, can also be in the form of recommendations for next steps.

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