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Counting Box Learning Media Based on Local Wisdom: Innovation and Implications in Mathematics Learning in Elementary Education

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Abstract. One of the factors that causes students to have difficulty learning mathematics in addition to material is the need for more variety of media provided by teachers in learning. One effort that can be made to overcome students' learning difficulties is to develop additional learning media that suit the characteristics and needs of grade 1 students. The research aims to explain the process of developing local wisdom-based counting box media and analyze the attractiveness of the media. This research highlights local wisdom in Indonesia by using palm seeds to learn media. The research uses the Research and Development research method with the Borg and Gall development model, which adapts six stages: Research and Information Collection, Planning, Developing Preliminary Form of Product, Preliminary Field Testing, Revising Main Product, and Main Field Testing. The research subjects were 15 students in class 1 at MI Ar-Rohmah. The validation results showed that the criteria were very valid and interesting. The validation results obtained a score of 98 from material experts, a score of 97 from media experts, and a score of 96 from learning experts. The level of media attractiveness was obtained from 15 student response questionnaires, with 92% of results indicating it was exciting. The media's attractiveness can also be seen from the students' enthusiasm for learning the material from the previous observation without using media. Based on the results, developing counting boxes in mathematics learning can overcome students' difficulties in understanding and mastering arithmetic skills. The development by utilizing local wisdom in the form of palm seeds also provides a learning experience in the students' environment. Based on this, developing a counting box by utilizing local wisdom can be a solution to creating engaging learning media by using objects around students.
Keywords. Counting Box; Mathematics Learning; Learning Media; Local Wisdom

INTRODUCTION

Mathematics is a subject that is quite difficult for students to understand, this can be seen from the many students who are less enthusiastic about studying mathematics (Jankvist & Niss, 2020; Maryam Faizah et al., 2023). This is evidenced by the many students needing help understanding various concepts of the primary material in mathematics (Chinn, 2020) Difficulty in understanding concepts, causing students to be unable to solve their problems (Amallia & Unaenah, 2018). The goal of teaching mathematics in elementary school is to provide students with the skills necessary to calculate and solve problems that students encounter in everyday life analyzing data is relevant to daily life problems (Rakhmawati & Mustadi, 2022; Oljayevna & Shavkatovna,

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2020).

To solve difficulties in everyday life, students must have a basic understanding of mathematics (Gardner, 1999; Yayuk et al., 2020). Students with a mature understanding of mathematical concepts will be able to solve problems through mathematical calculations. They will be able to think creatively, thoroughly, and systematically and find solutions using appropriate mathematical calculations (Nisa et al., 2021). Students' understanding of the material being studied must also be the basis for mathematical calculations (Faizah & Ridwan, 2022). Students will be more successful in mastering the material they study if the learning process is tailored to their needs and characteristics (Anggraini et al., 2023).

One of the subjects that elementary school students must master is mathematics (Astika Desanti et al., 2023). Despite this, many students consider mathematics to be the most challenging subject to learn (Indofah & Hasanudin, 2023). Based on this assumption, students quickly quit before even starting their math lessons (Borko et al., 1992; Boaler, 2015). Students usually only want to understand the ideas taught by their teacher, so they are not interested in learning concepts that they can learn from other sources (Amallia & Unaenah, 2018).

Based on the results of interviews with the homeroom teacher of MI Ar-Rohmah Malang. Students in grade 1 of elementary school have difficulty understanding mathematical concepts. Young people said that many first-grade students still had difficulty understanding mathematics, especially the topic of addiction. This happens because there is a lack of learning media, so students tend to get bored when studying the material, especially the additional material. Students' interest in the subject matter has decreased due to the lack of learning media and the dominance of lecture techniques in the learning process (Buckingham, 2008; Kustyarini et al., 2020). Apart from that, using teaching materials that only consist of modules and worksheets makes students not want to study more extensive material (Setiawan et al., 2022).

Students really need to carry out concrete learning with daily activities at the grade 1 level (Widodo et al., 2020). Therefore, students need learning media to attract their attention and encourage them to participate (Utomo, 2023) and understand the content discussed during the learning process (Munna & Kalam, 2021). A teacher needs learning media in the classroom to support the student learning process (Ningsih & Sari, 2021). Learning media is anything that can convey messages (Hadza et al., 2020), can stimulate students' thoughts (Roemintoyo & Budiarto, 2021), feelings and desires (Syawaluddin et al., 2020) to foster a fun learning environment (Bulkani et al., 2022) for students. Utilizing learning media in the classroom encourages students to learn and makes achieving the expected learning goals easier (Ediyani et al., 2020). The use of media in the learning process is absolutely necessary (Magdalena et al., 2021), so that teachers can create a fun (Barab et al., 2005; Whitaker, 2020) and focused learning atmosphere for students.

Using learning media in the classroom can encourage students to understand the subject matter more deeply and attract students' interest in the additional material being studied (Winarto et al., 2020; Rachmavita, 2020). In grade 1 SD/MI students, students' numeracy skills (Chan & Scalise, 2022) it is starting to get better, but students will have a hard time understanding the content if they do not yet understand the basic concept of addition (Iswara et al., 2022).

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The difficulties students face in learning additional material can cause them to have trouble solving problems encountered in other issues. This also happens to grade 1 student of MI Ar-Rohmah, who still struggle to calculate 2-digit numbers. This happens because students have not mastered the concept of addition well and still tend to memorize the questions and answers they usually get. This memorization habit will make it difficult for students when they get different questions (Puspita et al., 2022). When students can calculate addition up to 20 and not just memorize it, they will quickly master adding any number.

Students need retention and interest in learning because learning additional material is less attractive (Filgona et al., 2020), teachers' inadequate use of instructional media during the teaching and learning process is the cause of this (Hardiansyah & Mulyadi, 2022). The underuse of instructional media that helps students comprehend more content is also a result of schools needing to provide the necessary facilities during the learning process. The teacher only uses items around the students, such as ice cream sticks and money.

Using learning media in the added material learning process significantly impacts student learning outcomes and subject mastery (Putri Nanda Agustin et al., 2022). The counting box learning media improves students' understanding of mastering additional material. This media has been proven to improve student learning outcomes, as shown in the study by Repni et al (Repni et al., 2022) the research title is "Application of counting box media to improve mathematics learning outcomes." This research indicates that student learning results were not yet at the 80% success indicator in the first cycle, with a class average of 77.7 and a completion rate of 77.5%. In cycle II, the success indicator was greater than 80%, the class average was 89.03, and the completeness of the student learning outcomes was 93.6%.

For students to understand the additional material being studied, using counting box learning media in the learning process is essential. Learning media, known as a "counting box", is a box made of board modified using simple tools and materials (Puspitasari et al., 2024). Counting box media must be modified according to the needs and character of students.

The development of the counting box media has proven to be beneficial in helping kids comprehend addition concepts and practice counting in order to provide answers to problems (Dalimunthe et al., 2024). Teaching the concept of addition to students through the use of counting box media is expected to help them understand the material being studied. This counting box media can be adjusted to the needs of students. With this media, students are also expected to continue to remember the additional concepts they have learned.

What is different about developing this counting box media is that it is equipped with a counting aid using palm seeds. This was carried out since there are still many palm trees in Indonesia, particularly in the Malang region's woods, where the strewn seeds are never touched to be utilized. Through local wisdom (Bulkani et al., 2022), researchers tried to use palm seeds as a tool in the addition medium.

Based on the description, the researcher developed a counting box learning media based on local wisdom to help grade 1 students of MI Ar-Rohmah Malang understand the concept of addition. The counting box media was developed by considering the needs

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and characteristics of students based on local wisdom.

METHOD

This research is an RnD (Research and Development) study that adopts the Borg and Gall model (Bennett et al., 1984; Aka, 2019) , which includes 6 stages: Research and Information Collection, Planning, Developing Preliminary Form of Product, Preliminary Field Testing, Revising Main Product, and Main Field Testing. In this study, the participants were 15 first-grade students from MI Ar-Rohmah Malang. The validation process was carried out by three expert validators: material experts, media experts, and learning experts. The criteria used to validate the media were adjusted to the validation questionnaire that had been created. The questionnaire contained the substance of the discussion of the material, media flexibility, and the effectiveness of media use in the learning process. After the validation, revisions were made to improve the validity of using the counting box learning media. Data is gathered via observation, interviews, surveys, and documentation during the development and learning process (Schensul et al., 1999; Pandey & Pandey, 2015). The data was analysed by using quantitative and qualitative methods. While validation results and students' opinions on the product's attractiveness were included in the quantitative data analysis, the qualitative data analysis was predicated on interviews and validator recommendations. The parameters presented were used to assess the validity of the media.

Table 1. Procedure for Developing Counting Box Media Based on Local Wisdom by Borg and Gall Mind Mapping (Sakinah et al., 2023)

No	Stages	Description
1	Research and Information Collection	a. Initial Analysis (Observation) b. Student Analysis c. Teacher Interview d. Task Analysis e. Learning Objectives Analysis f. Learning Media Analysis
2	Planning	a. Planning Product Design b. Prototype/ Storyboard c. Initial Draft
3	Developing Preliminary Form of Product	a. Designing media b. Creating media c. Allocating costs
4	Preliminary Field Testing	a. Questionnaire Validation b. Expert Validation (Material Expert, Media Expert, and Learning Expert) c. Validation Result
5	Revising Main Product	a. Analysis of Expert Validation b. Revising Product
6	Main Field Testing	a. Final Product b. Trial in Class at MI Ar-Rohmah

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RESULT AND DISCUSSION

RESULT

Research and Information Collection

Researchers interviewed class 1 teachers about students' problems during the learning process. This step is taken to detect and identify problems in the field. By conducting literature reviews and discussions with experts, researchers produced information in developing media products by counting box learning media according to the problems found at MI Ar-Rohmah. After data collection, it was found that: (1) The use of teaching materials for addition materials used LKS, so learning was less effective; (2) The media used is ice cream sticks, so it does not attract students' interest in studying addition material; (3) Teachers still dominantly use the lecture method so that students get bored quickly; (4) Teachers support the development of counting box learning media because it suits the characteristics of students who still need concrete objects to practice addition. After the needs analysis, the researcher conducted a learning outcomes analysis. The analysis of learning outcomes used is about performing addition arithmetic operations using concrete objects up to 20.

Planning

At this stage, researchers began to design the counting box learning media being developed. Researchers create a product framework by determining the devices, tools and materials needed to determine the size and shape of the media being created. Counting boxes, answer areas, counting holes, question card containers, answer cards, hammers, palm seeds, question and answer cards, card boxes, and guidebooks are components of the addition counting box media. At this stage, the researcher determines the learning objective for students to perform addition operations using 20 concrete objects. The material created for the counting box media also included class 1 addition content focused on addition operations from 1 to 20. Material and questions are created based on learning outcomes adapted to learning objectives. This addition media was chosen to increase learning motivation and help students understand addition calculation operations.

Developing Preliminary Form of Product

Based on the product design, researchers produced the following counting box learning media development product:

1. Counting Box
   Counting box made from multiplex covered with stickers measuring 68 x 45 cm with 10 horizontal holes and 5 vertical holes. At the bottom of the hole there is a drawer space at the bottom for storing 100 palm seeds.

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Figure 1. Counting Box

The answer space arranges the magnets for working on addition problems. It is made with dimensions of 58 x 35 cm and is attractive and adapted to student characteristics. The answer space consists of 10 places to paste the results. The counting hole measuring 63 x 40 cm consists of 50 holes, which are used to count numbers with a maximum counting value of 20.

2. The Palm Seed and Question
   The palm seed container is used to store palm seeds. It is located on the left side of the counting hole with a width of 8.5 cm and a length of 37 cm. Palm seeds are coloured using polish paint to attract students' attention. There are 120 palm seeds used in counting operations. The question and answer card container is used to store question cards. It is located on the top of the counting hole with a width of 40 cm and a length of 8.5 cm.

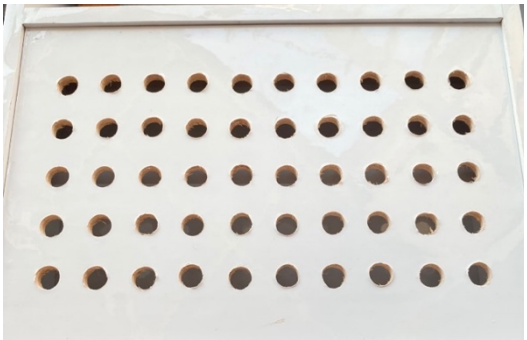

Figure 2. The palm seed

3. The Palm Seed and Question & Answer Card
   The making of question cards and answer cards is with a size of 8 x 11 on Art Paper 260. The card box is 8.5 cm wide and 12 cm long. This product will contain 10 question cards and answers. These question cards and answers will be coloured to attract students' attention such as forest images. These question cards and answers will be packed in a box that says "Question Cards and Answer Cards".

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Figure 3. The palm seed and Question & Answer Card

4. Number Magnet and User Manual
   The answer number magnets are in the form of numbers that students attach to the addition box according to the correct answer. Located on the right side of the counting hole with a width of 8.5 cm and a length of 37 cm. In addition, there is a user guide book containing information on how to use the counting box media for addition. The user guide book is printed on Art Paper.

Picture 4. Number Magnet and User Manual

Preliminary Field Testing

Initial field tests are conducted at this stage, and researchers perform validation procedures to assess the product in the presence of chosen validators. The validators involved are specialists in media design, learning methodologies, and material development. The material expert validator will evaluate the media's relevance to the learning objectives and provide feedback on the developed content.

Validated media design experts will assess media design, appeal, and feasibility. Meanwhile, learning specialists will assess the effectiveness of media use in facilitating the learning of additional material. This validation stage aims to identify deficiencies and validate the feasibility of the media before it is practised. Researchers will gain valuable suggestions, criticism, and input that can help address deficiencies in the material produced. The following are the results of the validation of the product developed by the researcher as follows:

1. Material Expert Validation Data Analysis

   This expert validated the validation of the material expert. He teaches

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elementary school mathematics at MIN 1 Malang City and has experience in the field. He is a graduate of S1 Mathematics Education at Surabaya State University and S2 Elementary Madrasah Teacher Education UIN Malang. The following is the presentation of the validation results by the material expert:

a. Quantitative Data

Based on the results of the validation recapitulation by material experts, overall it was obtained $P = \frac{74}{75} \times 100 = 98{,}6$ with very valid and very appropriate criteria. This means that the material used in developing the total counting box media does not require revision but still pays attention to the suggestions and criticism provided by the validator as evaluation material.

b. Qualitative Data

Qualitative data was obtained from criticism and advice from material experts, namely:

1) Natural media such as palm seeds are very good, but if a very large amount is needed, you can make a palm seed imitation.
2) Making practice questions in the form of story questions from easy to difficult, from 1+1 to 10+10.
3) Introducing friends with the number 10 so that children are skilled at counting up to 20. For examples 10 = 1+9=2+8=3+7=4+6=5+5.

The suitability of the material used with the level of student understanding makes the material suitable for use by grade 1 students. In addition, the material uses seeds, which can be a teaching aid to carry out the addition process. This can improve students' ability to understand the concept of addition.

2. Media Design Expert Validation Data Analysis

This expert is a lecturer at UIN Maulana Malik Ibrahim Malang, where she teaches the Learning Media course. She is a graduated from the Masters in Educational Technology program. The following is the presentation of the validation results by media design expert:

a. Quantitative Data

Based on the results of the validation recapitulation by design media experts, overall it was obtained $P = \frac{73}{75} \times 100 = 97{,}3$ with very valid and very feasible criteria. This means that the counting box media does not require revision but still pays attention to the suggestions and criticisms given by the validator as evaluation material.

b. Qualitative Data

Qualitative data obtained from the material design expert validator, namely

1) Add animation of male and female students counting on the answer space display.
2) The font size is reduced
3) Variation of writing colour in the guidebook
4) The counting holes are tidied up so they are not fibrous

The suitability of using palm seeds in learning media can improve students' ability to understand the concept of addition. This is because it is by the media validation criteria. Palm seeds are easy to use and are widely found by students in

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the surrounding environment. This makes the media engaging and flexible for students to use while learning additional material.

3. Learning Expert Validation Data Analysis

This expert is a teacher at MI Ar-Rohmah Malang and has experience teaching in Elementary Schools. The following are the results of the validation:

a. Quantitative Data

Based on the results of the overall validation of learning experts, the results obtained were $P = \frac{72}{75} \times 100 = 96$ with very valid and very appropriate criteria. The results show that the counting box media does not require revision but still pays attention to the suggestions and criticisms given by the validator as evaluation material.

b. Qualitative Data

Qualitative data was obtained from expert learning validators in the form of suggestions that wooden hammers should not be used in lower grades but plastic hammers.

The suitability of using seeds in the learning process can improve students' ability to understand the concept of addition. This is because it is based on the validation criteria of learning experts. Palm seeds are easy to use and attract students' interest in learning to understand the additional material. Using seeds and learning media also helps students understand the material because students can directly carry out the counting process using concrete objects that are by the student's development stage.

From the results of the validation assessment by several experts, the following results were obtained: Based on the result the material expert's validation score was 98.6, the media design expert's score was 97.3, and the learning expert's score was 96. So, the counting box board learning media for addition shows results with very valid criteria and is feasible for students to practice on addition material. With the validation results obtained, counting teaching aids that utilize cultural wisdom can improve students' conceptual understanding of additional material.

Revising Main Product

After getting validation results and comments from experts, researchers made revisions by considering suggestions and criticisms from validators to improve the media. Some revisions of the media are as follows: Questions and answers revised in story form, make easy to difficult questions to count to 20, Answer space view, Reducing the font size and giving colour variations to the manual, tidying up the counting holes so they don't get tangled.

Main Field Testing

Counting box media was implemented on 15 grade 1 students at MI Ar-Rohmah Malang. Students participated in various mathematics learning activities using counting box media on addition material. After learning, students were asked to fill out a student response questionnaire on counting box media for addition. The following are the results of student responses to counting box media for addition:

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Based on the recapitulation results of 15 student response questionnaires, the results obtained were $= \frac{552}{60} \times 100 = 92$ % with very interesting criteria. This proves that students' responses to the use of counting box media for addition are positive and interesting. Based on the results of the use of media in first-grade students, it can be seen that students are very interested in using learning media because they use local wisdom when doing the counting process. In addition, using learning media in the learning process makes students understand the concept of addition better because they carry out the counting process directly with concrete objects. Using local wisdom in the learning process also makes students interested in studying the material more deeply and understanding the concept of the material being studied. This happens because the objects used are in the environment around the students, so they are easy to understand and master.

DISCUSSION

Mathematics is a compulsory subject in the elementary schools/Islamic elementary schools in Indonesia. The Independent Curriculum is being used in Indonesian education. In the Independent Curriculum, mathematics is essential in helping students develop logical and critical thinking skills and their understanding of mathematical ideas (Tatnall, 2020). Students can be encouraged to connect mathematical ideas and real-world situations by applying mathematical principles, which will help them see the value of mathematics in daily life. In instilling mathematical concepts, researchers created a special counting box media for addition material linked to basic materials based on local wisdom. Indonesia has forests that grow many palm trees, so researchers are interested in using counting tools from palm seeds.

To the learning theory that grade 1 SD/MI students have concrete operational characteristics (Hasanah & Fajri, 2022) that reflects their cognitive development stage. At that stage, students have concrete thinking, so that students are still very dependent on direct experience and physical objects (Baroody, 2017). Students learn by seeing, touching, and doing. In addition, grade 1 students have to learn through games. Learning activities involving games are very effective because students like to feel happy with fun activities. At this stage, students also have a very high curiosity and like to ask questions so that this can be used for further exploration (Rahayu et al., 2022).

The counting box media for addition has been designed using the Borg and Gall development model to support this. This model involves a comprehensive process of creating, implementing, and evaluating media to ensure validity. A series of tests were carried out to ensure the validity of the material, media design, and learning process. The expert test findings demonstrated the validity and suitability of the media as a teaching tool for mathematics, particularly addition topics. This counting box media's development has a unique quality that embodies the idea of local wisdom, making it innovative in the field of study. The Counting Box media for addition provides students with an exciting and comprehensive learning experience to help them develop conceptual understanding.

The development of a counting box for addition adapted to local wisdom has been proven to help students understand the concept of addition (Tiwow et al., 2022) . Using

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palm seeds in learning media helps students in the counting process by adjusting the number of questions obtained with the number of palm seeds counted so that students can understand the concept of addition as a whole by utilizing concrete objects (Kalogeropoulos et al., 2021). Using palm seeds can also utilize the abundant local wisdom in Indonesia. The use of media based on local wisdom can also continue to be developed because of the ease of obtaining goods according to student needs (Yusuf, 2023). Based on this, the development of this media can solve students' difficulties in understanding addition material by using counting box learning media based on local wisdom.

CONCLUSION

Counting Box media has proven valid and appropriate supplemental study material for aspiring elementary school teachers. The validity and readability test results showed a valid score, material validation of 98.6, media design validation of 97.3, and learning experts 96. The level of media attractiveness was obtained from 15 student response questionnaires, with 92% of results indicating it was exciting. Counting box media greatly facilitates students in the independent learning process. Furthermore, this counting box media can be developed for mathematics materials, especially subtraction and summary, and disseminated to a broader audience. This local wisdom-based learning media has been proven to help students understand the concept of addition better, this is because the palm seeds used provide a concrete learning experience that is in accordance with the abilities of lower grade students. The limitation of this media development is that it is only for addition material for grade 1 students. It is hoped that further research development can provide media development solutions for student problems in other mathematics subjects in more depth.

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