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Game-Based Educational Monopoly (Monotif) to Improve Early Childhood Cognitive Abilities in Arithmetic

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Abstract

The aim of the study was to produce game based MONOTIF media to stimulate children's cognitive abilities in counting. Involve 12 early childhood children aged 5-6 years. The instrument used was a questionnaire with a Liker scale of 1 to 4. Children were given interventions for 8 meetings with a time span of 1 meeting lasting 90 minutes. Data analysis techniques with percentage calculations. The results of the study show that children can significantly improve cognitive abilities in arithmetic through game based MONOTIF media. Children who are enthusiastic in participating in the game. Game-based instructional not only improves cognitive abilities but can also increase children's involvement in learning. Learning by playing becomes a child can adapt to the environment. Limitations of the sample research used is still very small, it needs to be used with a larger sample.

Keywords: Educational Monopoly, Cognitive Abilities, Arithmetic.

Introduction

Early age is a sensitive period, during this time children can easily receive stimuli from their environment. At the golden age, children begin to be sensitive to various stimuli and various educational efforts provided by their environment(Amalia & Khoiriyati, 2018). Early childhood education is useful for stimulating children's intelligence to develop optimally(Papadakis et al., 2019; Shofyatun & Nirmala, 2018; Wolska-Długosz, 2015). Various knowledge will be easily absorbed by children at an early age because children's brains at an early age are more optimal in absorbing knowledge. Educators can create a learning atmosphere that stimulates student creativity by using media to facilitate the achievement of instructional goals(Ambiyar et al., 2020; Asset et al., 2015; Cho et al., 2013). Media is a tool in the instructional process in class and outside the classroom. Game-based educational monopoly learning media (MONOTIF) is a medium that can stimulate cognitive abilities in arithmetic. Based on this explanation, the use of instructional media is needed to stimulate children's cognitive abilities in counting.

Cognitive abilities are a series of mental abilities, skills, talents in processing certain types of information(Fauzi & Basikin, 2020; Gardner, 2014). Multiple intelligence is intelligence possessed by every child which is divided into 9 intelligences namely linguistic intelligence, visual spatial intelligence, musical intelligence, mathematical logical intelligence, kinaesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, naturalist intelligence, and spiritual intelligence(Winarti et al., 2019). Every child who has a certain intelligence will solve problems by involving certain intelligences. There are intelligences that are more prominent than other intelligences, but some intelligences can also run in harmony with other intelligences. The way to develop cognitive abilities in counting in children is through playing activities. According to(Lai et al., 2018), playing is a primary need for children. Playing activities can stimulate creative thinking and develop intellectual abilities in children(Ambiyar et al., 2020; Lim & Han, 2020). Through play activities the teacher provides opportunities for children to explore and gain direct experience in solving simple problems.

The supporting elements for achieving effective instruction are materials/materials, media, classroom atmosphere, and instructional methods(Segal et al., 2014). One of the elements that support instructional is instructional media. Instructional media is used to facilitate the delivery of instructional objectives. According to

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(Mardati & Wangid, 2015) in her research regarding the application of picture card media can improve initial numeracy skills in early childhood. (Pangestika et al., 2017)concluded that the application of number card media can improve the cognitive abilities of early childhood. One good way of conveying instructional material is through playing activities using media that interest children, so that children more easily understand the information received.

(Rambli et al., 2013) explained that the application of letter card media can improve the ability to recognize letters in early childhood. Learning activities while playing using letter card media can create a fun learning atmosphere that makes it easier for children to learn letter recognition. However, the letter card media is limited only to stimulate linguistic intelligence in terms of letter recognition. Even though the multiple intelligences of children include 9 intelligences that must receive a stimulus for each intelligence. To stimulate children's cognitive abilities in arithmetic, educators must have ideas, innovations, and skills in making instructional media. This game-based educational monopoly instructional media (MONOTIF) is a combination of letter card media, picture cards, and number cards which are modified in the form of educational monopoly as media in game-based instructional. According to Chatib (2017), monopoly is a property business game in the form of building and land assets, this game uses pawns, dice, playing land cards, and play money. This educational monopoly is different from monopoly in general, there are elements that stimulate cognitive abilities in arithmetic, such as letter recognition, number recognition, image recognition of fruits and animals, and color recognition. This game based MONOTIF media was developed aiming to stimulate cognitive abilities in counting in children, so that children's cognitive abilities can be stimulated properly.

Method
Sample
The study was conducted at Az Zahra Kindergarten, and this study focused on group B with an age range of 5-6 years. The characteristics were decided based on the consideration that teachers in group B have introduced simple problem-solving techniques about numeracy—this study involved as many as 12 early childhood Group B. Sampling techniques with purposive sampling methods. Determining samples was based on researchers' consideration of which examples are most helpful and representative(Sugiyono, 2015). The selection to be taken is determined based on knowledge of a population, its members, and the purpose of the study; the sample is taken randomly.

Research Design
The method used was a quantitative approach using the Borg and Dick Carey innovation model (Gall et al., 2016; Walter Dick, 2015). After the learning model was developed, validation was done before testing with prospective users. This research design provides interventions for students to learn through MONOTIF instructional media. In the early stages, are given a questionnaire to know students initial knowledge before intervention. After analyzing the student's responses, learning activities were carried out every day for seven days with an activity time of 10 minutes for each group. Each group consists of two students, so there are six groups. Students are expected to take surveys designed to measure experiences during the learning process. Teachers and parents have given consent to the activities undertaken for the study. At the end of the learning process, post-tests are carried out to measure the effectiveness of the learning process.

Research Instruments
The instruments were designed according to numeracy understanding for early childhood ranging from 5 to 6 years. The device used was a Likert scale questionnaire to obtain information to assess the level of numeracy ability based on the use of MONOTIF media. Assessment rubric for scores includes1= Undeveloped; 2= Start growing; 3= Grow as expected; and 4= Excellent development.

Data Analysis Techniques
Pre- and post-test analyses aim to diagnose students' experiences before and after using learning models in the learning process. Data analysis techniques were used based on information from surveys conducted on students.

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Students are observed by filling out forms based on the student's perspective on MONOTIF instructional media. Statistical testing was achieved through the t-test method(Gall et al., 2016) to determine learning effectiveness in field trials. The t-count value is compared to the one-way t-table, with a confidence level of 95% and df = n-1. The null hypothesis is accepted when the t-count becomes more significant than the t-table. If the opposite happens, then the null hypothesis is accepted.

Results and Discussion
Based on the results of identifying problems, problems arise because schools actually have very significant potential to develop children's cognitive abilities. The problems found when making observations in class, namely instructional media, are still not optimal in stimulating children's cognitive abilities in arithmetic. In addition, another problem is the lack of educational games in the classroom. Teachers often convey instructional material only with the media of pictures drawn on the blackboard. After knowing the problems that exist in schools, then it is necessary to collect various information and data that can be used as reference material. Product development planning g is expected to be able to overcome existing problems. At the data collection stage, researchers collected data in the form of the level of attainment of children's cognitive abilities in counting. Identify according to the level of cognitive ability in counting for children aged 5-6 years. The next stage is designing educational products in the form of game-based educational monopoly media (MONOTIF) which has the benefit of increasing cognitive abilities in arithmetic, mathematical logic, children learn to count the number of pictures of fruits, and pictures of objects around them.

Data analysis techniques are techniques for processing data obtained from research and used to answer questions about the product that has been developed whether it meets the criteria of validity, practicality, and effectiveness(Chernikova et al., 2020). The validity test phase is carried out by analyzing the validity data obtained from the MONOTIF instructional media validation results. The validation process is carried out by submitting the MONOTIF media validation instrument sheet to the validator which consists of two experts who are experts in the field of instructional media and the validator from the material. Each expert was asked to assess the product, so that the weaknesses and strengths of the designed product could be identified. Product design validation is carried out by giving a score of 1 to 4 on each point to be assessed. Based on the analysis of media validation data provided by each validator, then recapitulated in table 1.

Table 1. Results of Media Expert Validation

No.	Assessment Aspects	Validation 1	Validation 2	Means
1.	Design	3.5	3.1	3.3
2.	Material content	3.3	2.8	3.05
3.	Legibility	3.6	3	3.3
	Mean			3.2

The result of the overall validation average score is 3.2. Based on the validity criteria, the MONOTIF instructional media used in the study met the validity requirements. The effectiveness test stage is reviewed from several things, namely analysing the results of observations of children's activities when learning, and the achievement of indicators of children's numeracy skills. Observations made to measure the level of mastery of students in achieving predetermined instructional goals according to the basic competencies that children must achieve. Product effectiveness can be assessed from the data obtained during instructional activities using MONOTIF media. The results of observing the use of MONOTIF media are shown in table 2.

Table 2. Results of Learning Activities

No.	Category	Respondence	Percentage (%)
1.	Undeveloped	0	0
2.	Start Growing	0	0
3.	Growing As Expected	1	8.33
4.	Very Well Developed	11	91.67
	Total	12	100

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The results of the trial using MONOTIF media in game-based learning in large groups were carried out with a sample of 12 children in group B, there was 1 child with a percentage of 8.33% who scored in the category of developing according to expectations (BSH), and 11 children with a percentage of 91, 67% scored in the very good development category (BSB). Based on the level of student mastery, the interpretation of the average score obtained by group B children is very high with a percentage of ≥ 90%. The practicality test stage is carried out by analyzing the results of observations of teacher activity when teaching, and also the teacher's response after using MONOTIF media. Observation of teacher activity is assessed based on indicators of activities carried out by the teacher during instructions. The following table 3. results of observations of teacher activities in instructional.

Table 3. Instructional Process Results

No.	Instructional Process	Score	Percentage (%)
1.	Introduction	4	100
2.	Implementation Process	3.4	85
3.	Conclusion	3.6	90
	Average	3.6	90

The score obtained for each indicator of teacher teaching activity is 3.6 with a percentage of 90%, it can be said that the teaching activity of teachers in group B achieves very good criteria. Teacher response data were obtained from the teacher by filling out a questionnaire after the instructional process was completed. The response questionnaire contains teacher responses after using MONOTIF instructional media in game-based instructional. The following table 4 recapitulates the results of the teacher's response to instructions.

Table 4. Instructional Results Recapitulation

No.	Implementation of the Instructional Process	Score	Percentage (%)
1.	Daily Instructional Execution Plan	3	75
2.	Appropriateness of Instructional Materials	4	100
3.	MONOTIF media can improve children's cognitive abilities in counting	4	100
4.	Instructional Activities	3	75
	Average	3.5	87.5

The average percentage of teacher responses obtained was 87.2%. Based on the teacher's response level criteria, the interpretation of the average score obtained is very good. At the time of the product trial, the first activities carried out were introducing the children, observing the children's characters, conversing about the theme of plants with the sub-theme of vegetables, providing apperception activities by singing about various vegetables. After that introduce pictures of vegetables to children, then ask children about vegetables that can be consumed. Next, the child is given a worksheet by completing the letters in the name of the vegetable, counting the number of vegetables, and a collage of the parts of the tomato vegetable.

After the child completes the task on the worksheet, the teacher explains how to play the MONOTIVE game and the rules that must be obeyed when playing. The child's first step is to do '*hompimpa*' to determine their turn to play. Player 1 rolls a dice made of flannel, so it is safe for children. The second step is for the child to run the pawn according to the number that appears on the dice. If the child stops at the letter box, the child is asked to say what letter is in the box. If the child stops at the yellow box, then the child is asked to take a yellow card with a question card in it, then the child answers the question on the card. The questions on the yellow cards varied, such as mentioning the characteristics of animals, counting the number of vegetables, mentioning animals with 2 legs or four legs, and mentioning the characteristics of fruits. While the green card contains challenges, such as reading prayers in daily activities, reading short letters, and singing songs that have been determined on the green card. Children are very enthusiastic and excited when playing MONOTIF, there are some children who still need to be reminded how to play.

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MONOTIF is an instructional media in the form of an educational game tool that is played using pawns, dice, monopoly cards, and monopoly boards. MONOTIF was developed as a game-based instructional medium for group B children at Az Zahra Kindergarten. The way to play MONOTIF is the same as monopoly games in general, it's just that the monopoly board and monopoly cards are modified so that they can develop children's cognitive abilities in counting. Game-based instructional is an instructional that focuses more on developing children's cognitive abilities in arithmetic. Every Instructional activity is carried out to stimulate children's cognitive abilities in improving abilities. This game-based instructional activity is applied to group B children by using instructional media which can develop existing cognitive abilities in children.

The guidance also needs to be done to increase students' active participation in learning(St. Onge & Eitel, 2017; Tesfaye, 2015). At the end of each game, the teacher rewards each group with the highest point. Points are awarded for each success that students achieve in groups and individually. Vesting was a need for a sense of usefulness, important, appreciated, admired, and respected by those around them. In this case, students try to achieve the best results to impress others. They also want to prove that they could also be successful. If students are given awards according to their abilities, students would be even more encouraged to learn.

Conclusion

Based on the results of the development, it can be concluded that MONOTIF instructional media has fulfilled the category of valid, practical, and effective. MONOTIF instructional media validation scores can be categorized as valid with a significant average score so that it can be applied to large group trials. MONOTIVE instructional media (can be categorized as practical. This practicality data is obtained from teacher activity data which can be observed when the instructional process takes place, and also from the teacher's response questionnaire to the instructional which obtains very good percentages. The teacher's response when teaching using monopoly educational media shows positive results, and children are more enthusiastic in instructional activities Acquisition of teacher activity scores when instructional is very significant which is categorized as good MONOTIF instructional media can be said to be effective based on the criteria namely: 1) the level of student mastery is very significant obtaining a complete score above the average, and 2) achievement indicators instructional achievements that get very good results with high interpretation. MONOTIF media are expected to be taken into consideration in the development of instructional media that are fun as well as stimulate children's cognitive abilities in counting.

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