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Development of Code-Based Chess Board Media to Improve Calculating Abilty in Collection Material

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Abstrak

Kemampuan berhitung merupakan kecerdasaan matematika mencangkup kemampuan untuk menggunakan angka dan perhitungan, poladan logika, dan pola pikir ilmiah. Peningkatan kemampuan berhitung ini dapat ditingkatkan melalui bantuan media pembelajaran berupa papan catur berbasis *code*. Inovasi pelaksanaan pembelajaran menggunakan permainan dapat dijadikan referensi bagi guru supaya dapat menyajikan pembelajaran yang menarik bagi siswa. Tujuan dilakukannya penelitian ini adalah untuk mengetahui tahapan pengembangan, tingkat kevalidan dan peningkatan kemampuan berhitung siswa. Penelitian ini merupakan penelitian pengembangan dengan model pengembangan Borg & Gall yang telah dimodifikasi. Penelitian ini menggunakan instrumen penelitian berupa wawancara, angket, tes (*pre-test* dan *post-test*) dan juga dokumentasi. Hasil penelitian ini menunjukkan tingkat kevalidan dari ahli materi mendapatkan skor 86% dan tingkat kevalidan dari ahli media mendapatkan skor 83%. Kedua hasil validasi menunjuukan bahwa media yang dikembangkan peneliti termasuk sangat layak dan tidak memerlukan revisi. Sedangkan peningkatan kemampuan berhitung siswa setelah digunakannya media catur berbasis *code* dalam pembelajaran termasuk dalam kategori sedang.

Kata Kunci: *Catur berbasis code, kemampuan berhitung, penjumlahan*

Abstract

Numeracy ability is mathematical intelligence which includes the ability to use numbers and calculations, patterns and logic, and a scientific mindset. This increase in numeracy skills can be improved with the help of learning media in the form of a code-based chess board. Innovations in implementing learning using games can be used as a reference for teachers so they can present interesting learning for students. The aim of this research is to determine the stages of development, level of validity and improvement of students' numeracy skills. This research is development research using a modified Borg & Gall development model. This research uses research instruments in the form of interviews, questionnaires, tests (pre-test and post-test) and also documentation. The results of this research show that the validity level of material experts got a score of 86% and the validity level of media experts got a score of 83%. Both validation results show that the media developed by researchers is very feasible and does not require revision. Meanwhile, the increase in students' numeracy skills after using code-based chess media in learning is included in the moderate category.

Keywords: *Code-based chess, counting skills, addition*

Introduction

Teachers use mathematics learning to foster students' creative thinking and help them gain better mastery in mathematics. Mathematics learning is a learning process that combines two inseparable types of activities. According to Susanto(2013), this activity focuses on learning and teaching. In mathematics learning, these two components work together to create activities that involve teacher-student, student-student, and environmental interactions.

Lecture methods, inadequate and unsupportive teaching materials and material that is quite extensive mean that students often have difficulty understanding the material in a lesson (Fatih & Dkk, 2022). Monotonous delivery of material, no updates and learning concepts that are difficult for students to understand encourage teachers to create innovative learning (Alfi et al., 2022). One of the tools used by teachers in the learning process is learning media. Learning media helps students gain information and knowledge (Fatih & Alfi, 2021). According to Piaget's theory, students at elementary school age (7-12 years) are in the concrete operations stage . Learning mathematics with the help of concrete objects helps elementary school age students understand logical operations. Using an inductive approach is one of the characteristics of mathematics learning in elementary school. Students will gain an understanding of ideas through experiments or concrete learning media. To master the next material or concept, understanding concepts is needed in mathematics.

Media helps students in teaching and learning activities (KBM). This is in line with the opinion of (Fatih, 2018) who said that the learning media used in the teaching and learning process is very important because it can help motivate and make it easier for students to learn. Real learning media can help students understand what the teacher teaches. However, if the teaching materials used are poor or uninteresting, the learning process will not reach the desired level of success (Fatih & Dkk, 2022). To choose appropriate learning media for certain learning, teachers must understand the characteristics of the very diverse learning sources.

Mathematics is one area that requires resources. Due to the fact that some students are afraid of mathematics subjects because they find them difficult, there is a need to do things such as using learning media to prevent students from feeling afraid or facing difficulties when learning mathematics. As is known, mathematics is a field of science that can be considered the mother of all sciences (Fathani, 2019). Even though mathematics is a very important field, many people misunderstand it. Mathematics is often understood only as formulas that most students don't like. In elementary school, mathematics includes addition material.

Based on the results of interviews and observations conducted by researchers with class III teachers at Kendelrejo 01 State Elementary School on November 30 2022, it was found that the use of media continues to be blackboard media, so students get bored when studying because there is no interesting media. Students become lazy to study because of these limitations. As a result, they have poor learning outcomes. Of the 29 children, 15 children experienced learning delays in mathematics lessons, which affected the delivery of the following material. Apart from that, material related to adding one number to another number, elementary school students in class III still have difficulty calculating quickly, this is due to the lack of media that can help students speed up their understanding of the correct way to count. This is one of the inhibiting factors and causes student learning outcomes to not run optimally.

A code-based chess board, which focuses on addition material, is a learning tool that can improve student learning outcomes and reduce learning delays. This chess board can also be used as a learning resource specifically designed to meet students' needs. The chess board is a game

that is commonly played, but the function of the chess board is aimed at learning arithmetic in grade 3 students who experience learning delays and are weak in mathematics. Games can also improve children's growth and development. Playing makes children happy and increases their interest in learning. The goal is to increase their interest in learning. All parents must realize that play and children's movement and sound activities are the best way to teach children (Khasanah, 2019).

Numeracy is the ability to use calculations, numbers, logic, and a scientific mindset. Mathematics games generally aim to teach children the basics of counting from an early age so that they are ready to learn mathematics at the next level, namely secondary school. Own play is any activity carried out to enjoy oneself without considering the end result and is carried out spontaneously without coercion from others, which requires parental attention. Children should enjoy the game.

The existence of learning with this game model can be a reference for teachers to carry out learning.

Metode (15%)

This research is development research using the Borg & Gall model which has been modified by researchers. The following are the development stages carried out by researchers.

This research was conducted on class III students at SDN Kendalrejo 01 Talun with a total of 29 students in the mathematics subject of addition. The techniques used by researchers include: interview techniques, questionnaires, tests and also documentation.

This research uses validation data analysis techniques by accumulating the scores obtained and converting them into percentages which will then be matched with the available criteria table. The following is a table of criteria used by researchers.

No Level of Achievement Description

No	Number of Achievement	Description
1.	82% < score ≤ 100%	Very feasible, no need Revised
2.	63% < score ≤ 81%	Eligible, no need for revision
3.	44% < score ≤ 62%	Not feasible, needs to be revised
4.	25% < score ≤ 43%	Not feasible, needs to be revised

Meanwhile, the data analysis technique used to analyze test results is to use the N-Gain formula as follows.

$$S = \frac{Posttest\ score - pretest\ score}{Maximum\ score - Pretest\ score}$$

Next, the researcher also matched the calculation results with the N-Gain formula in the following criteria table.

N-Gain Category	Value
g > 0,7	Fast
0,3 ≤ g ≥ 0,7	Medium
g < 0,3	Slow

Hasil dan Pembahasan (70%)

1. Development of Code-Based Chessboard Media to Improve Counting Skills on Addition Material.
   a. Potential Problems

      At this stage the researcher conducted observations and interviews at SDN Kendalrejo 01. The interview was conducted with the class III teacher at SDN Kendalrejo 01. Based on the results of the interview conducted by the researcher, it can be seen that the teacher has used media in carrying out mathematics learning, especially in addition material. The media used by the teacher is number cards. However, this media is considered less effective because students are not interested in the media used by the teacher.

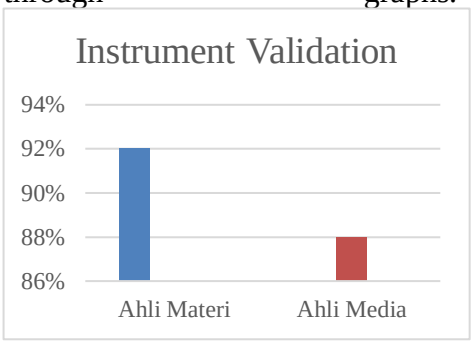
b. Data Collection
After the researcher discovered the problem at SDN Kendalrejo 01, the researcher then collected information and data to be used in planning a product to solve the problem. At this stage the researcher determines the research object, followed by conducting interviews, using questionnaire instruments and also carrying out documentation.

c. Product Design
After carrying out the process of discovering potential problems and also collecting data, researchers design the product to be developed. The following is a product design developed by researchers.

d. Design Validation
At this stage, researchers carry out product validation tests with experts to ensure that the learning media created by researchers meets expectations. Before validating the product with experts, the researcher validated the instrument with the supervising lecturer to determine the suitability of the instrument that the researcher would use to carry out the product validation test. The following is a percentage of the results of instrument validation carried out by researchers.

Instrument Validation	Precentage	Information
Materials Expert	92%	Very good and no revision needed
Media Expert	88%	Very good and no revision needed

The following are the results of the percentage validation of research instruments when viewed through graphs.



In this study, researchers conducted validation tests on material experts and media experts. Based on the results of material expert validation, the researcher obtained a good average assessment scale and received advice from experts to prepare a learning implementation plan. Furthermore, the researchers also carried out validation tests with media experts and obtained a good average rating scale and received suggestions for creating modules on how to play games and also duplicating media for efficient implementation of learning.

e. Revision
At this stage the researcher makes improvements to the media developed by the researcher in accordance with expert advice.


Before revision


After Revision

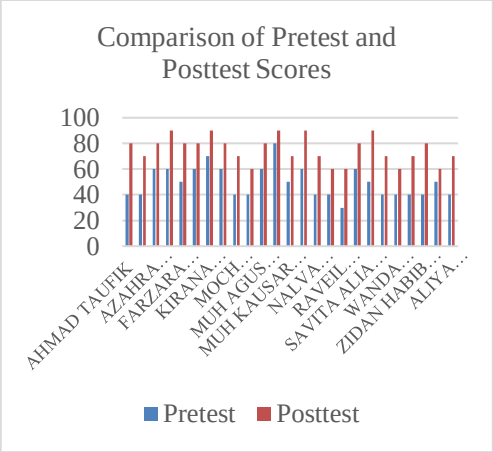
f. Trials
Researchers then conducted trials on learning media developed

at UPT SDN Kendalrejo 01. This media was applied to mathematics learning addition material in class III to help improve students' numeracy skills. Researchers analyzed the results of the pre-test and post-test using the N-Gain formula. If the results of calculations using the N-Gain formula are matched with the N-Gain criteria table, the increase in students' abilities is included in the medium category.

2. Validity of Code-Based Chessboard Media to Improve Counting Skills on Addition Material.

   In this research, researchers validated the product with material experts and media experts. The results of the validation by the research material expert received a score of 92% in the very appropriate category and did not require revision. Researchers get advice from material experts to prepare learning implementation plans. Furthermore, the researchers also carried out validation tests on media experts and got a score of 88% in the very appropriate category and did not require revision. Researchers received suggestions for creating modules on how to play games and also duplicating media for efficient implementation of learning. Learning media is used as a tool in the learning process, both inside and outside the classroom (Fauziah & Fatih, 2021). The results of the validity of this media are in line with research conducted by Kencana et al., (2021), this research shows that chess media which is included in the valid category can help students to improve their learning outcomes.
3. Improvement in Class III Students' Numeracy Skills After Using Code-Based Chessboard

   Media The improvement in class III students' numeracy skills after using code-based chessboard media can be seen from the results of the pretest and posttest scores. The following is a comparison of the pre-test and post-test scores for class III SDN Kendalrejo 01 Talun.



These results were then analyzed using the N-Gain formula and obtained a mean result of 0.5171 and included in the medium criteria. So it can be concluded that the use of code-based chessboard media can help improve class III students' numeracy skills in addition material. This is in line with the journal entitled "Development of Chess Learning Media to Improve Students' Understanding in Elementary School Social Studies Learning" which shows the results that the use of chess media in the learning process can help improve students' understanding (Aisah, 2022). Apart from that, research entitled "Development of Chess Expression Media to Stimulate the Ability to Recognize Emotions in Children Aged 5-6 Years" also shows that there is a significant increase between the pre-test and post-test so it can be concluded that chess media is feasible and effective as a medium. learning (Gemilang & Ningrum, 2023).

Simpulan (5%)

This research resulted in the development of a code-based chess board media product which was used to help improve the numeracy skills of class III students on addition material. The stages that researchers went through to produce this media development are as follows. a) potential problems, b) data collection, c) product design, d) design validation, e) revision and also f) testing. Based on the validation results from media experts and material experts, it can be seen that the validation results by media experts obtained a good assessment scale. Likewise, the validation results from material experts obtained a good average rating scale. Based on the results of the analysis of pre-test and post-test scores for class III students at SDN Kendalrejo 1, there was an increase in students' numeracy skills, including those in the medium category.

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Curriculum Vitae

Moch Faizin, usually called Kang Faiz, was born in Blitar on August 6 2000. The

writer was born to Moch Rochman and Sriani, the first child. The author lives in Kendalrejo RT 02/RW06 Kendalrejo Village, Talun District, Blitar Regency.

In 2007 the author started his elementary education at SDN Kendalrejo 01 and graduated in 2013. Then he continued his junior high school at Madrasah Tsanawiyah Ma'arif NU Blitar City which is now better known as MTsm NU Blitar/ MAMNU and graduated in 2016. Next the author continued at a higher school level at Madrasah Aliyah Ma'arif NU, Blitar City and graduated in 2019. Then in the same year the author was accepted at Nahdlatul Ulama University with the Primary School Teacher Education Study Program, Faculty of Education and Social Sciences.

The author has prepared the final assignment with perseverance and high motivation to continue learning and trying. With various challenges and trials, the author has successfully completed the final thesis assignment with the title "Development of code-based chess board media to improve numeracy skills in addition material (Class III SDN students Kendalrejo 01 Blitar Regency).