



Puzzle-assisted scramble model to improve elementary school students' science and social sciences learning outcomes

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Article Info

Article history:

Received Apr 5th 2026

Revised May 27th 2026

Accepted Jun 25th 2026

Keyword:

Scramble Learning Model; Media Puzzle; Learning Outcomes; Elementary School; Social Science

DOI:

<https://doi.org/10.65779/arshaka.v2i1.87>

ABSTRACT

This research aims to improve student learning outcomes through the application of the Scramble learning model assisted by puzzle media. This study uses the Classroom Action Research approach with the Kemmis and McTaggart models which is carried out in two cycles, including the stages of planning, implementation of actions, observation, and reflection. The research subjects were 18 students in class V of MI Muhammadiyah Kalosi. The data collection technique uses learning outcome tests, observation of teacher and student activities, and documentation. The data was analyzed using quantitative descriptive techniques. The results showed that the application of the Scramble learning model assisted by puzzle media was able to gradually increase students' learning outcomes in each cycle, with the percentage of learning completeness increasing from 33.33% in pre-action to 72.22% in Cycle I, and reaching 100% in Cycle II. The practical implications of this study show that the learning model can be used by teachers to increase involvement, motivation, collaboration, and understanding of science concepts as a whole, as well as become an effective strategy in designing more interactive and engaging learning in elementary schools.



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INTRODUCTION

Natural and social science (IPAS) learning in elementary schools has a strategic role in building science literacy, critical thinking skills, and students' ability to understand natural phenomena (Conoyer et al., 2022). IPAS not only emphasizes memorizing concepts, but also requires students to observe, reason, question, test, and deduce information systematically. The national curriculum emphasizes that social studies learning at the elementary school level must be concrete and active, adjusted to the stage of cognitive development of students, so that the learning experiences gained can build a strong foundation of knowledge (Saiful Azizi Nik Abdullah & Shohib, 2025). The concrete operational stage at elementary school age allows learners to learn through hands-on experience and object manipulation, so that learning approaches that emphasize active engagement become relevant (Maria et al., 2026).

However, the reality in the field shows that the learning outcomes of social studies for students are still not optimal (Abricot et al., 2022; Kim et al., 2021). Observational research and learning outcome value data indicate that learners tend to be passive, participate less in discussions, have difficulty understanding abstract concepts, get bored easily, and are often not confident in answering questions. In addition, the achievement of learning completeness has not met the minimum standards set by the school. This problem is not only caused by the ability of the learners, but also related to the learning strategies used (Rusniati & Prijanto, 2024; Winangun et al., 2024). The lack of variety of

interactive learning methods and media is a factor that hinders the improvement of learning outcomes, so innovation in learning models is needed to increase student engagement and motivation.

Active and cooperative learning has been widely recognized in the educational literature as an effective approach to improving conceptual understanding (Prihatmojo et al., 2025). According to Vygotsky, knowledge is built through social interaction and collaborative learning experiences, so that opportunities to discuss, collaborate, and exchange ideas can strengthen students' understanding (Suci, 2018). The constructivist approach emphasizes that learners are not passive recipients of information, but active builders of knowledge through experience, reflection, and problem-solving. In this context, a learning model that emphasizes active participation and group interaction is considered more suitable for improving IPAS learning outcomes than a teacher-centered learning approach (Anggraini et al., 2026).

One of the adaptable learning models is the Scramble model, which requires students to compile randomized answers, terms, or information so that they must think quickly, thoroughly, and work together (Irfan et al., 2020). This model provides students with the opportunity to connect scientific terms with concrete meanings or examples, as well as practice concentration, cooperation, and speed of thinking (Saridewi & Kusmaryatni, 2017). In previous studies, the Scramble model has been reported to be effective in increasing learner engagement and concept comprehension, particularly in language and mathematics learning, so that its potential can be adapted for science learning in primary schools (Putra et al., 2020; Rostiana & Imran, 2024; Talia & Ireland, 2025). The use of learning media is also an important factor in increasing the effectiveness of learning. Puzzle media was chosen because of its concrete, visual, and in accordance with the characteristics of elementary school students (Adinda, 2019). Puzzles can provide fun challenges, increase motivation to learn, and help students organize information gradually (Sartika & Rohani, 2021). Cognitively, this media allows students to recognize patterns, connect pieces of information, and build a complete understanding of the concepts being taught.

The combination of the Scramble model and puzzle media is believed to be able to create more interesting and interactive learning (Adinda, 2019). By integrating Scramble and puzzles, learners not only stimulate cognitive abilities, but also social skills and learning motivation. This model allows students to be actively involved in the learning process, collaborate in groups, and solve problems systematically (Irfan et al., 2020). Previous research has shown that learning interventions that combine active strategies with concrete media can significantly improve student learning outcomes compared to conventional methods (Sartika & Rohani, 2021). Although the Scramble model and puzzle media have been used in different learning contexts, there is a research gap regarding the combined application of the two in science learning in primary schools. Previous studies have addressed Scramble or puzzles more in isolation, and rarely examined their use in a systematic Classroom Action Research (PTK) approach. Therefore, research is still needed that integrates the Scramble model with puzzle media in PTK to measure its effectiveness in improving students' social studies learning outcomes.

The novelty of this research lies in the combined application of the Scramble model assisted by puzzle media systematically through the Classroom Action Research approach. This research not only emphasizes improving concept understanding, but also pays attention to learner involvement, learning motivation, and overall learning activities. Thus, this study is expected to make a practical contribution for teachers in designing more interactive and effective science learning at the elementary school level. Based on the context, problems, and gaps of the research, the purpose of this research is to improve the learning outcomes of social studies of class V students of MI Muhammadiyah Kalosi through the application of the Scramble learning model assisted by puzzle media. This research was carried out with a Classroom Action Research approach that involves planning, implementing actions, observation, and reflection, so as to provide empirical evidence regarding the effectiveness of the proposed learning model.

METHODS

Using the Classroom Action Research (PTK) approach which aims to improve learning processes and outcomes through the provision of actions in a systematic and reflective manner. Classroom action research is carried out as an effort to solve learning problems through a continuous process of action, observation, and reflection so that improvements are obtained to the quality of learning and student learning outcomes (Tampe, 2023). This study uses the PTK Kemmis and McTaggart model which

consists of four main stages, namely planning, acting, observing, and reflecting. The four stages are carried out on a cyclical and repetitive basis until the indicators of research success are achieved.

The research was carried out in class V of MI Muhammadiyah Kalosi, Alla District, Enrekang Regency in the even semester of the 2025/2026 school year. The research subjects amounted to 18 students consisting of 9 male students and 9 female students. The selection of research subjects was based on the results of initial observations which showed that the learning outcomes of students in science subjects were still relatively low, especially in the material of human digestive organs.

This research is planned in two action cycles. Each cycle consists of two learning meetings and one evaluation of learning outcomes. In the planning stage, the researcher compiled teaching modules, learning tools, puzzle media, observation instruments, and learning outcome test instruments. The action implementation stage is carried out by applying the Scramble learning model assisted by puzzle media in IPAS learning. At the observation stage, researchers and observers observe the activities of teachers and students during the learning process. Furthermore, the reflection stage is carried out to evaluate the implementation of actions in each cycle as a basis for learning improvement in the next cycle.

The action given in this study is in the form of the application of the Scramble learning model assisted by puzzle media on the material of human digestive organs. In its implementation, students are divided into several groups to carry out activities to match answers or concepts that are randomized using puzzle media. Through these activities, students are encouraged to discuss, collaborate, exchange opinions, and complete learning tasks collaboratively. The use of the Scramble model assisted by puzzle media is expected to be able to create a more active, interactive, and fun learning atmosphere so that it can increase student engagement and learning outcomes.

The data collection techniques in this study include tests, observations, and documentation. The test technique is used to measure the learning outcomes of students after the implementation of learning actions. The test instrument is in the form of 20 multiple-choice questions arranged based on learning indicators of human digestive organ material. Observation is carried out to observe the activities of teachers and students during the learning process using observation sheets. The indicators of observation of student activities include: (1) activeness in participating in learning, (2) participation in group discussions, (3) ability to work together, (4) ability to answer or compile puzzles, and (5) involvement in concluding learning materials.

The data on student learning outcomes was analyzed using quantitative descriptive analysis techniques by calculating the percentage of student learning completeness individually and classically. The research is declared successful if at least 75% of students obtain a score of ≥ 75 according to the Learning Goal Achievement Criteria (KKTP). In addition, the observation data was analyzed descriptively to determine the increase in teacher and student activity during the learning process in each action cycle.

RESULTS

Pre-Action Results

The pre-action stage was carried out to determine the initial condition of the learning outcomes of class V students of MI Muhammadiyah Kalosi in the subject of IPAS material on the human digestive system before the implementation of the learning action. Based on the results of initial observations, the learning process is still dominated by lecture methods so that students' activities and involvement in learning are not optimal. Students tend to be passive, lack enthusiasm for learning, and still have difficulty understanding the material being taught. This condition has an impact on the low learning outcomes of students.

To find out the initial abilities of the students, the researcher gave an initial test (pretest) to 18 students. The results of the pretest showed that only 6 students (33.33%) had achieved learning completeness with a score of ≥ 75 , while 12 students (66.67%) had not achieved learning completeness. The average grade of the class obtained was 63.61 with the less category. The data shows that student learning outcomes are still low, so corrective action is needed through the application of the Scramble learning model assisted by puzzle media.

Table 1. Grouping of Student Learning Outcomes at the Pre-Action Stage

Value	Criteria	Number of Students	Percentage
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93–100	Excellent	0	0%
84–92	Good	0	0%
75–83	Enough	6	33,33%
0–74	Less	12	66,67%

Results of Cycle I

Cycle I was carried out in two meetings by applying the Scramble learning model assisted by puzzle media to the human digestive system material. At the stage of implementing the action, the teacher divided the students into several groups and distributed the puzzle media of the human digestive organs that had been randomized. Students work together to compile puzzles, work on scramble cards, and match the functions of the digestive organs based on the results of group discussions. Next, each group presented the results of their discussion in front of the class.

The application of the Scramble learning model assisted by puzzle media in Cycle I showed a positive change in students' learning activities compared to the pre-action stage. Students began to actively discuss, work together in groups, and dare to convey the results of the discussion in front of the class. However, some students still seem to lack confidence in asking questions and expressing opinions during the learning process.

The results of the evaluation in Cycle I showed an increase in student learning outcomes compared to the pre-action stage. A total of 13 students (72.22%) have achieved learning completion, while 5 students (27.78%) have not achieved learning completion. The average grade of the class increased to 77.50. Despite the increase, the results have not fully met the research success indicators that have been set because there are still some students who have not reached a score of ≥ 75 .

Table 2. Grouping of Student Learning Outcomes in Cycle I

Value	Criteria	Number of Students	Percentage
93–100	Excellent	0	0%
84–92	Good	5	27,78%
75–83	Enough	8	44,44%
0–74	Less	5	27,78%

Based on the results of the reflection of Cycle I, several improvements were made in Cycle II, namely reducing the number of group members, improving the management of learning time, using PowerPoint media to clarify the delivery of material, and providing motivation to students to be more active in discussions and presentations.

Results of Cycle II

Cycle II was carried out in two meetings by correcting various obstacles found in Cycle I. Teachers divided students into smaller groups so that all students had a greater opportunity to be actively involved in learning activities. In addition, the use of PowerPoint media helps teachers explain the material of the human digestive organs more clearly and interestingly.

During the learning process, students seemed more enthusiastic in compiling puzzles, working on scramble cards, discussing, and presenting the results of group work. Interaction between students has also increased so that the learning atmosphere becomes more active, communicative, and fun.

The results of the evaluation in Cycle II showed a very significant increase in learning outcomes. All 18 students (100%) have achieved learning completeness with a score of ≥ 75 . The average grade of the class increased to 91.94 in the very good category. The data shows that the application of the Scramble learning model assisted by puzzle media is able to optimally improve student learning outcomes.

Table 3. Grouping of Student Learning Outcomes in Cycle II

Value	Criteria	Number of Students	Percentage
93–100	Excellent	10	55,56%
84–92	Good	5	27,78%
75–83	Enough	3	16,66%
0–74	Less	0	0%

The success in Cycle II shows that the improvement of actions carried out after reflection in Cycle I has a positive impact on the learning process and outcomes. Smaller group divisions make students more active in working together and discussing, while the use of puzzle media and scramble cards helps students understand the material of the human digestive system in a more concrete and interesting way.

Comparison of Student Learning Outcomes

To find out the improvement in student learning outcomes from the pre-action stage to Cycle II, it can be seen in the following table.

Table 4. Comparison of the Completeness of Student Learning Outcomes

Stages	Completion Percentage	Average
Pre-Actions	33,33%	63,61
Cycle I	72,22%	77,50
Cycle II	100%	91,94

Based on the table, there is an increase in the percentage of completeness and average grade points in each learning cycle. In the pre-action stage, the percentage of learning completeness only reached 33.33% with an average score of 63.61. After applying the puzzle-media-assisted Scramble learning model in Cycle I, the percentage of completeness increased to 72.22% with an average score of 77.50. Furthermore, in Cycle II the percentage of completeness reached 100% with an average class score of 91.94. These results show that the application of the Scramble learning model assisted by puzzle media has a positive impact on improving student learning outcomes.

DISCUSSION

The results of the study showed that the application of the Scramble learning model assisted by puzzle media had a significant impact on improving the learning outcomes of class V students of MI Muhammadiyah Kalosi on the material of the human digestive system. Overall, the percentage of learning completeness increased from 33.33% in the pre-action stage to 72.22% in Cycle I, and reached 100% in Cycle II. The average grade of the class also increased from 63.61 to 77.50 in Cycle I, and then reached 91.94 in Cycle II. This increasing trend shows that learning interventions implemented systematically through Classroom Action Research are able to improve the quality of learning outcomes gradually and consistently, in line with the principles of continuous evaluation proposed in the Kemmis and McTaggart models (Lestariningsih et al., 2022; Yusnidar et al., 2024).

The increase in student activity was also seen significantly during the learning process. In the pre-action stage, students tend to be passive, less enthusiastic, and dominant in following the lecture method, so involvement in group discussions and cooperation is very low. After applying the puzzle-assisted Scramble model, students began to actively discuss, compile puzzles, match randomized answers, and dare to present the results of the discussion in front of the class. This activity is in line with constructivist theories that emphasize that knowledge is built through social interaction and active experiences, as well as cooperative learning theories that show that group collaboration can increase motivation and understanding of concepts more effectively (Prihatmojo et al., 2024; Ruchiyat et al., 2026).

From the perspective of understanding concepts, the application of puzzle media and the Scramble model has been proven to improve students' ability to understand the material of human digestive organs in a concrete and comprehensive manner (Adinda, 2019; Sartika & Rohani, 2021). Puzzle arranging helps learners recognize the relationships between organs and their respective functions, while scramble cards require learners to relate terms and concepts logically. The increase in average scores and percentage of learning completeness supports previous findings that concrete media-based learning and active cognitive activity can strengthen the understanding of IPAS concepts at the elementary school level. The entire cycle showed that the success of the intervention was not only influenced by the method, but also by an integrated combination of factors, including effective group division, engaging learning media, student motivation, and teacher reflection to improve learning strategies (Hedayati et al., 2017; Sartika & Rohani, 2021). These factors support each other so that students can be more actively involved, cooperative, and think critically in completing learning tasks.

These findings underscore the importance of a holistic approach to learning, which focuses not only on methods but also on the design of learning environments that encourage engagement and active participation.

The practical implications of this study are comprehensive and relevant. First, teachers can apply the Scramble model assisted by puzzle media to increase student motivation, engagement, and collaboration, as well as make it easier to understand the concept of IPAS in a concrete way. Second, reflection and improvement of learning strategies between cycles shows the importance of adaptive classroom management, including regulating the number of participants per group, using additional media, and strengthening the role of teachers as active facilitators. Third, the integration of this strategy can be a guideline for the development of a more interesting IPAS curriculum and learning methods, emphasizing experimental activities, concept development, and group discussions. Fourth, the results of the study encourage further research to measure the impact of this method on social skills, long-term motivation, or application to other science subjects, so that the findings can be applied more widely in elementary schools. Thus, this research makes a theoretical as well as practical contribution to science education, providing a systematic, empirical learning model based on students' real experiences.

CONCLUSION

This study shows that the application of the Scramble learning model assisted by puzzle media is an effective strategy in improving the quality of science learning at the elementary school level, not only in terms of learning outcomes, but also in encouraging involvement, collaboration, and understanding of students' concepts as a whole. This approach allows teachers to integrate active methods, concrete media, and adaptive classroom management so that the learning process becomes more interactive, communicative, and fun. In addition, this model is in line with the principles of constructivism and cooperative learning, emphasizing the importance of learner-centered learning experiences and social interaction in building knowledge. Thus, this research makes a significant contribution both practically and theoretically, providing a framework that teachers can use to design science learning that is more systematic, interesting, and able to optimally develop students' cognitive and social skills.

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