**Educare :**
**Jurnal Penelitian Pendidikan dan Pembelajaran**
2025, 5(1), 54-64
https://doi.org/10.56393/educare.v5i1.3276

# Improving Mathematics Learning Outcomes Through Baamboozle Media with the Numbered Heads Together Model in Elementary School

**I Ketut Suastika [1*], Muti'atun Nafi'ah [1], Adna Arum Ambarwati [2]**
[1] Universitas PGRI Kanjuruhan Malang, Indonesia
[2] Sekolah Dasar Negeri 2 Tanjungrejo Malang, Indonesia
* Author Correspondence

**Article History**
Received: 8 June 2025;
Revised : 1 July 2025;
Accepted: 3 August 2025.

**Keywords**
Baamboozle;
Numbered Head Together;
Mathematics.

**Abstract**
This study aims to improve the learning outcomes of mathematics students in grade IV of SDN Tanjungrejo 2 Malang through the application of Baamboozle interactive media combined with the Numbered Heads Together (NHT) learning model. The background of this research is based on the low mathematics learning outcomes, as shown by the average student score of 66.07 which is still below the Minimum Completeness Criteria (KKM) which is 75. This study uses the Kemmis and McTaggart model Class Action Research (PTK) method which is carried out in two cycles, each consisting of planning, implementation, observation, and reflection stages. The learning outcome data was obtained through an evaluation test at the end of each cycle and was analyzed in a quantitative descriptive manner by calculating the average score and percentage of learning completeness. The results showed that the average student score increased from 66.07 in the pre-cycle to 73.57 with 60.71% learning completeness in the first cycle, and increased again to 80.35 with 85.71% learning completeness in the second cycle. This finding proves that the application of Baamboozle interactive media combined with the Numbered Heads Together model is effective in improving the mathematics learning outcomes of grade IV students of SDN Tanjungrejo 2 Malang. The implications of this study show that the integration of interactive digital media with cooperative learning models can be an alternative to innovative, effective, and fun learning strategies in elementary schools.

**Contact :** Corresponding author e-mail: suastika@unikama.ac.id
**How to Cite :** Suastika, I. K., Nafi'ah, M., & Ambarwati, A. A. (2025). Improving Mathematics Learning Outcomes Through Baamboozle Media with the Numbered Heads Together Model in Elementary School. *Educare : Jurnal Penelitian Pendidikan Dan Pembelajaran*, 5(1), 54–64. https://doi.org/10.56393/educare.v5i1.3276

## Introduction

Mathematics education in elementary school has a strategic role in building students' logical, analytical, and problem-solving skills from an early age. This competence is an important foundation in facing the challenges of the 21st century that require numeracy, literacy, critical thinking, and mastery of information technology. In addition, Mathematics plays a role in forming a systematic mindset that is applicable in daily life as well as in the development of science and technology (Adjie et al., 2021). Therefore, Mathematics learning in elementary school needs to be designed with an interesting, interactive, and meaningful approach so that students can understand concepts that are often considered difficult and abstract.

Nevertheless, the facts on the ground show that Mathematics is still one of the subjects that is considered difficult, boring, and scary for most elementary school students. The results of national studies show that students' interest, motivation, and learning outcomes in the field of Mathematics tend to be low, one of which is due to monotonous learning methods and lack of active student involvement (Nanditha, Wirdati, & Kanus, 2023). A similar problem was found based on initial observations in class IVB of SD Negeri Tanjungrejo 2 Malang City, where only 42.86% of students achieved the Learning Goal Achievement Criteria (KKTP) in the material calculating volume using standard units. The majority of students appear to be less enthusiastic, passive, and lack understanding of the basic concepts being taught. This condition is suspected to be due to a learning model that is still conventional and has minimal use of interactive digital media.

Various previous studies have proven that interactive media-based learning and cooperative models can improve student engagement and learning outcomes in elementary schools (Ibrohim et al., 2020). One widely used model is Numbered Heads Together (NHT) which encourages the involvement of all group members and increases individual responsibility in discussions. This model is effective in increasing social interaction, motivation, and understanding of concepts of students at various levels of education (Surya, 2018). On the other hand, digital media such as Baamboozle, a web-based educational game, have been shown to increase student participation and learning outcomes in various subjects at the elementary level (Hartanto et al., 2024; Kusyani & Adelina Ray, 2023).

However, previous studies have generally only tested the effectiveness of Baamboozle or NHT separately. There has not been much research, especially at the elementary school level in Indonesia, that specifically examines the influence of the combination of these two approaches in mathematics learning, especially in the context of elementary schools in Malang City. Most of Baamboozle's research is focused on language learning or science, while NHT's research is more applied to social materials

or memorization concepts. Thus, there is still a research gap in the form of a lack of empirical studies on the effectiveness of integrating Baamboozle interactive media with the NHT learning model to improve the learning outcomes of Mathematics for elementary school students, especially in volume materials.

Based on these conditions, this study aims to improve the learning outcomes of grade IV students of SD Negeri Tanjungrejo 2 Malang City through the application of the Numbered Heads Together cooperative learning model combined with Baamboozle educational game media. This research is focused on the material of calculating volume using standard units. In addition, this research is expected to enrich the treasure of technology-based Mathematics learning research in elementary schools, as well as provide an alternative innovative learning strategy that is effective and fun in accordance with the principles of differentiated learning and the use of technology in the Independent Curriculum.

## Method

This research aims to improve the mathematics learning outcomes of grade IVB students at SDN Tanjungrejo 2 Malang City through the implementation of the Numbered Heads Together (NHT) cooperative learning model, assisted by Baamboozle interactive game media, using the Classroom Action Research (CAR) approach based on the Kemmis and McTaggart model, which consists of two cycles with two meetings each. The study involved 28 students of class IVB during the even semester of the 2024/2025 academic year. Each cycle was carried out through four stages: planning, implementation, observation, and reflection. In the planning stage, the researcher developed instructional materials, including teaching modules, learning outcome test items, observation sheets for student learning activities and motivation, and Baamboozle media tailored to the volume calculation material using standard units. The learning outcome test comprised five descriptive items constructed based on achievement indicators, with content, construct, and measurement validity ensured through expert judgment by two mathematics education lecturers and one grade IV teacher. Instrument reliability was tested using the Cronbach's Alpha coefficient through SPSS analysis. The implementation stage involved applying the NHT model, where students were grouped, assigned numbers, and selected randomly to answer questions using the Baamboozle game designed in alignment with the lesson content. During observation, the researcher and an observer documented student activities, participation, and motivation through structured observation sheets. Reflection was conducted by analyzing student test results and observation data to identify the strengths and weaknesses of the actions in each cycle, which served as the basis for revisions in the subsequent cycle. Learning outcome data were analyzed using quantitative descriptive methods by calculating the average score and percentage of

learning completeness through the formula: (number of students achieving completeness ÷ total number of students) × 100%. The Minimum Completeness Criteria (KKTP) was set at 80, with individual mastery defined as a minimum score of 80, and classical mastery achieved if at least 85% of students met the KKTP.

## Results and Discussion

### Results

The research was carried out in class IVB of SDN Tanjungrejo 2 Malang City with a total of 28 students. Classroom action research was conducted in 2 cycles where each cycle consisted of 2 meetings. Based on the results of classroom action research that has been carried out in class IVB of SDN Tanjungrejo 2 Malang City for two cycles, data was obtained that showed that student learning outcomes increased after the use of the Numbered Head Together (NHT) type cooperative learning model with the help of bamboozle interactive game media. Baamboozle is a digital platform designed to change the way teachers and students interact in the learning process. With a fun and interactive approach, baamboozle allows teachers to create educational quizzes that students can play in the form of games. (Khaira Mardiah 2024) Before doing 2 cycles, the researcher conducted a pre-cycle stage to find out the learning outcomes of grade IVB students in the subject of Mathematics.

The classroom action research activity began with the pre-cycle stage, where the researcher made observations of the school environment and grade IVB students at SDN Tanjungrejo 2 Malang City. The purpose of this observation is to obtain data on the characteristics of the class that will be the subject of the study. In addition to conducting direct observations and interviews with homeroom teachers, at this pre-cycle stage, the researcher also carried out a pretest to find out the students' initial abilities before action was given. The data obtained at the pre-cycle stage includes pre-test data on Mathematics learning outcomes in grade IVB SDN Tanjungrejo 2 Malang City. Here's a breakdown of the pre-cycle data:

**Table 1.** Completeness of Pre-Cycle Learning Outcomes

| NO | Aspects | Information |
|---|---|---|
| 1 | Number of students in grade IVB | 28 |
| 2 | Number of students who achieve learning completeness | 12 |
| 3 | Number of students who have not reached learning completion | 16 |
| 4 | Highest Score | 90 |
| 5 | Lowest Score | 30 |
| 6 | Correspondence | 68,5 |
| 7 | Percentage of Completeness of Learning Outcomes | 42,86% |

Based on the findings at the pre-cycle stage, there are still many students who get a score below the KKTP for the Mathematics subject, which has been set at 80. In the

material calculating volume using standard units, only 42.86% or as many as 12 students managed to achieve the Learning Goal Achievement Criteria (KKTP) score. This shows that the average score of grade IVB students in mathematics subjects in the pre-cycle stage is still below the Learning Goal Achievement Criteria (KKTP) that has been set. This condition is caused by the lack of innovation in the learning process carried out by researchers at that stage where the researcher only uses the lecture method making students feel bored and difficult to focus during learning activities.

The findings of the class action research in cycle I are presented in detail based on the four stages carried out. The stages carried out in classroom action research are: planning, implementation of actions, observation, and reflection. Cycle I was designed based on the results of the pre-cycle which showed that learning still used conventional methods in the form of lectures and questions and answers, which caused low student involvement and many learning outcomes that had not reached the KKTP.

In this planning stage, the researcher compiled a learning module using a cooperative learning model of the Numbered Heads Together type in mathematics learning material calculating volume using standard units with the help of the Baamboozle game. The researcher also compiled assessment instruments in the form of observation sheets of student activities and assessments to measure learning outcomes. The learning strategy is designed so that students are active in groups, discuss with each other, and be motivated to answer questions that arise through the Baamboozle game

The results of this study are supported by several previous studies that concluded that the application of the NHT-type cooperative learning model has a significant effect on students' mathematics learning outcomes (Ikhwandari et al., 2019; Nur et al., 2016; Pratiwi, 2018; Rahmi & Adnan, 2019). Marasiwi Research (2017); Allathifah et al. (2019) and (Widiani, 2021) also concluded that the application of NHT-type cooperative learning can improve students' mathematics learning achievement.

In the implementation of this first cycle, researchers have implemented an innovation in the learning process, namely through the use of the interactive game Baamboozle combined with the Numbered Head Together (NHT) learning model.

**Table 2.** Learning Outcomes of Cycle I Students

| NO | Aspects | Information |
|---|---|---|
| 1 | Number of students in grade IVB | 28 |
| 2 | Number of students who achieve learning completeness | 17 |
| 3 | Number of students who have not reached learning completion | 11 |
| 4 | Highest Score | 100 |
| 5 | Lowest Score | 50 |
| 6 | Correspondence | 78,5 |
| 7 | Percentage of Completeness of Learning Outcomes | 60,71% |

## Discussion

Based on the table above, the implementation of the first cycle was obtained as a result that there was an increase in student learning outcomes. It is known that of the 28 students, there are 17 students who have achieved completeness while 11 students who obtained scores below the KKTP. The range of scores obtained ranges from 50 to 100. This shows that there are 5 additional students who are included in the complete category in this 1st cycle. Although it has not met the completeness target of 80% from the researcher.

The reason why there are still many students who have not completed the first cycle of learning is because students are not used to the use of Baamboozle interactive game media combined with Numbered Head Together (NHT). Although the use of this learning media is applied directly by teachers and teachers are the main implementers in the implementation of this Baamboozle game, there are still several obstacles faced in the implementation of Baamboozle media in the classroom. Students are still not used to the use of this media. Even though teachers have given direction and encouraged active engagement, students still tend to be confused and panicked in answering questions that arise. This happens because students are faced with a continuous running time. In addition, there are still some students who lack confidence to answer in front of their friends because this is related to the acquisition of group scores. These barriers show that the use of interactive learning media such as Baamboozle requires time and habituation, as well as the teacher's approach in guiding and motivating students to be more courageous, active, and involved in the learning process.

However, the findings in this cycle show that there is an increase in mathematics learning outcomes in grade IVB of SDN Tanjungrejo 2 Malang City. The obstacles that occur will be perfected in the implementation of the next cycle.

In Cycle II, the researcher continued implementing the Baamboozle interactive game integrated with the cooperative learning model of the Numbered Heads Together (NHT) type to enhance student engagement and participation. However, improvements were made from the previous cycle by adjusting the time allocation for each question. The extension of response time was intentionally designed to alleviate students' feelings of being rushed or pressured, thereby enabling them to process the questions more calmly and provide more accurate and thoughtful answers. Additionally, the researcher introduced a "help card" system, where each group received one help card that could be used when a student encountered difficulties in answering. This card allowed group members to collaboratively assist their peers, reinforcing the spirit of cooperative learning and fostering a supportive classroom environment.

The adjustments made in Cycle II aimed to address the challenges observed in the initial cycle, particularly related to time constraints and the lack of peer support

mechanisms during the learning process. These modifications were expected to create a more conducive learning atmosphere that encourages active participation and collaboration among students. The impact of these improvements is reflected in the students' learning outcomes in Cycle II, as detailed in the following table, which presents the comparative data of students' performance after the implementation of the enhanced learning strategies.

**Table 3.** Learning Outcomes of Cycle II Students

| No | Aspects | Information |
|---|---|---|
| 1 | Number of students in grade IVB | 28 |
| 2 | Number of students who achieve learning completeness | 24 |
| 3 | Number of students who have not reached learning completion | 4 |
| 4 | Highest Score | 100 |
| 5 | Lowest Score | 70 |
| 6 | Correspondence | 85,18 |
| 7 | Percentage of Completeness of Learning Outcomes | 85,71% |

Based on the table above, it is known that out of 28 students, there are 24 students who have achieved completeness while 4 students who obtained scores below the KKTP. Meanwhile, the percentage of completeness reached 85.71%. This indicates an increase in student learning outcomes in mathematics learning from cycle I to cycle II from 60.71% to 85.71%.

The increase in learning outcomes in Cycle II was caused by the increased focus of students in working on questions in games. In the previous cycle, students still looked stiff and tended to be pressured by time constraints and responsibilities in their groups. They are careful when answering questions because it will affect the group's score. This makes them unable to show their abilities optimally. However, in cycle II, students began to get used to the learning flow that combined the interactive game Baamboozle combined with the Numbered Heads Together (NHT) type cooperative learning model so that they were able to adapt better. With the addition of time to each question and the existence of a help card, students feel more comfortable and not in a hurry to answer. This allows them to better understand the material, work closely with their group members, and answer questions with confidence. The increase in learning outcomes that occur is not only influenced by the use of media but also because students are actively involved in the learning process.

Based on the results of research during the pre-cycle, cycle I and cycle II which aim to improve student learning outcomes in Mathematics learning on the material calculating volume using standard units has shown an increase. This can be seen from

the increase in the average value of learning outcomes from pre-cycle, cycle I, and cycle II in the following Table and Graph.

**Table 4.** Comparison of Student Learning Outcomes

| No | Aspects | Pre-cycle | Cycle I | Cycle II |
|---|---|---|---|---|
| 1 | Number of students in grade IVB | 28 | 28 | 28 |
| 2 | Number of students who achieve learning completeness | 12 | 17 | 24 |
| 3 | Number of students who have not reached learning completion | 16 | 11 | 4 |
| 4 | Highest Score | 90 | 100 | 100 |
| 5 | Lowest Score | 30 | 50 | 70 |
| 6 | Correspondence | 68,5 | 78,5 | 85,18 |
| 7 | Percentage of Completeness of Learning Outcomes | 42,86% | 60,71% | 85,71% |

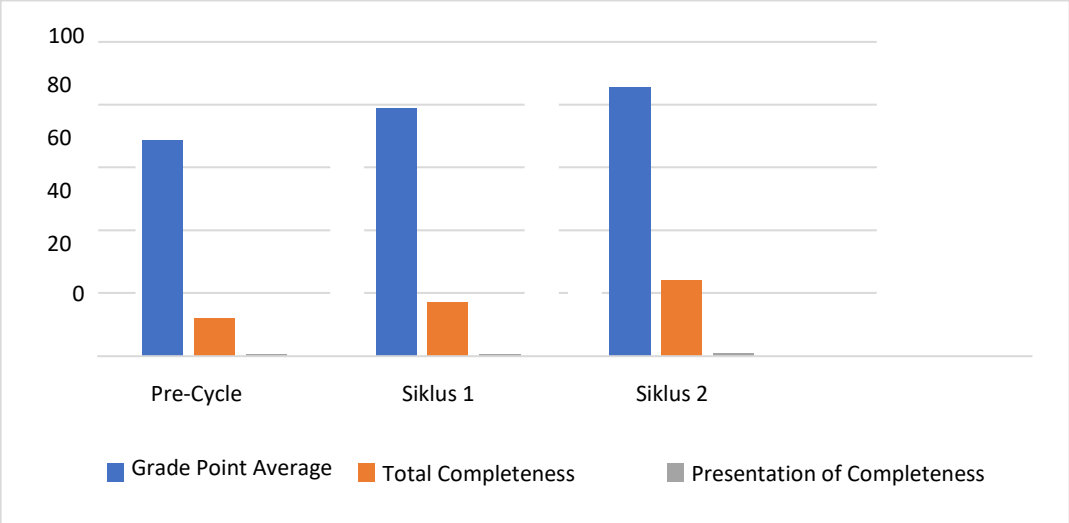


**Figure 1.** Comparison of Student Learning Outcomes

Based on the images and data above, the criteria for research success in the aspect of mathematics learning outcomes were obtained with a pre-cycle completion percentage of 42.86%. In the first cycle, the percentage of learning completeness was obtained at 60.71%, while in the second cycle the learning completeness percentage value was obtained at 85.71%.

With the implementation of the interactive game Baamboozle combined with the Numbered Heads Together (NHT) type cooperative learning model, it has been proven to be able to improve the learning outcomes of grade IVB students of SDN Tanjungrejo 2 Malang City. This success cannot be separated from the combination of the Baamboozle interactive game combined with the Numbered Heads Together (NHT)

type cooperative learning model which can foster the activeness of learning students adapted to the circumstances of the class.

## Conclusion

Based on the results of the Classroom Action Research (PTK) that has been carried out, it can be concluded that the application of the Baamboozle interactive game combined with the Numbered Heads Together (NHT) type cooperative learning model is effective in improving the learning outcomes of Mathematics students in grade IVB of SDN Tanjungrejo 2 Malang City. The results of the study showed a significant increase, where the percentage of learning completeness increased from 42.86% in the pre-cycle to 60.71% in the first cycle, and reached 85.71% in the second cycle. The application of the combination of digital media and cooperative model has been proven to be able to increase student participation, motivation, and understanding of the material of calculating volumes using standard units. Based on these findings, it is suggested that other elementary school teachers can use interactive media such as Baamboozle in learning Mathematics and other subjects to create an active, fun, and competitive learning atmosphere. In addition, this study still has limitations in the scope of one class without a comparison group. Therefore, it is recommended for future research to develop a similar study by involving a wider sample, comparing it with other learning models or media, and exploring its influence on aspects of critical thinking skills and student learning motivation in more depth.

## Acknowledgments

With great gratitude, the author expresses his deepest gratitude to all parties who have provided support, assistance, and motivation during the process of preparing this class action research report. Thank you to the Principal of SDN Tanjungrejo 2 Malang City for giving permission and opportunity to the author to carry out research in the school environment. Thank you also to all teachers, especially the homeroom teachers of class IVB, who have helped the smooth process of implementing research in the classroom. The author also expressed his appreciation to the students of class IVB who have participated enthusiastically so that this research can run well. Not to forget, to the supervisors who have provided direction, input, and motivation during the process of preparing this report until it is completed. Hopefully all the help and support given will be good deeds and get a double reward from Allah SWT. Finally, the author realizes that this report is still far from perfect, for which all constructive criticism and suggestions are expected for the improvement of future works.

## Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

## References

Adjie, N., Putri, S. U., & Dewi, F. (2021). Improvement of basic math skills through realistic mathematics education (RME) in early childhood. *Journal of Obsession: Journal of Early Childhood Education, 6*(3), 1650–1658. https://doi.org/10.31004/obsesi.v6i3.1832

Afdal, A., Handayani, E. S., & Rohaniah, R. (2024). Improving learning outcomes through a cooperative learning model in grade IIB elementary school students. *PTK: Journal of Class Action, 4*(2), 291–304. https://doi.org/10.53624/ptk.v4i2.355

Enrekang, U. M. (2022). Literature review: Interactive educational game media in mathematics learning. *Journal of Mathematics and Science Education, 5*(4), 4382–4390.

Hartanto, R. T., Hamidah, H., & Kusuma, J. W. (2024). The application of the game-based learning model with Baamboozle game quiz on the mathematical critical thinking skills of junior high school students. *National Panel Discussion on Mathematics Education,* 10, 45–53.

Ibrohim, I., Mansyur, S., Syah, M., Ruswandi, U., & Djati, S. G. (2020). Technology-based active learning strategies in improving mathematics learning outcomes. Journal of Educatio FKIP UNMA, 6(2), 548–560. https://doi.org/10.31949/educatio.v6i2.594

Ikhwandari, L. A., Hardjono, N., & Airlanda, G. S. (2019). Increasing students' motivation and mathematics learning outcomes with the numbered heads together (NHT) model. Journal of Basicedu, 3(4), 144–151. https://doi.org/10.31004/basicedu.v3i4.283

Indah Puspaningrum, D., Wijayanto, M. N., & Setiawaty, R. (2021). NHT model to improve learning outcomes of elementary school students (literature review). National Seminar of LPPM UMMAT, 1(1), 183–200.

Kasbolah. (2001). Classroom action research. Jakarta: Bumi Aksara.

Khaira Mardiah. (2024). The application of Baamboozle educational quiz in increasing motivation and learning outcomes in elementary students. *Journal of Education Research, 12*(2), 184–198.

Kusuma, E., & Fadiana, M. (2024). The use of Wordwall educational games to improve Indonesian learning outcomes for grade V elementary school students. Journal of Basic Science, 8(2), 1566–1573. https://doi.org/10.31004/basicedu.v8i2.7433

Kusyani, D., & Ray, S. A. (2023). The effectiveness of Baamboozle on the ability to understand North Sumatran folklore texts in grade VII junior high school students. Ghancaran: Journal of Indonesian Language and Literature Education, 5(3), 465–480.

Mariani, S. D., Larasati, D. A., Prasetya, S. P., & Stiawan, A. (2022). The effect of hybrid learning using Baamboozle media on the learning outcomes and interests of junior high school students. Journal of Social Studies Education Dialectics, 2(2), 206–216. https://doi.org/10.26740/jdpips.v2n2.48607

Nanditha, Y., Wirdati, W., & Kanus, O. (2023). The effect of the numbered heads together (NHT) type cooperative learning model on PAI learning outcomes. An-Nuha, 3(2), 228–239. https://doi.org/10.24036/annuha.v3i2.302

Nur, L., Siregar, K., Yana, S. P., Suryani, I., Haryati, D., Hutabarat, S., Nadira, D. A., et al. (2024). Mathematics learning in grade 3 elementary school at SDN 101765.

Journal of Learning and Social Sciences, 2(1), 154–159. https://doi.org/10.61132/sadewa.v2i1.469

Sunny, V., Sundari, F. S., & Kurniasih, M. (2023). The application of the project-based learning model with concrete media to improve the learning outcomes of mathematics in class V E at SDN Police 1 Bogor City. Didactic: PGSD Scientific Journal STKIP Subang, 9(2), 1070–1079. https://doi.org/10.36989/didaktik.v9i2.788

Surya, Y. F. (2018). The application of the numbered head together model to improve social studies learning outcomes in grade IV of elementary school. Journal of Basicedu, 2(1), 136–145. https://doi.org/10.31004/basicedu.v2i1.34

Wiryana, R., & Alim, J. A. (2023). Mathematics learning problems in elementary school. Journal of Educational Progress, 2(3), 271–277. https://doi.org/10.33578/kpd.v2i3.187

Yasin, I. (2021). Cultural problems of improving the quality of education in Indonesia: A total quality management perspective. Ainara Journal: Journal of Research and PKM in the Field of Education, 2(3), 239–246. https://doi.org/10.54371/ainj.v2i3.87

Yeni, R. F. (2016). The use of the numbered head together (NHT) method in mathematics learning. Journal of Mathematics Research and Learning, 9(2), 263–267

Yestiani, D. K., & Zahwa, N. (2020). The role of teachers in learning in elementary school students. Journal of Fondatia, 4(1), 41–47. https://doi.org/10.36088/fondatia.v4i1.515