Reading questioning answering (RQA) method in learning the interaction of living things with their environment: The application to improve students' cognitive learning outcomes

Milanda Kasim*, Masra Latjompoh, Regina Valentine Aydalina

Universitas Negeri Gorontalo, Indonesia

Abstract: This study aims to determine the improvement in students' cognitive learning outcomes through the implementation of the Reading Questioning and Answering (RQA) teaching method on the topic of interactions between living organisms and their environment at SMP Negeri 1 Tilango. This research is a pre-experimental study involving only one class as the experimental class. The study was conducted over two sessions. Data were collected using observation and testing techniques. The data analysis techniques used include the analysis of learning implementation, student activity analysis, and cognitive learning outcome analysis. The results of the study indicate that the application of the Reading Questioning and Answering (RQA) teaching method can enhance the cognitive learning outcomes of Grade VII.3 students at SMP Negeri 1 Tilango.

Keywords: Environment, learning outcomes, living things, RQA method

Abstrak: Penelitian ini bertujuan untuk mengetahui peningkatan hasil belajar kognitif peserta didik melalui penerapan metode pembelajaran Reading Questioning and Answering (RQA) pada materi interaksi makhluk hidup dengan lingkungannya di SMP Negeri 1 Tilango. Penelitian ini merupakan penelitian pre-experimental yang hanya melibatkan satu kelas sebagai kelas eksperimen. Penelitian ini dilaksanakan selama dua kali pertemuan. Data dikumpulkan menggunakan teknik observasi dan tes. Teknik analisis data yang digunakan adalah analisis keterlaksanaan pembelajaran, analisis aktivitas siswa, dan analisis hasil belajar kognitif siswa. Hasil penelitian menunjukkan bahwa penerapan metode pembelajaran Reading Questioning and Answering (RQA) dapat meningkatkan hasil belajar kognitif siswa kelas VII.3 SMP Negeri 1 Tilango.

Kata kunci: Lingkungan, hasil belajar, makhluk hidup, metode RQA

*Corresponding author: milandakasim10@gmail.com

INTRODUCTION

Natural science is a systematic compilation of theories that are typically restricted to natural phenomena (Fortunato et al., 2018; Haryadi & Pujiastuti, 2019; Mohzana et al., 2023; Soler et al., 2013). It is a product of scientific methods, including experimentation and observation, and it necessitates a scientific attitude defined by honesty, openness, inquiry, curiosity, and more (Chowdhury, 2018; Damopolii et al., 2020; John, 2018; Lindholm, 2018). Thus, natural science is not merely the mastery of a collection of knowledge consisting of facts, concepts, or principles, but it is also a process of discovery (Bisriadi, 2020; Nasir et al., 2023). Science education, presenting real-life concepts, has a greater potential to develop students' experiences and competencies in understanding nature and the environment based on scientific concepts (Listyawati, 2012).

Science concepts are mostly abstract and highly theoretical topics, making it difficult for students to understand them, which impacts their learning outcomes (Nasir et al., 2024; Yunus et al., 2018). To improve student learning outcomes, teachers are required to master

the principles of teaching and learning, and to employ various methods and teaching models so that students' cognitive learning outcomes can improve. However, interviews with science teachers at SMP Negeri 1 Tilango revealed that teachers only connect students' reasoning with natural events, thus helping students understand scientific concepts which they can apply in their daily lives. This extensive material coverage results in a learning process focused more on covering all materials without considering students' understanding of the subject matter. This issue leads to a learning process that tends to use lecture and reading assignment methods, causing students to respond with note-taking and memorization learning patterns.

One effort to improve student learning outcomes is to implement the reading questioning and answering (RQA) teaching method. The RQA method can improve students' cognitive learning outcomes as it is a student-centered approach that trains students to read seriously and understand the content, helping them identify substantial parts of the reading material so that they have a concept of the material being studied (Sumampouw, 2013).nRQA teaching method guides students to read specific learning materials or basic learning methods (Darmayanti, 2015). The RQA method consists of three stages: reading, questioning, and answering. The RQA teaching method is an evolving approach grounded in constructivist learning theory (Murni, 2018).

RQA method is a cooperative learning approach based on constructivism, focusing on students (Safitri, 2016). This method meets the need to enhance metacognitive skills by allowing students to review material, identify key points in the form of questions, and find answers to these important points from various sources (Iqbal & Hariyadi, 2015). The RQA method requires students to read, formulate questions, and answer the questions related to the learning material. Reading is the initial learning process, questioning involves activities derived from reading and summarizing, and answering involves responding to the questions with relevant material (Amin, & Corebima, 2016). This method focuses students on reading the learning material, understanding the content, formulating questions and answers in writing, a process unique to the RQA method (Bahri, 2016).

RQA method can help students improve their learning outcomes by requiring them to read the learning material individually, thereby training them to read seriously, understand the material, and identify substantial information (Maulida & Mayasari, 2019). Regular reading allows individuals to filter information effectively, enhance thinking skills, and develop analytical abilities. During the reading phase, students can create and evaluate something by considering alternative solutions based on the information. Students are asked to formulate written questions about the information and solve previously held ideas. At this stage, students are expected to be able to formulate questions and provide accurate assumptions, thus improving basic and further explanations. After creating questions, students answer them individually, building new relationships in the concepts they have read and managing their thought processes. This activity can involve re-reading from various sources, conducting experiments, or discussing to reinforce understanding (Andayani et al., 2023). This study aims to determine the improvement in students' cognitive learning outcomes through the implementation of the reading questioning and answering (RQA) teaching method.

METHOD

This research employs a pre-experimental design, specifically the one group pretest-posttest design. It was conducted at SMP Negeri 1 Tilango, located in Ilotidea Village, Tilango District. The study was carried out for more than a month starting from November 2024. The research subjects were class VII.3, consisting of 22 students (10 female and 12 male). Data collection techniques included observation and testing. Data analysis utilized instruments for evaluating learning implementation and student activity, assessed through various aspects or categories in the learning process. Cognitive learning outcomes were tested using pretest-posttest items in the form of 10 multiple-choice questions and 5 essay questions.

RESULTS AND DISCUSSION

The research data were obtained through observations of learning implementation, student activity, and test administration. Tests were used to measure students' cognitive learning outcomes on the topic of interactions between living organisms and their environment using multiple-choice and essay questions. Pretests were given before applying the RQA teaching method, and posttests were administered afterward. The average cognitive learning outcomes were analyzed through individual completeness, both pretest and posttest, and N-Gain analysis.

Figure 1 – 2, and Table 1 are the recapitulation of supporting data from observations of learning implementation, student activity, and main research data, namely cognitive learning outcomes and N-Gain values.

Analysis of learning implementation

The analysis of learning implementation after applying the RQA method is presented in Figure 1. Learning implementation was observed through opening activities, core activities, and closing activities. Each of these activities included several assessment aspects during the learning process. The analysis results indicate that meetings I and II achieved scores in each aspect ranging from 81%-100%, classified as very good. All aspects of learning implementation were rated very well by the teachers.
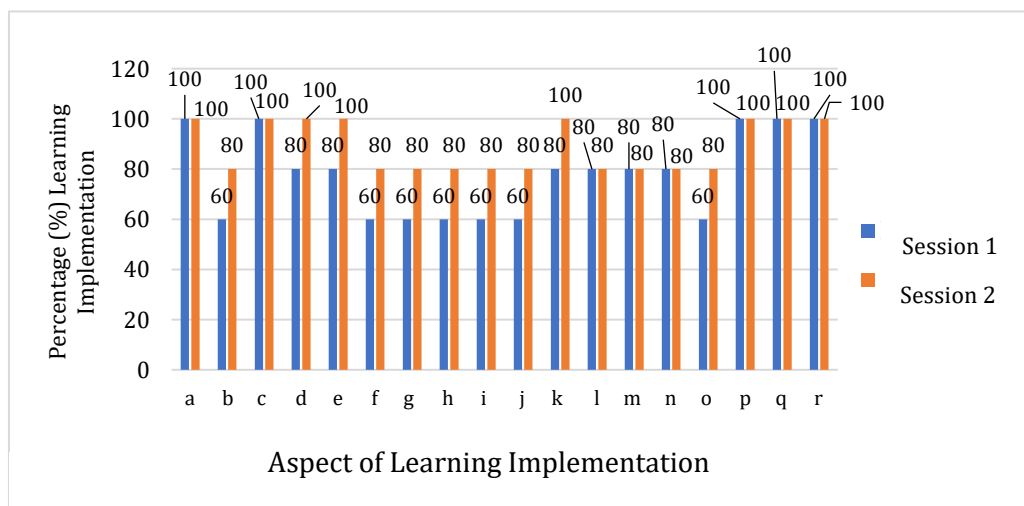

Fig. 1. Percentage graph of instructional implementation.

Note:

Aspect a) The teacher opens the lesson with a greeting, a salutation, and a prayer; b) The teacher takes attendance, conditions the class, and implements routine practices (as an implementation of discipline values); c) The teacher administers a pretest; d) The teacher provides an introduction and motivates the students; e) The teacher conveys the learning indicators and learning objectives; f) The teacher presents the material on the concept of the environment and its components, as well as the material on interactions within ecosystems forming a pattern; g) The teacher divides the students into 4 groups, each consisting of 6 students; h) The teacher assigns the students to read the material to be discussed. After reading, students are asked to identify the main ideas of the material and create a summary of the material they have read; i) The teacher gives each group a sheet of paper to write down questions from the material they have read; j) The teacher gives each group the opportunity to answer questions created by another group by exchanging the sheets of paper containing the questions; k) The teacher guides and directs the students if there are differing opinions about the questions or answers provided; l) The teacher guides the students in group discussions; m) The teacher observes and guides the students during presentations and class discussions; n) The teacher corrects any unclear or differing concepts among the students and clarifies any remaining uncertainties; o) The teacher asks the students to summarize the material; p) The teacher provides rewards and appreciation to the students for actively participating in the learning process; q) The teacher administers a posttest; and r) The teacher concludes the lesson with a prayer and a salutation.

Analysis of Student Activity

The analysis of student activity after applying the RQA method is presented in Figure 2.
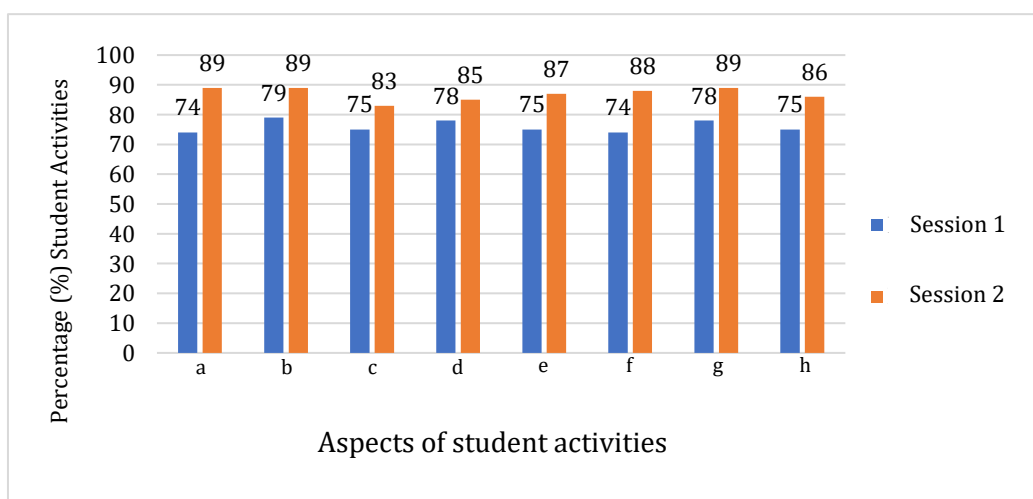

Fig. 2. Percentage graph of students activities.

Note:

Aspect a) Students respond to the teacher's introduction and objectives; b) Students pay attention to the teacher's explanation of the material; c) Students read the material to

be discussed, identify key ideas, and create a summary of the material they have read; d) Students formulate several written questions related to the material and exchange them with another group; e) Students answer the questions that have been created; f) Students discuss with their group members; and g) Students present the results of their group discussion; h) Students summarize the material.

Student activity was observed through various aspects during the learning process. The results showed an increase in science learning activities for class VII.3 students. This is evident from the average percentage of student activity in meetings I and II, which fell into the very good category, with scores ranging from 81%-100%.

Cognitive learning outcomes

Cognitive learning outcomes were measured using a written test instrument comprising multiple-choice and essay questions. Pretest questions were administered at the beginning of the first meeting, and posttest questions were given at the end of the final meeting. The purpose was to obtain data on students' cognitive learning outcomes. The pretest results showed the highest score of 55 and the lowest score of 40. Posttest results showed the highest score of 80 and the lowest score of 71.

The percentage of average pretest and posttest scores and the N-Gain score can be seen in Table 1.

Tabel 1. Analysis of Average Pretest and Posttest Scores

Number of respondence	Average score		N-Gain Score	Category
	Pretest	**Posttest**		
22	44.7	75.2	0.76	Highly effective

The average pretest score for 22 respondents was 44.7%, while the average posttest score was 75.2%. The N-Gain score was 0.76, categorized as highly effective.

Based on data analysis, the following three aspects were analyzed:

Learning implementation

The analysis of teacher activity was obtained from observation sheets containing steps of the learning process. Observers marked ($\sqrt{}$) each item conducted during the learning process. The results were expressed as a percentage, reflecting the quality of learning implementation, with the very good category scoring 80%-100%. Learning implementation is considered good if the average score is ≥62%. The quality of learning implementation is considered good if the percentage is ≥61% (Muchlis et al., 2020).

The increased percentage of learning implementation from the first to the second meeting indicates a positive response to the improvements and enhancements during the learning process. This improvement could be due to various factors, such as improved teaching methods, communication strategies, or adjustments to learning materials according to students' needs. Student activity is a crucial factor in the successful implementation of learning. Learning activities support the success of learning (Buyung, 2017).

Student activity

Student activity during the learning process was observed and categorized as good in meeting I, with a percentage of 74%-79%, indicating that only some students were active while others were less active. In meeting II, the category was very good, with a percentage of 83%-89%. Student activity is considered good if at least 70% of students are actively involved. Student activity is essential and should be developed by teachers during the learning process (Wahyuddin & Nurcahaya, 2019). Student learning activity involves students' physical and mental engagement related to cognitive, affective, and psychomotor aspects (Hanafiah, 2009). To enhance student activity, teachers should not only convey knowledge, skills, and attitudes but also engage students in various forms of learning, such as discovery learning (Nusantari et al., 2021), Inquiry (Mandasari et al., 2021; Nasir et al., 2020; Nunaki et al., 2019), independent learning (Hockings et al., 2018), collaborative learning (Le et al., 2018), problem-solving (Van Gog et al., 2020), PBL (Damopolii et al., 2024; Silahooy et al., 2024)and more.

Cognitive learning outcomes

In addition to analyzing student activity, cognitive learning outcomes were also assessed using pretest and posttest evaluations. This aims to measure the cognitive development of students regarding the taught material. Pretest and posttest methods are used to measure students' cognitive development concerning the material taught (Adri, 2020).

The results indicate that using the RQA method for teaching interactions between living organisms and their environment improved students' cognitive learning outcomes. This is evidenced by the significant difference between pretest and posttest scores. RQA method compels students to read assigned learning materials, ensuring the designed teaching methods are implemented and the understanding of learning materials is significantly improved (Lashari et al., 2017). RQA method strengthens students' cognitive skills by encouraging them to read, understand, identify substantial content, formulate questions, and answer them (Bahtiar, 2013). RQA method is an effective way to enhance cognitive learning outcomes (Syarifah et al., 2016).

The N-Gain score analysis showed a value of 0.76, categorized as high, indicating the effectiveness of the RQA method. This shows that RQA method significantly increases learning effectiveness. The Reading Questioning Answering (RQA) teaching method is considered to be based on constructivist learning theory (Maulida & Mayasari, 2019). To empower students' cognitive learning outcomes on the topic of interactions between living organisms and their environment, the RQA teaching method can be utilized.

Students' cognitive learning outcomes are a critical component of their knowledge base. Active participation in the learning process helps students better understand the material and acquire the knowledge necessary to enhance their cognitive learning outcomes. Cognitive learning outcomes reflect the extent of students' mastery of the subjects they study, or their comprehension of the material, involving knowledge and the development of intellectual skills (Potter & Kustra, 2012). These skills include recalling or recognizing facts, procedural patterns, and concepts, which contribute to the development of students' intellectual abilities. Therefore, students must actively engage in the learning process to improve their learning outcomes.

CONCLUSION

The research concluded that the RQA method can improve the cognitive learning outcomes of students on the topic of interactions between living organisms and their environment in class VII.3 at SMP Negeri 1 Tilango, as evidenced by the significant increase in posttest scores compared to pretest scores. The quality of learning implementation and student activity during the learning process were also rated very well, contributing to the overall effectiveness of the RQA method. Therefore, the RQA teaching method is recommended for enhancing student engagement and cognitive learning outcomes in science education.

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