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Developing Interactive Game for Problem Solving Ability of 5-6 Years Kindergarten Children

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ABSTRACT

The objective of this study was to develop an interactive game that enhances problem-solving abilities in Kindergarten students aged 5-6 years. This research falls under the category of Research and Development, utilising the Borg & Gal developmental paradigm. Gall implemented 9 out of the 10 developed stages, specifically: 1) Identifying instructional objectives, 2) Instructional analysis, 3) Analysis of learners and context, 4) Formulating performance objectives, 5) Developing assessment instruments, 6) Developing instructional strategies, 7) Developing and selecting teaching materials, 8) Designing and conducting formative evaluation of instructions, 9) Revising instructions. The class exam evaluation revealed that the average score in class B1 was 85.55%, while in class B2, the average score among presenters was 83.77%. The findings from the medium-grade exam indicated that interactive games were effective in enhancing problem-solving skills in early infancy.

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1. INTRODUCTION

Interactive Games refer to creative activities or games that involve the invention, production, and distribution of computer and video games. These games provide interactive enjoyment, promote dexterity, and offer educational benefits. Interactive game groups serve as both a source of enjoyment and a tool for learning or education. Games can serve as interactive forms of media for educational purposes (Maillot, Perrot, & Hartley, 2012). Utilising interactive games for learning can effectively inspire students to develop proficiency in problem-solving endeavours. Each stage in educational games provides levels that might enhance students' cognitive thinking abilities in solving problems from a scientific perspective (Sumartini, 2016). Mardhotillah and Rakimahwati (2021) proposed that interactive games have the potential to enhance reading skills in young children and can be effectively utilised as a means to foster many areas of language development during early life. Games can enhance children's imaginative abilities, contribute to their problem-solving skills, foster their understanding of digital games, and cultivate age-appropriate cultural knowledge (Akman & Güçhan, 2015).

Furthermore Wahyuni, Hidayat & Budiarti (2022) suggested that using educational games in the form of quiziz applications can improve children's cognitive abilities in the remembering section, it can be seen that children's cognitive increases significantly by 83.9%. Research Hayatie, Atikah, &

Fadlullah,. (2021) also suggested that educational games in active learning can help support the life skills of early childhood aged 5-6 years. Then the research of Borman & Erma, (2018) states that educational game applications recognize letters, numbers and colors that can be used by children aged 4-6 years by combining visual, auditory and kinesthetic learning styles so that they can foster joy in children and are fun to learn . In short, the game is a type of media that can be used by teachers in the teaching and learning process which functions to increase students' knowledge through a media that is designed in a unique and interesting way, which contains pictures and writing which are usually in the form of puzzles, guessing pictures and composing. an object.

Cognitive is a broad knowledge of reasoning power, inventiveness and creativity, language skills and memory. The combination of child maturity with the influence of the surrounding environment is called cognition which is a non-mental function which includes perception, thoughts, symbols, reasoning, and problem-solving, but the characteristics of the children are different so that the cognitive development of children is not the same (Novitasari, 2018). Cognitive development plays an important role throughout an individual's life, with early skills benefiting preparation for higher levels of education throughout life, more stable psychic health, and less time spent unemployed (Kent, Pitsia, & Colton, 2018). How much a child's cognitive development can be observed when the child can or cannot solve the simple problems they face. Provide a concise summary Cognitive processes are intricately linked to the amount of intelligence, which differentiates individuals with diverse interests, particularly in relation to conceptualization and acquisition of knowledge.

Problem-solving ability is one of the abilities that must be developed in early childhood, because problem-solving is one of the aspects contained in the realm of cognitive development. Problem solving is finding steps to overcome existing gaps. The process of cognitive development allows children to remember, imagine how to solve a problem, develop strategies, and connect sentences into a conversation (Permata, 2020). Problem solving is a way for someone to use knowledge, skills, and understanding to meet the demands of non-routine situations (Putri, 2017). The ability to solve problems is an important ability that must be possessed by 21st-century children (Rahman, 2019). In other words, if students are trained to solve problems, they will be able to make decisions because they have become skilled at collecting relevant information, analysing information, and realising how necessary it is to re-examine the results obtained.

Problem-solving skills grow with age from an early age and will develop and contribute to self-determination abilities, namely, the ability to act independently (Palmer et al., 2013). In addition to training the ability to find solutions, the ability to solve problems can have an impact on the development of other abilities, such as critical and systematic thinking skills (Syaodih et al., 2018), creative (Shieh & Chang, 2014). , and communication (Dyah & Farida Agus Setiawati, 2019). Problem solving is the same as learning, where knowledge is obtained and then used efficiently to solve problems (Soden, 2013). Problem-solving can influence children's ability to generate solutions to science-related problems, and how this ability relates to other aspects of cognitive development, namely, children's propensity to ask questions, and the use of science-based ideas during problem solving (Fusaro & Smith, 2018). In other words, if students care about problem-solving, then these students will be able to make decisions, because these students have become experts on how to collect relevant information, analyze information, and realize how necessary it is to review the results that have been made.

Based on observations conducted on July 27, 2022, in a kindergarten setting, it was determined that the children's problem-solving skills were deficient. Upon initial observation, it was evident that numerous youngsters exhibited confusion regarding different shapes and struggled to solve basic tasks, such as comprehending colours and mixing them. Additionally, the children were notably inactive. These issues arise from multiple sources, such as the boring teaching approach employed by the instructor, which relies heavily on lectures. Additionally, the learning materials lack appeal and fail to encourage children's problem-solving skills. Furthermore, the learning process is predominantly centred around books, magazines, and student worksheets. Teachers frequently utilise LKS (Learning

and Knowledge Systems) to enhance cognitive development in children. Therefore, to prevent children from experiencing boredom and lack of interest in the offered material. As a teacher. Furthermore, youngsters exhibit a preference for expeditiously completing tasks, as they have become accustomed to using technology, resulting in a sense of entitlement. This fosters a sense of entitlement in youngsters, leading them to become complacent and unmotivated in fulfilling their responsibilities and navigating their everyday tasks. The researchers aimed to carry out a study named enhancement of problem-solving skills in kindergarten children aged 5-6 years through the development of interactive games.

2. METHOD

The type of research in this research is Research and Development (R&D) with the developmental model of Bord and Gall (Gall 2015). This research was conducted at Lillah Kindergarten with a total sample of 45 children, namely group B1 15 people with 8 boys and 7 girls B2 group 15 people with 10 boys and 10 girls and group B3 15 people with boys -7 people and 8 Woman. The product development procedure in this study follows the steps in the Borg & Gall, Gall model. As for this study, The researcher only carried out up to stage 9 as can be seen from the image below:

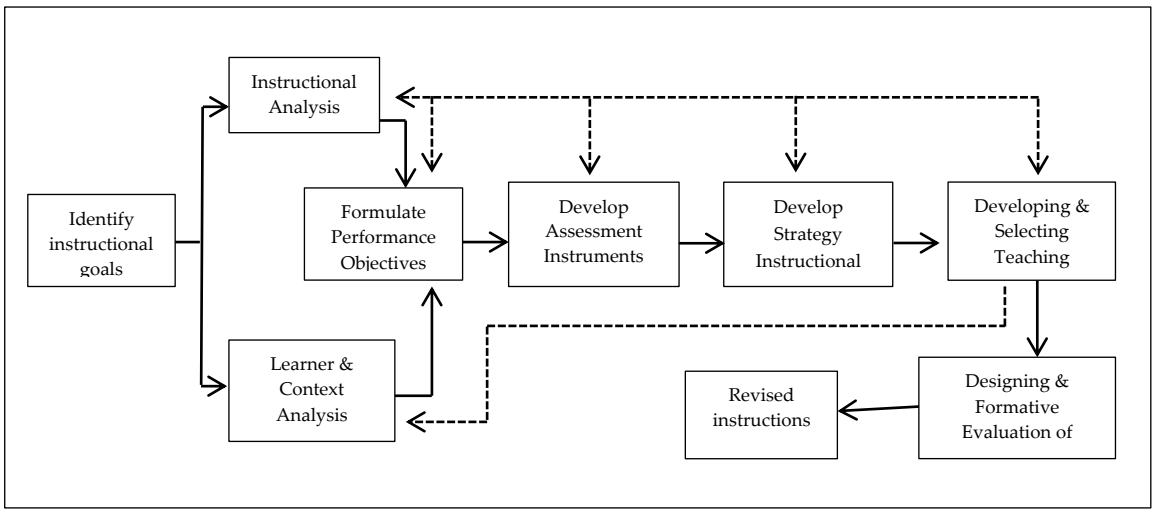


Figure 1. Stage on Research

The stages in the picture above can be explained in detail in the following description:

1. Stages Identification of instructional objectives
   The initial stage carried out was the identification of instructional objectives based on the results of the literature study. The main purpose of instructional / learning in kindergarten is to improve problem solving skills. In connection with the cognitive abilities of early childhood, one of the learning strategies that can be used to develop early childhood cognitive abilities is to use problem-solving strategies. Teachers can develop problem-solving abilities through an ideal learning process to develop problem-solving abilities in early childhood by using a variety of learning media and interesting activities so that children want to be actively involved in the learning process.
2. Instructional Analysis
   This analysis is an analysis of the learning process to determine the specific skills, procedures, and learning tasks involved in achieving teaching objectives.
3. Analyzing Learners and Context

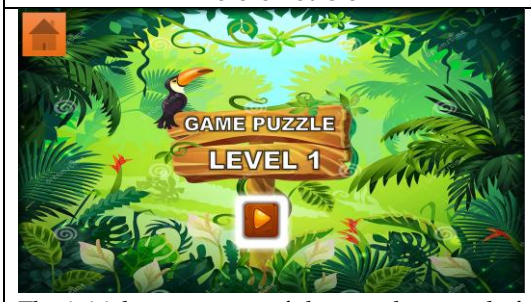
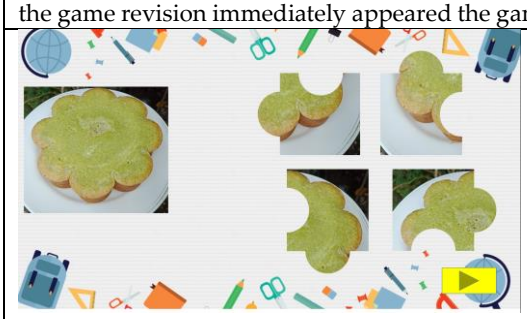
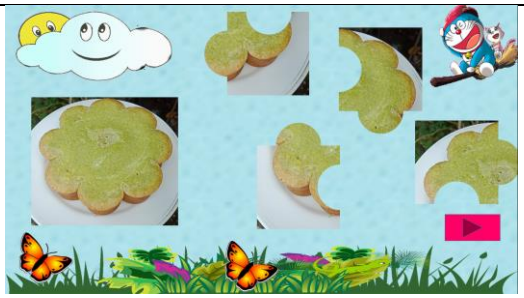
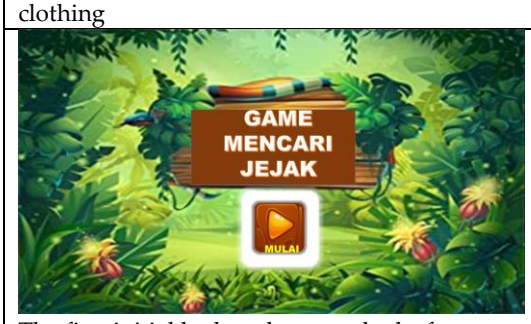
This analysis is conducted to identify learners' skills and attitudes, instructional characteristics, and settings in which new knowledge and skills will be used.

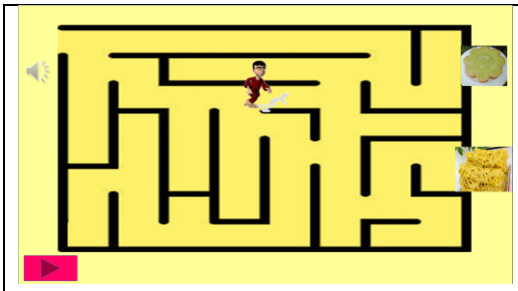
4. Formulating.Performance Objectives
   Formulating performance objectives is done to translate specific learning needs and objectives, such as test items, teaching materials, and learning models.
5. Developing Assessment Instruments
   This instrument must be directly related to the knowledge and skills specified in the learning objectives
6. Developing Instructional Strategies
   specific learning strategies developed to assist learners with their efforts to achieve each learning objective;
7. Developing and Selecting Teaching Materials
   Developing and selecting instructional materials involves developing instructional materials, including print materials such as textbooks and teacher training, or other media such as interactive audio or video tapes. If the lesson plan is specific to a teacher, lesson plans or guidelines for in-person instruction will also be developed as part of this step.
8. Designing and Conducting Formative Evaluation of Instruction,
   Realizing the design into a product and evaluating the product.
9. Revising instruction.
   Performed to perfect the product based on the results of product evaluation.

3. FINDINGS AND DISCUSSION

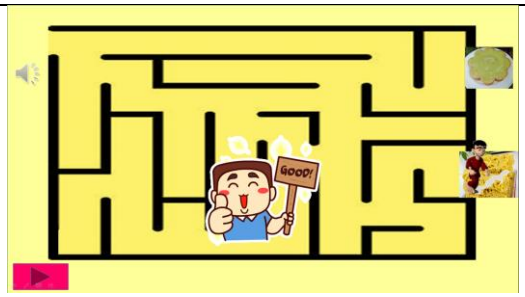
Interactive games are created using powerpoint applications that are tailored to the developmental needs of problem solving skills in children aged 5-6 years. Presenting the content that will be presented in the interactive game consists of three games, namely puzzle games, picture guessing games, and tracking games designed using the theme I love Indonesia using 2 topics namely; the first is the topic of Riau regional culture, Riau traditional houses and Riau traditional clothing, the second topic is traditional food such as kembojo cakes, jalar bread, lapek, laksaman berserk ice, mak inah honey ice, and bridal tears ice. The development of interactive games is carried out based on material to help improve the problem solving abilities of children aged 5-6 years and validation tests are carried out by experts.

At the stage of developing interactive game media, it is carried out by developing media based on material to help improve the problem solving abilities of children aged 5-6 years. The instrument was compiled based on the theory of children's problem-solving abilities which were then validated by a validator. After the repairs were carried out, the research instrument was said to be valid and feasible so that it could be used as a tool in data collection. The results of the eligibility validation test for the content of the material averaged 4.35 with a percentage value of 87.14%, so it could be concluded that it was very feasible and valid. It was concluded that the material aspects of interactive games to improve problem solving in children aged 5-6 years have been validated by children's education material experts age. The results of the assessment of the validity test of the media aspect obtained an average score of 4.71 and a score percentage of 94.28%, with a very valid category. Instrument validation was then carried out in the procedural step of this study to obtain a score with an average of 4.44 and a score percentage of 88.88% with a very valid category. The results of the assessment of the validity test of the instrument aspect are carried out with one assessment because each indicator has met the requirements for a validity score. After conducting an interactive game product design validation test by material, media and instrument experts on interactive game displays. As for the validator's suggestions, the improvements to the media product designs developed are as follows:

Before Revision	After Revision
 The initial appearance of the puzzle game before the game revision immediately appeared the game	 Added a cover image before the game play
 The appearance of the puzzle game at level 1 on the introduction of Komojo sponge cake	 The background in the game image is replaced with colors and characters that are appropriate for early childhood
 Puzzle game display at level 2 before being revised in the introduction of Riau Malay traditional clothing	 The background game puzzle 2 is replaced with interesting colors and images that match the character of early childhood
 The first initial look at the game looks for traces of when it was before it was revised	 Changes in the initial appearance of the game look for traces according to suggestions from media experts



The game view looks for traces before being revised like in the first game



The form of the appearance of the game looking for traces in the first game after being revised was changed by adding caricature images according to early childhood

An initial look at the picture guessing game before revision

The initial appearance after being revised in the picture guessing game by adding the names of researchers and supervisors to the covers.

Figure 2. Display of Interactive Games before and after Revision to Improve Problem Solving Ability in Children 5-6 Years Old

In the middle-class trial phase, this is carried out after the product has been validated by material and media experts. After obtaining input from material and media experts, the next step is to revise the media made based on the suggestions and input provided. Revisions were made to improve the product before the medium-grade test was carried out at Lillah Kindergarten, Marpoyan Damai District, Pekanbaru City. When the researcher conducted an assessment of the moderate class trial, the problem-solving ability of children aged 5-6 years, the researcher made initial observations of problem solving abilities in children aged 5-6 years who were accompanied by the teacher to obtain results with an average percentage in class B1 of 66, 11% and in class B2 the percentage is 64.44%. For more details, see the table below:

Table 1 Results of the Initial Observation Questionnaire of Problem Solving Ability of Children aged 5-6 years in Middle class

No	Indicator	Class	
		B1	B2
1.	Able to identify exploratory and probing problems	34	33
2	Able to explain the chronology of the problems he faced	40	39
3	Demonstrate looking for simple troubleshooting solutions	43	43
4	Able to collect information obtained in solving problems	40	39
5	Apply knowledge or experience in a new context	39	36
6	Trying to practice solutions to solve the problem	41	38
7	Demonstrate a creative attitude in solving problems (ideas, ideas out of the ordinary)	38	38
8	Be able to provide reasons why the solution was chosen	41	41
9	Able to communicate new knowledge gained	41	41
Total		**357**	**348**
Average		**39,66**	**38,66**
Percentage		**66,11**	**64,44**

Furthermore, the researchers collaborated with the teacher in using interactive games using 1 theme, namely the theme Aku Citan Indonesia with 2 topics, namely the first Riau Malay Cultural Customs, the second the topic of Riau Malay traditional food. This interactive game is made with 3 kinds of play. At the first meeting the researcher introduced puzzle games to children. This activity is carried out with a duration of between 20 minutes to 30 minutes in the main activity. The laptops used in this interactive game use 5 laptops, so in one class, there are 15 children who are divided into 5 groups with each group consisting of 3 children. Previously, the researcher gave the children an example of how to play the puzzle game. Furthermore, the researchers gave the children the opportunity to play the game alternately according to their respective groups. The second interactive game is a picture guessing game. As usual the teacher first divides the children into 5 groups in playing the gaabr guessing game. Likewise the implementation of the third interactive game, namely the trace-finding game by dividing children into 5 groups. However, in this game, there are no trace levels, but there are 4 types of tracking games in the game.

Then, the researchers assessed the problem-solving abilities of children aged 5-6 years using observation sheets. The assessment is carried out after learning by asking children to provide responses or a number of questions related to the theme for the product being developed in children. The results of the child's response will be given a checklist value on the child's observation sheet by researchers and teachers. Following below are the results of assessing children's responses in using games to improve children's problem-solving skills:

Table 2 . Observation Results of Problem Solving for Children Aged 5-6 Years After the Implementation of Interactive Games in Middle-Class

No	Indicator	Class	
		B1	**B2**
1.	Able to identify exploratory and probing problems	52	51
2	Able to explain the chronology of the problems he faced	51	50
3	Demonstrate looking for simple troubleshooting solutions	54	53
4	Able to collect information obtained in solving problems	55	53
5	Apply knowledge or experience in a new context	48	49
6	Trying to practice solutions to solve the problem	49	47
7	Demonstrate a creative attitude in solving problems (ideas, ideas out of the ordinary)	51	47
8	Be able to provide reasons why the solution was chosen	50	50
9	Able to communicate new knowledge gained	52	52
Total			**452**
Average			**50,22**
Percentage			**83,77**

Based on the results of the medium class test assessment in the table above, the average number in class B1 is obtained with a percentage of 85.55%, then in class B2 the average number with presenters is 83.77%. This was stated to be very effective in the development of interactive games for the development of problem-solving abilities of children aged 5-6 years at Lillah Kindergarten, Marpoyan Damai District, Pekanbaru City. This was stated to be very effective in the development of interactive games for the development of problem-solving abilities of children aged 5-6 years at Lillah Kindergarten, Marpoyan Damai District, Pekanbaru City. So, the results of the medium-grade test using interactive games show that interactive games are feasible to use in improving early childhood problem-solving skills.

Learning by using interactive games can ideally motivate students to be skilled in problem solving activities. Each level offered in stages in educational games can train students' cognitive thinking skills in solving problems in games from a scientific aspect (Sumartini, 2016). Games are a means of entertainment that can hone skills and can also be used as learning and educational media

(Arpiansah, Fernando, & Fakhrurozi, 2021). Using games can improve imagination skills and add to children's experiences, create solutions, build digital game knowledge and culture according to their age development (Akman & Güçhan, 2015). Interactive Games are creative activities or games related to (creation, production, distribution of computer and video games/games) which are interactive entertainment, dexterity and education. Interactive game groups are not only entertainment but also a learning or educational tool. Interactive games that use technology can be an alternative to learning so that they are more flexible and can be taken anywhere and can be used at any time. Games are a means of entertainment that can hone skills and can also be used as learning and educational media (Arpiansah, Fernando, & Fakhrurozi, 2021). Research conducted by Permata (2020) used puzzle game media on problem-solving skills in kindergarten. This is in accordance with the research of Candra, A. M., & Rahayu, T. S. (2021) that interactive game-based learning media can improve the ability to solve thematic problems in the material for arithmetic operations in class 2 elementary school. Thus it can be concluded that interactive games developed by researchers can improve problem-solving abilities in children in kindergarten.

4. CONCLUSION

The study has developed interactive games specifically designed to enhance problem-solving abilities in children between the ages of 5 and 6. The findings from the medium-grade test utilising interactive games demonstrate the viability of employing interactive games to enhance problem-solving skills in young children. This interactive game has significant ramifications for educators and the field of early childhood education. Interactive games can enhance problem-solving skills in youngsters aged 5-6 years, making them valuable tools for teachers in learning activities. The interactive games built by researchers possess certain limitations that necessitate further refinement in future research. The research has several limitations. Firstly, it focuses exclusively on the development of problem-solving abilities in children aged 5-6 years through interactive games. Secondly, the research only covers the revision of the final product and does not extend to the dissemination and implementation stages. Lastly, the scope of interactive learning is not addressed in this study. This advancement is exclusive to universities equipped with laptops or computers, rendering it inaccessible to institutions lacking such devices for utilisation of this interactive game.

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