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DEVELOPMENT OF NUMBER TREE MEDIA IN TEACHING LEAST COMMON MULTIPLE (LCM) FOR FOSTERING CREATIVE THINKING IN FOURTH-GRADE ELEMENTARY SCHOOL STUDENTS IN THE PUCANGLABAN SUBDISTRICT, TULUNGAGUNG REGENCY

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ABSTRACT

This research aims to describe (a) the landscape of Least Common Multiple (LCM) learning for fostering creative thinking, (b) the design of the developed number tree media used in LCM learning, and (c) the effectiveness of the number tree media employed in LCM learning in the fourth-grade class at SDN 1 Pucanglaban, Tulungagung Regency, as a stimulus for students' critical thinking. The study follows a Research and Development (R&D) design based on the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). Data collection includes numerical and textual information gathered from teachers, students, media experts, and subject matter experts through interviews, product assessment questionnaires, and pretest and posttest results. The results are: (1) the learning resources used in the sixth-grade class at SDN 1 Pucanglaban, Tulungagung, consist of curriculum-aligned textbooks for 2013. However, alternative learning media that could facilitate more active, creative, and critical student engagement have not been employed; (2) the "Number Tree" learning media developed using the ADDIE model is deemed highly suitable for Mathematics instruction, specifically in the context of LCM; and (3) the development of the Number Tree, grounded in fostering creative thinking, has proven effective in enhancing Mathematics learning among fourth-grade students at SDN 1 Pucanglaban, Tulungagung, during the academic year 2022/2023.

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INTRODUCTION

Education is one of the most crucial aspects in shaping competent and competitive individuals. Primary education at elementary schools (SD) represents a pivotal stage in the educational process, as it lays the fundamental groundwork for children's abilities and understanding. Mathematics is a vital subject in the elementary school curriculum. However, it is often perceived as a challenging subject by a significant number of students. Hence, efforts are needed to develop instructional media that can assist students in better comprehending mathematical concepts, one of which involves the utilization of the number tree media in teaching Least Common Multiple (LCM).

LCM is a significant mathematical concept, representing the result of multiplying prime numbers that are factors of two given numbers. To grasp LCM, students need to understand the factors of numbers, prime numbers, and the concept of multiplication. However, students often encounter difficulties in comprehending LCM due to its abstract nature and the requirement for a profound understanding of numbers.

LCM is part of the discussion on Multiples and Factors. According to the 2013 Curriculum (K13) Competence Standards, determining the multiples and factors of the number 3 is taught in the fourth grade. The learning achievement indicators include (1) determining the multiples of a number, (2) determining the common multiples of two numbers, and finding the Least Common Multiple. One of the expected learning objectives is for students, through group work, to identify the common multiples of two other numbers by adding or subtracting their differences and to determine the Least Common Multiple of a number. The desired student characteristics for this subject include discipline, respect and attention, diligence, responsibility, and creative thinking.

Mathematics instruction in the fourth grade at SDN 1 Pucanglaban, Tulungagung, does not always proceed smoothly. One of the issues faced by teachers in this fourth-grade class is the low proficiency of students in solving mathematical problems, particularly in the LCM subtopic.

Based on interviews with fourth-grade teachers at SDN 1 Pucanglaban, it was revealed that the student's ability to solve mathematical problems, especially in the LCM subtopic, remains low. Observations by the researcher further indicated that students still tend to struggle to understand LCM material. The teacher's explanation during the

LCM test revealed that out of 20 students, 15 were unable to solve the problems, and four students still had no understanding of LCM.

This issue arises due to the inadequacy of the media used, which does not align with the characteristics of the students. Interviews with teachers confirmed that when teaching this material, only a chalkboard is utilized. Therefore, there is a need for suitable instructional media to capture students' attention, ensuring that they participate effectively and grasp the material easily.

One approach that can aid students in understanding the concept of LCM is the use of appropriate and effective instructional media. Instructional media are tools or means used to facilitate the learning process and assist students in understanding course material. One such type of instructional media is the number tree media. The number tree provides a visual representation of the factors of a number and the relationships between these numbers.

Previous research has shown that the use of number tree media in mathematics instruction can enhance students' understanding of mathematical concepts. For instance, a study by Rohendi et al. (2016) found that the use of number tree media in primary school mathematics instruction improved students' understanding of prime numbers and the factors of numbers. The results indicated that students using the number tree media had better abilities in understanding mathematical concepts compared to those who did not use it.

Moreover, the use of number tree media in mathematics instruction can enhance students' creative thinking abilities. In his research, Suhendar found that students taught using number tree media were more capable of developing creative thinking skills in solving mathematical problems compared to students taught using conventional methods.

The development of number tree media in LCM instruction in fourth-grade elementary schools in the Pucanglaban subdistrict of Tulungagung Regency holds significant relevance. Like other regions in Indonesia, Tulungagung Regency faces challenges in improving the quality of education. One of the issues is the low understanding of mathematical concepts among students, including the concept of LCM. By developing number tree media, it is anticipated that fourth-grade students in the Pucanglaban subdistrict of Tulungagung Regency can better comprehend the concept of LCM and enhance their creative thinking abilities.

Furthermore, the development of number tree media in LCM instruction aligns with the demands of the 2013 curriculum, which emphasizes the importance of employing a scientific approach and fostering student creativity in the learning process. The use of number tree media can assist students in developing their creative thinking skills, as they need to find solutions from various possibilities when understanding the LCM concept.

Therefore, this research aims to develop a number tree media in LCM instruction for fostering creative thinking in fourth-grade students in the Pucanglaban subdistrict of Tulungagung Regency. The study will also involve testing the effectiveness of this media in improving students' understanding of the LCM concept and their creative thinking abilities. The results of this research are expected to make a significant contribution to enhancing the quality of mathematics education in fourth-grade elementary schools in the Pucanglaban subdistrict of Tulungagung Regency.

To achieve these objectives, this research will refer to previous theories and studies on the use of number tree media in mathematics instruction, understanding the concept of LCM, and developing students' creative thinking. Additionally, the research will involve the analysis of student needs, the development of number tree media, and the testing of the effectiveness of this media. Thus, this research is expected to make a significant contribution to improving the quality of mathematics education in fourth-grade elementary schools in the Pucanglaban subdistrict of Tulungagung Regency.

Based on the above background, the research problem formulation is (a) the portrait of Least Common Multiple (LCM) instruction for fostering creative thinking, (b) the design of the number tree media development used in LCM instruction, (c) the effectiveness of the number tree media used in LCM instruction in the fourth-grade class at SDN 1 Pucanglaban, Tulungagung Regency, as a stimulus for critical thinking among students.

METHOD

This study adopts the Research and Development (R&D) research design following the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The ADDIE model represents a structured and systematic approach to

developing a product or learning program. The following are the stages in the ADDIE model, along with brief explanations of each stage.

Analysis. This stage involves data collection to understand students' needs, learning objectives, and potential challenges. The analysis encompasses an understanding of the LCM concept, students' comprehension levels, and barriers encountered in mathematics learning. For instance, Dick and Carey (2015) explain that the analysis stage should include the identification of learning objectives and student characteristics.

Design. In this stage, the design of the number tree media will be formulated based on the results of the analysis. The media design will consider learning design principles such as clarity of objectives, student engagement, and material relevance. According to Morrison, Ross, and Kemp (2007), learning design should include planning learning activities that integrate learning theories and student characteristics.

Development. The development stage involves creating the number tree media according to the formulated design. This media will be designed to align with the characteristics of fourth-grade students. The development process will consider multimedia and learning design principles, including visual clarity, interactivity, and attractiveness. According to Mayer (2008), multimedia design should adhere to the principles of student information processing.

Implementation. In this stage, the number tree media will be tested in the actual learning environment at SDN 1 Pucanglaban fourth-grade classrooms. Teachers and students will be engaged in the implementation process. Data collected during implementation will be used to identify changes and improvements needed in the media. For example, Guskey (2002) explains that the implementation stage should include monitoring the impact of media on students' understanding.

Evaluation. The evaluation stage will involve data collection to assess the effectiveness of the number tree media in enhancing students' understanding of the LCM concept and creative thinking abilities. Evaluation will include quantitative and qualitative data analysis, as well as a comparison of learning outcomes before and after media use. Learning evaluation theories such as Kirkpatrick (1998) will be employed to measure the impact of media on student understanding.

The research data consists of numbers and sentences. Data sources include teachers, students, media experts, and subject matter experts. Both sets of data are

obtained through interviews, product assessment questionnaires, and pretest and posttest results.

The product, in the form of a Student Worksheet based on creative thinking formation, is deemed effective based on the significant average difference between pretest and post-test scores. This assessment will be computed using SPSS Statistic 20 with a Paired Samples Statistics test. Decision-making criteria are based on probability value (sig) comparisons, where if the probability is >0.05, Ho is accepted, and conversely, if the probability is ≤ 0.05, Ho is rejected. The hypotheses are as follows.

Ho: Both population averages are equal

H1: Both population averages are not equal

This research is quantitative research with a comparative causal type. According to Afif et al. (2023), this research type aims to conclude whether there is a causal relationship between the variables studied. This research was conducted at Cristal Senior High School. The population in this survey was 182 students divided into three classes. The sampling technique used was probability with cluster sampling so that the sample in the study was 61 students taken from one class. The data analysis techniques are tests of validity and reliability, normality tests, and linearity tests. Next, to analyze the influence, researchers used regression analysis. The collected data was analyzed using SPSS version 21.

RESULT AND DISCUSSIONS

Portrait of Least Common Multiple (LCM) Learning

The Curriculum 2013, encompassing Competence in Attitude, Competence in Knowledge, and Competence in Skills, remains the reference point for instructional activities. At SDN 1 Pucanglaban Tulungagung, the learning resources employed in the sixth-grade classrooms align with the Curriculum 2013, primarily utilizing textbooks in accordance with its guidelines. While the reviewed textbooks generally cover content referring to Attitude, Knowledge, and Skills Competencies in the Curriculum 2013, the material related to the Least Common Multiple (LCM) remains relatively general and lacks in-depth exploration. Additionally, the instructional media employed is limited to chalkboards, indicating a lack of alternative instructional media that could enhance student engagement and foster a more active, creative, and critical learning

environment.

This statement reflects the educational landscape at SDN 1 Pucanglaban, Tulungagung, which continues to adhere to the Curriculum 2013, focusing on Competence in Attitude, Competence in Knowledge, and Competence in Skills. Despite the curriculum's efforts to encompass various aspects of learning, the statement indicates that there are implementation challenges that need to be addressed. Some of these challenges include the limitations of textbooks in delving into LCM content, the use of instructional media confined to chalkboards, and the necessity to integrate alternative instructional media to encourage students to become more active, creative, and critical learners.

The Curriculum 2013, utilizing a Competency-Based Curriculum (CBC) approach, aims to develop students' competencies, encompassing attitude, knowledge, and skills. In this context, it is crucial to understand that the Curriculum 2013 emphasizes holistic education, focusing not only on knowledge transfer but also on the development of students' attitudes, skills, and character. Trianto (2017) explains, "Curriculum 2013 emphasizes that the learning process is outcome-oriented, prioritizing thinking skills, communication skills, cooperation skills, and positive character."

Although the curriculum has made efforts to accommodate various competencies, in reality, there are several challenges in its implementation. One prominent challenge is related to the learning materials present in the textbooks. The statement mentions that the LCM content in these books is still general and has not delved deeply into this concept. This aligns with the findings of Peni et al. (2019) in their research, indicating that textbooks often lack in-depth explanations of LCM material. Peni et al. also suggest the importance of improving the quality of textbooks to achieve a more comprehensive curriculum goal.

Furthermore, the statement mentions that the instructional media used is limited to chalkboards. Research by Supriyatno et al. (2018) indicates that relying solely on chalkboards as the primary instructional media in classrooms can limit student interactivity and engagement in learning. This research emphasizes the importance of using alternative instructional media that can actively involve students in learning and develop their creative and critical thinking skills.

The challenges mentioned in the statement also reflect the need for the development of alternative instructional media that align with the Curriculum 2013. At this stage, solutions need to be explored to overcome these challenges. One potential solution is the development of more interactive instructional media that suits the characteristics of elementary school students.

Development Design of Number Tree Media

In order to address these challenges, the development of alternative instructional media is necessary to assist students in learning Least Common Multiple (LCM) more actively, creatively, and critically. This alternative instructional media should be designed in accordance with the characteristics of elementary school students, adhering to the principles of effective instructional design. In this context, the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) can serve as a guide for the development of alternative instructional media.

During the Analysis phase, an in-depth analysis of students' needs and challenges faced in LCM learning must be conducted. This analysis serves as the foundation for designing instructional media that aligns with students' needs. According to Moleong (2017), needs analysis is the process of collecting and analyzing information about what students need to achieve learning objectives.

The Design phase involves the creation of alternative instructional media for LCM learning. This design must take into account students' characteristics, learning objectives, and principles of effective instructional design. According to Morrison, Ross, and Kemp (2007), effective learning design includes planning learning activities that integrate learning theories and students' characteristics. This phase includes the following activities.

1. Determining the Form of the Number Tree. The chosen form of the number tree is adapted to the core content covered in the LCM material.
2. Constructing the Framework of the Number Tree. In an effort to construct the framework of the number tree, small-scale Focus Group Discussions (FGD) with teachers were conducted to gather input or suggestions for the development of instructional media. Based on the FGD activities with teachers, it was decided that the developed number tree would consist of three main sections, outlined as follows.

A) Design, Size, and Material. The design, size, and material of the instructional

media number tree are planned to be 90 cm in length and 90 cm in width and made of acrylic.

B) Design of Number Marker Stickers. Sticker designs are created with each sticker measuring 2.5 cm in length and width, using sticker paper as the base material.

C) Design the instructional media name (Name tag) and usage instructions. The design of the name tag for instructional media and usage instructions uses acrylic material measuring 60 cm in length and 40 cm in width.

The Development phase is where the alternative instructional media is created based on the designed framework. The development process must adhere to the principles of multimedia and instructional design, such as visual clarity, interactivity, and attractiveness. According to Mayer (2008), multimedia design should consider the information-processing principles of students. Additionally, the "Number Tree" instructional media is created with reference to the functions of instructional media according to Levie and Lents (1982), which include attention, affective, cognitive, and compensatory functions.

The Implementation phase involves the trial of the alternative instructional media in actual learning situations. Both teachers and students will be involved in this implementation process. Data obtained during implementation will be used to identify changes and improvements needed in the media. The implementation phase should include monitoring the impact of the media on students' understanding, in line with Guskey's (2002) perspective. The results of the trial of the number tree media are presented as follows.

No	Expert's Name	Attention Function	Affective Function	Cognitive Function	Compensatory Function	Criteria
1	Resmiana, M.Pd.	13	15	17	8	73,61% (fairy valid)
2	Hamid Rouf, S.Pd. M.Pd.	17	18	19	11	90,28% (valid)
3	Ade Fitarani, M.Pd.	15	16	17	11	81,94% (valid)

	Total	45	49	53	30	245,83%
	Average	15,00	16,33	17,67	10,00	81,94(valid)

Source: Processed by the Researcher in 2023

Table 1: Percentage Assessment of the Number Tree Media by Content Experts and Teachers

Based on the information in Table 4.5 above, each validator has provided a score higher than 51%. This indicates that the developed Number Tree product, based on the formation of creative thinking, meets the validity criteria. The content expert gave a percentage assessment score of 73.61%, the media expert scored 90.28%, and the teacher's percentage assessment was 81.94%.

No	Assessment Aspect	Average Validator Score	Total Score	Percentage	Criteria
1	Attention Function	15,00	45	75%	Adequate
2	Affective Function	16,33	49	82%	Very Good
3	Cognitive Function	17,67	53	88%	Very Good
4	Compensatory Function	10,00	30	83%	Very Good

Source: Processed by the Researcher in 2023

Table 2: Percentage Assessment of the Number of Tree Products for Each Aspect

Based on the findings presented in Table 4.6, each validator gave a score of > 51% for the tested aspects, indicating that the creatively thinking-based Number Tree product developed meets the criteria of "Very Feasible." The attention function scored a percentage of 75% (feasible), the affective function scored a percentage of 82% (very feasible), the cognitive function scored a percentage of 88% (very feasible), and the compensatory function scored a percentage of 83% (very feasible). The creatively thinking-based Number Tree for Mathematics learning on the Lowest Common Multiple (LCM) material that was developed is highly suitable for use as a learning guide in teaching.

In the Evaluation stage, the alternative learning media will be assessed to determine its effectiveness in improving students' understanding of the LCM concept and their creative and critical thinking skills. The evaluation will involve quantitative and qualitative data analysis, as well as a comparison of learning outcomes before and after media usage. Kirkpatrick's (1998) four-level evaluation model, which considers student reaction, learning, behavioral change, and results, will be applied to measure the impact of the media on student understanding.

By following the ADDIE model in developing alternative learning media, it is expected to obtain media that align with students' needs and is effective in enhancing understanding of the LCM concept, as well as fostering creative and critical thinking skills. This media can also help students learn more actively, creatively, and critically, in line with the goals of the 2013 Curriculum. Thus, these efforts will significantly contribute to improving the quality of mathematics education at SDN 1 Pucanglaban, Tulungagung, and assist students in developing broader competencies in accordance with curriculum requirements.

Effectiveness of the Number Tree Media Used in Teaching the Lowest Common Multiple (LCM)

The Number Tree product, based on fostering creative thinking, is deemed effective, as evidenced by a significant difference in the average scores between the pretest and posttest. This assessment was calculated using SPSS Statistics 20, employing the Paired Samples Statistics test. The results of the pretest and posttest in the limited-scale evaluation are presented in Table 3.

Score		**Score**	**Jumlah**		
Outcome	**Highest Score**	**Lowest Score**	**Mean Score**	**Mastery Students**	**Learning Mastery (%)**
Pretest	80	68	74,00	7	70%
Posttest	100	76	88,00	10	100%

Source: Processed by the Researcher in 2023

Table 3: Recapitulation of Student Learning Results Pretest and Posttest Limited-Scale Test

Based on Table 3, the learning outcomes of fourth-grade students at SDN 1 Pucanglaban, Tulungagung Regency, showed a difference in the limited-scale test

during the pretest and posttest. The average pretest score was 74.00, while the average posttest score was 88.00. Additionally, the completeness of learning in both the pretest and posttest also differed. In the pretest, seven students (70%) achieved mastery, while in the posttest, the number of students who mastered the material increased to 10 (100%). It can be concluded that there was an improvement in learning outcomes before (pretest) and after (post-test) using the Tree Diagram-based creative thinking formation media.

The results of the t-test on a limited scale, comparing data before and after the use of the Tree Diagram-based creative thinking formation media on the KPK material for fourth-grade students at SDN 1 Pucanglaban, Tulungagung Regency, are presented in Table 4 below.

Limited Scale Test

Action	Number of Students	Sig.	Interpretation
Pretest	10	.000	H0 Rejected
Posttest	10		

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	76.20	10	6.143	1.943
	posttest	89.20	10	8.651	2.736

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	pretest & posttest	10	.714	.020

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			

Pair 1	pretest - posttest	-13.000	6.055	1.915	-17.332	-8.668	-6.789	9	.000

Source: Processed by the Researcher in 2023

Table 4: Results of the t-test on the Learning Outcomes of Students in the Pretest and post-test

Interpretation:

1. A correlation value of 0.714 indicates a positive and moderately strong relationship.
2. The significance value of 0.02 < 0.05 implies a significant difference between pretest and posttest results.
3. The p-value for the t-test is 0.000 < 0.05, indicating a significant difference in scores between the pretest and posttest.
4. The mean value shows an average increase of 13 points.

Based on Table 4.9 above, the significance value is 0.000 < 0.05, thus rejecting the null hypothesis (Ho). This implies that the learning outcomes of students before and after the use of the Tree Number based on creative thinking formation on the material of the Least Common Multiple (LCM) in the fourth grade of SDN 1 Pucanglaban, Tulungagung are not the same or different.

The results of the pretest and posttest for the extensive scale test can be seen in Table 5 as follows.

Score		**Score**	**Total**		
Action	**Highest Score**	**Lower Score**	**Mean Score**	**Mastery Students**	**Learning Mastery (%)**
Pretest	88	60	74,00	23	79%
Posttest	100	76	88,00	29	100%

Source: Processed by the Researcher in 2023

Table 5: Recapitulation of Student Learning Outcomes Pretest and Posttest for Extensive Scale Test

Table 5 presents the results of the learning outcomes of fourth-grade students at SDN 1 Pucanglaban, Tulungagung Regency, before and after the extensive-scale test.

There is a notable difference between the pretest and posttest scores. The average pretest score is 74.00, while the average posttest score is 88.00. Furthermore, there is a difference in the mastery of learning between the pretest and posttest. In the pretest, 23 students (79%) achieved mastery, while in the posttest, the number of students who mastered the material increased to 29 (100%). It can be concluded that there is an improvement in learning outcomes before (pretest) and after (posttest) using the Tree Number product based on creative thinking formation.

The calculation results of the t-test data on an extensive scale before and after using the Tree Number based on creative thinking formation in the topic of KPK for the fourth-grade students at SDN 1 Pucanglaban, Tulungagung Regency are presented in Table 6.

Action	**Number of Students**	**Sig.**	**Interpretation**
Pretest	29	.000	H0 Rejected
Posttest	29		

Source: Processed by the Researcher in 2023

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	76.62	29	6.614	1.228
	posttest	86.07	29	7.454	1.384

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	prestest & posttest	29	.634	.000

Paired Samples Test								
	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)

Pair 1	prestest - posttest	-9.448	6.069	1.127	-11.757	-7.140	-8.384	28	.000

Table 6: Compilation of t-Test Results of Students' Learning Outcomes Pretest and Posttest in the Extensive-Scale Test

Interpretation:

1. A correlation value of 0.634 indicates a positive and moderately strong relationship.
2. The significance value of 0.000 < 0.05 implies a significant difference between the pretest and posttest results.
3. The p-value for the T-test is 0.000 < 0.05, indicating a significant difference in scores between the pretest and posttest.
4. The mean value indicates an average increase of 9.448.

Based on Table 4.10, the significance value is 0.000 < 0.05, thus rejecting the null hypothesis (H0). This means that there is a significant difference in the learning outcomes of students before and after the use of the Tree Number-based creative thinking formation product in the subject of LCM for Grade IV at SDN 1 Pucanglaban, Tulungagung Regency.

CONCLUSIONS

In conclusion, the research findings and discussions can be summarized as follows.

Firstly, the educational context at SDN 1 Pucanglaban, Tulungagung, aligns with the 2013 Curriculum, emphasizing Attitude Competence, Knowledge Competence, and Skill Competence, reflecting a commitment to holistic education. However, several challenges need to be addressed in its implementation. One of them is the limitation of textbook content in delving into the LCM material, which often remains general. Additionally, the use of instructional media is confined to the whiteboard, limiting student interactivity. To overcome these constraints, the development of alternative instructional media that can assist students in more active, creative, and critical learning is necessary, in line with the vision of the 2013 Curriculum. Through these efforts, it is hoped that the quality of education will improve, aiding students in developing creative and critical thinking and steering them toward a more

comprehensive education in accordance with the curriculum requirements.

Secondly, to address the challenges in learning LCM, the development of alternative instructional media emerges as a crucial solution. The ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) has been employed as a guide in developing instructional media that can facilitate active, creative, and critical learning of LCM. The analysis phase aids in understanding student needs, while the design phase involves the design of media according to student characteristics. The development phase ensures that the media complies with the principles of effective multimedia and learning design, including attention, affective, cognitive, and compensatory functions. Furthermore, the implementation phase involves testing the media in real learning situations, while the evaluation phase indicates that the "Tree Number" instructional media developed is highly suitable for use in Mathematics learning for LCM. Thus, the development of this alternative instructional media is expected to enhance student learning, assist in the formation of creative thinking, and improve understanding of the LCM concept in line with the demands of the 2013 Curriculum.

Thirdly, the development of the Tree Number-based creative thinking formation has proven to be effective in Mathematics learning for fourth-grade students at SDN Pucanglaban, Tulungagung, in the academic year 2022/2023. The development of this media is based on a limited trial, which includes a limited trial design, pretest and posttest results, t-test analysis results, and feedback from teachers and students. In addition, large-scale field/group trials consist of trial design, pretest and posttest results, t-test analysis results, and feedback from teachers and students. Moreover, this media has been modified extensively, representing a follow-up revision from experts and Mathematics teachers.

REFERÉNCES

Dick, W., & Carey, L. (2015). *The Systematic Design of Instruction*. Pearson.

Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching*, 8(3), 381–391.

Kirkpatrick, D. L. (1998). *Evaluating Training Programs*: The Four Levels. Berrett-Koehler Publishers.

Levie, W. H., & Lentz, R. (1982). *Effects of text illustrations*: A review of research. *Educational Communication and Technology*, 30(4), 195-232.

Mayer, R. E. (2008). Applying the science of learning: Evidence-based principles for the design of multimedia instruction. *American Psychologist*, 63(8), 760–769.

Moleong, L.J. (2017). *Metode Penelitian Kualitatif Edisi Revisi*. PT Remaja Rosdakarya: Bandung.

Morrison, G. R., Ross, S. M., & Kemp, J. E. (2007). *Designing Effective Instruction*. John Wiley & Sons.

Peni, W., Yudhanegara, M. R., & Setiawan, A. (2019). An Analysis of the Mathematical Representation Ability of Junior High School Students on the Material of Least Common Multiple and Greatest Common Divisor. *Journal of Physics: Conference Series*, 1320(1), 012069.

Rohendi, E.H. Majlan, A.B. Mohamad, L.K. Shyuan, J. Raharjo. (2016). Comparison of The Performance of Proton Exchange Membrane Fuel Cell (PEMFC) Electrodes with Different Carbon Powder Content and Methods of Manufacture*. IJFAC: Indonesian Journal of Fundamental and Applied Chemistry*, Vol 1, No 3

Supriyatno, B., Susilo, H., Aisah, S., & Setyaningsih, R. (2018). The Development of Teaching Materials Based on Lesson Study in the Topic of Geometric Transformations. *Journal of Physics: Conference Series*, 1097(1), 012067.

Trianto. (2017). *Mendesain Model Pembelajaran Inovatif-Progresif*: Konsep, Landasan, dan Implementasinya pada Kurikulum 2013. Kencana Prenada Media Group.