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Effectiveness of Science Evaluation Questions on Animal Classification Material on Learning Outcomes and Problem Solving of Third Grade Elementary School Students

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Abstract: This study aimed to analyze the effectiveness of third-grade elementary school science assessment questions on animal classification in measuring students' learning outcomes and problem-solving skills. A quantitative approach with a pre-test–post-test design was employed involving 51 third-grade students. The assessment instrument consisted of science questions covering vertebrate and invertebrate classification, amphibian characteristics, and animal habitats. Data were collected through pre-test and post-test assessments and analyzed using descriptive and quantitative methods. The results indicated that the assessment questions effectively measured learning outcomes, with N-gain scores of 0.37 (moderate) in the first class and 0.25 (low) in the second class. Problem-solving analysis revealed that the first class performed better in planning solutions and drawing conclusions, while the second class showed stronger performance in understanding problems, with comparable achievement in implementing solutions. These findings demonstrate that assessment questions aligned with learning objectives and students' cognitive development effectively evaluate both conceptual understanding and problem-solving skills. Therefore, the developed science assessment questions are appropriate as an effective evaluation tool for elementary school science learning.

Keywords: Animal classification; Learning outcomes; Problem-solving skills; Science assessment questions; Third-grade elementary school students

Introduction

Science education in elementary school plays an important role in building students' initial understanding of natural phenomena and living things around them. Science aims not only to develop factual knowledge, but also to instill scientific thinking through the process of observing, classifying, and drawing simple conclusions (Rahmat M, 2024). Therefore, science learning at the elementary school level must be designed contextually and in accordance with the characteristics of students' cognitive development. One of the essential science subjects for third-grade elementary school students is animal classification, which includes grouping animals based on certain characteristics such as skeletal type (vertebrates and invertebrates), habitat, and lifestyle, including amphibians. This subject is important because it provides a foundation for students to understand the diversity of living things and the relationship between animals' physical characteristics and their environment (Andriliyani et al., 2021). A good understanding of the concept of animal classification is expected to help students develop logical and systematic thinking skills from an early age.

According to Piaget's theory of cognitive development, third-grade elementary school students are in the concrete operational stage (Ahmad et al., 2016). This stage shows that students have begun to understand simple cause-and-effect relationships, but still have difficulty understanding purely abstract and symbolic concepts. The success of science learning is inseparable from the process of evaluating learning outcomes carried out by teachers. Evaluation is an important component in learning because it serves to determine the level of student competency achievement and the effectiveness of the learning process that has

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been implemented (Karengga et al., 2025). Through proper evaluation, teachers can obtain information about students' understanding, learning difficulties, and the quality of learning that has taken place. In addition, there is a need for innovation in learning models, evaluation instruments, and learning tools that are appropriate for the level of child development (Devianti Komalasari & Ketut Widada, 2022; Putri Liani & Hamdian Affandi, 2023).

Evaluation questions, as one of the assessment instruments, play a strategic role in measuring student learning outcomes. Good questions must be compiled based on learning indicators, in accordance with learning objectives, and taking into account the cognitive development level of students (Muhadi et al., 2025; Ndiung & Jediut, 2020). At the elementary school level, especially in third grade, science assessment questions should place greater emphasis on the ability to remember and understand concepts (C1–C2) using simple language and contexts that are familiar to students' everyday lives (Ernita Pasaribu et al., 2024). However, in practice, science assessment questions are still found to be ineffective in optimally measuring student learning outcomes. Some questions tend to emphasize memorization without testing in-depth conceptual understanding, or are not fully aligned with the established learning indicators. This can cause the assessment results to not reflect the students' actual abilities, making it difficult for teachers to make decisions on follow-up learning (Savika & Zuhriyah, 2024). Although previous studies have discussed the development and quality of science assessment instruments, most have focused on validity, reliability, or students' cognitive achievement. Limited attention has been given to examining whether assessment questions specifically designed for third-grade animal classification topics effectively measure both learning outcomes and students' problem-solving skills. This gap highlights the need for a more comprehensive evaluation of assessment effectiveness in elementary science learning.

In animal classification material, the effectiveness of evaluation questions is very important because this material requires students to be able to classify, differentiate, and understand the characteristics of living things. Well-designed evaluation questions can help measure the extent to which students are able to identify the differences between vertebrates and invertebrates, understand the characteristics of amphibians, and associate animals with their habitats. Conversely, inappropriate questions can obscure conceptual understanding and fail to provide an accurate picture of student learning outcomes.

This study offers a novel contribution by simultaneously evaluating the effectiveness of science assessment questions in measuring students' learning outcomes and profiling their problem-solving skills within the specific context of third-grade animal classification learning. Unlike previous studies that primarily emphasize psychometric quality or learning achievement, this research integrates cognitive assessment with problem-solving analysis, providing teachers with more comprehensive evidence for improving classroom assessment practices. Based on this description, it is necessary to conduct research that examines the effectiveness of science evaluation questions for third-grade elementary school students on the subject of animal classification in relation to student learning outcomes. This research is important because accurate assessment instruments enable teachers to identify students' conceptual understanding, recognize learning difficulties at an early stage, and design appropriate instructional improvements. Furthermore, the findings are expected to contribute to the development of evidence-based science assessment practices that are aligned with elementary students' cognitive characteristics. This research is expected to provide an overview of the extent to which the science evaluation questions used are able to accurately measure student learning outcomes. In addition, the results of this study are expected to provide material for reflection for teachers in compiling science evaluation questions that are of higher quality, valid, and in accordance with the characteristics of elementary school students.

Method

This study used a quantitative descriptive research design. This approach was chosen to describe the effectiveness of third-grade elementary school science evaluation questions in measuring student learning outcomes on animal classification material based on numerical data obtained from student test results. The flow diagram is shown in Figure 1.

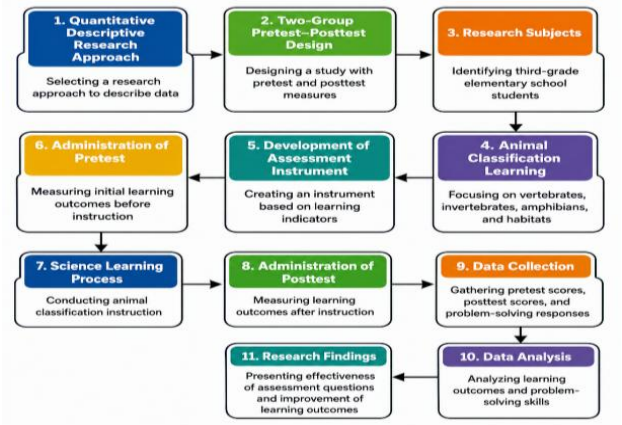

Figure 1. Flowchart of the Quantitative Descriptive Research Methodology

Research Design

The research design used was a two-group pretest-posttest design. In this design, students were given a pretest before learning and a posttest after learning using the same or equivalent science evaluation questions. The difference between the pretest and posttest results was used to see the changes and achievements in student learning outcomes after learning took place.

Research Subjects and Location

The research subjects were 51 third-grade elementary school students. The students were selected purposively because they had studied animal classification material in accordance with the applicable curriculum and were at the concrete operational stage of cognitive development. The research was conducted at an elementary school during the first semester of the 2025/2026 academic year.

Research Material

The material used in this study was animal classification, which included grouping animals based on certain characteristics such as vertebrates and invertebrates, characteristics of amphibians, and animal habitats. The material was adjusted to the third-grade elementary school science learning competencies.

Research Instruments

The research instruments were science evaluation questions for third-grade elementary school students on the subject of animal classification. The questions were compiled based on learning indicators and students' cognitive development levels, with an emphasis on memory and comprehension skills (C1–C2). Before use, the instruments were reviewed for content validity through expert judgment by elementary school science teachers or lecturers in the field of science education to ensure the suitability of the material, language, and level of difficulty of the questions. The question grid is shown in Table 1.

Table 1. Animal Classification Material Question Grid

No. Question	Main topic	Question indicator	Problem solving indicator
1.	Understanding animal classification	Explaining the meaning of animal classification	Understanding the problem
2.	Vertebrates and invertebrates	Identifying vertebrates based on characteristics	Understanding the problem
3.	Vertebrates and invertebrates	Distinguishing vertebrates and invertebrates	Implementing solutions
4.	Amphibians	Listing the characteristics of amphibians	Understanding the problem
5.	Amphibians	Identifying examples of amphibians	Implementing solutions
6.	Animal habitats	Determining animal habitats based on characteristics	Planning solutions
7.	Animal habitats	Grouping animals based on their living environment	Implementing solutions
8.	Animal classification	Grouping animals based on similar characteristics	Implementing solutions
9.	Animal classification	Determining animal groups from illustrations/text	Drawing conclusions
10.	Application of animal classification	Applying the concept of classification in everyday life	Drawing conclusions

Problem-solving skill indicators according to (Polya, 1981) consisting of understanding the problem, planning the solution, implementing the solution, and drawing conclusions.

Data Collection Techniques

Research data was collected through learning outcome tests, namely pre-tests and post-tests. Pre-tests were administered to determine students' initial abilities in animal classification, while post-tests were administered after the learning process to determine students' learning outcomes after receiving the learning treatment.

Data Analysis Techniques

Student learning outcome data were analyzed using quantitative descriptive analysis. The analysis was conducted by calculating the pretest and posttest scores to determine the N-Gain as shown in Equation 1.

$$N - Gain = \frac{Posttest\ Score - Pretest\ Score}{Ideal\ Maximum\ Score - Pretest\ Score} \quad (1)$$

The effectiveness of science evaluation questions is determined based on the improvement in student learning outcomes after learning about animal classification.

In addition, this study also looks at how students' problem-solving skills are based on indicators taken

from Polya. Calculating the average score for each indicator is shown in Equation 2.

$$Average\ indicator = \frac{\sum indicator\ score}{number\ of\ students} \quad (2)$$

Result and Discussion

Student learning outcomes were obtained through pre-tests and post-tests administered to two groups of third-grade elementary school students. Pre-tests were administered to determine students' initial abilities in animal classification, while post-tests were administered after the learning process using the same science evaluation questions. The results showed an increase in learning outcome scores in both groups after the learning process. Figure 2 presents the implementation of the learning activities and the administration of the science evaluation questions during the research. The documentation illustrates students' participation in the learning process and supports the implementation of the research procedures.

Figure 2. Documentation of the learning process and the administration of the science evaluation questions.

Table 2. Gain Score Test Results

Group	Pre-test average score	Post-test average score	Score gain
1.	71	82	0.37
2.	73	80	0.25

The improvement in student learning outcomes in Table 2 was analyzed using N-gain values to determine the effectiveness of science evaluation questions in measuring learning outcomes. Based on the calculations, an N-gain value of 0.37 (moderate category) was obtained for the first class and 0.25 (low category) for the second class. These results indicate that, in general, there was an improvement in student learning outcomes after instruction, although the level of improvement differed between classes. These findings indicate that the science assessment questions used were able to capture changes in student abilities before and after instruction, thus serving as a learning outcome measurement tool that is sufficiently sensitive to student competency achievement, as has been shown in previous studies (Alang et al., 2024; Amrin et al., 2025).

The improvement in learning outcomes is consistent with previous studies showing that assessment instruments aligned with learning objectives and indicators can accurately measure students' conceptual understanding and cognitive achievement (Hayati et al., 2023). Well-constructed evaluation questions not only measure students' mastery of concepts but also provide meaningful feedback for improving the teaching and learning process (Winingsih et al., 2023).

The effectiveness of science evaluation questions in this study was reviewed in terms of their ability to measure improvements in student learning outcomes in animal classification material. The N-gain value in the first class, which was in the moderate category, showed that most students experienced a significant improvement in their understanding of the concepts. This indicates that evaluation questions compiled based on learning indicators were able to adequately measure student understanding.

The science assessment questions in this study were designed in accordance with the indicators for animal classification material, namely the grouping of vertebrates and invertebrates, the identification of amphibian characteristics, and the determination of animal habitats. The alignment between learning indicators and test items is one of the main requirements for an effective assessment instrument (Hayati et al., 2023; Rudini, 2020). Therefore, the measurable improvement in learning outcomes through these questions shows that the instrument has good content validity.

Meanwhile, the N-gain value in the second class was in the low category. However, these results still show an improvement in student learning outcomes after learning. Differences in improvement categories between classes may be influenced by variations in students' initial abilities, differences in activity during learning, and learning conditions that are not entirely uniform. The results of this study can also be analyzed based on the characteristics of Piaget's cognitive development of third-grade elementary school students. According to Piaget's cognitive development theory, students aged 7–11 years are in the concrete operational stage, which is the stage where students are able to think logically about real objects or events. The science evaluation questions used in this study were presented in the form of simple texts and contexts that were close

to the students' lives, so they were appropriate for this stage of cognitive development.

These findings also suggest that the effectiveness of science evaluation questions depends not only on the quality of the test items but also on instructional implementation. Students who actively participate in classroom activities are more likely to demonstrate higher learning gains because they are better able to connect prior knowledge with new concepts. This interpretation is supported by constructivist learning theory, which emphasizes that meaningful learning occurs when students actively construct knowledge through interaction with learning experiences (Purnama et al., 2026; Saputri et al., 2023).

The animal classification material requires students to group and differentiate objects based on certain characteristics. This ability is one of the main characteristics of the concrete operational stage, so the use of evaluation questions that emphasize memory and comprehension (C1–C2) is considered appropriate for measuring the learning outcomes of third-grade students (Amrin et al., 2025). This reinforces the finding that the science evaluation questions used were effective in measuring student learning outcomes on the subject of animal classification. In addition, based on the results of the analysis of students' problem-solving skills on the subject of animal classification, the average score for the four problem-solving indicators, namely understanding the problem, planning a solution, implementing the solution, and drawing conclusions, was obtained for the two classes studied. These results show differences in problem-solving skill achievement between classes and between indicators, as shown in Table 3.

Figure 3 shows students working on the science evaluation questions during the post-test session and discussing the animal classification problems. This documentation supports the implementation of the assessment process described in this study.

Figure 3. Students completing the post-test and discussing animal classification problems.

Table 3. Analysis of Problem-Solving Skills

Group	Indicators			
	Understanding the problem	Planning solutions	Implementing solutions	Drawing conclusions
1.	79	89	78	88
2.	81	74	77	83

Based on the results of the analysis of students' problem-solving skills in the animal classification material, it was found that both classes showed relatively good abilities in the four problem-solving indicators, namely understanding the problem, planning solutions, implementing solutions, and drawing conclusions. Class 2 had a slightly higher ability to understand problems (81) than Class 1 (79), indicating that Class 2 students were better able to identify and understand the problems presented in the questions. However, on the indicator of planning solutions, Class 1 showed much better results (89) than Class 2 (74), indicating that Class 1 students were more skilled at determining problem-solving strategies based on the concept of animal classification. In the stage of implementing solutions, both classes showed almost the same results, namely 78 for Class 1 and 77 for Class 2, indicating that the ability to apply problem-solving strategies still needs to be improved in both classes. Meanwhile, in the drawing conclusions indicator, Class 1 again showed a higher score (88) than Class 2 (83), indicating that Class 1 students were better able to conclude the classification results logically and according to the concept.

The differences in problem-solving performance between the two classes indicate that students may possess different cognitive strengths across the four indicators. While Class 2 demonstrated stronger problem identification skills, Class 1 performed better in planning and concluding solutions. These findings are consistent with previous studies reporting that elementary students often develop problem identification skills earlier than higher-order planning and reasoning skills, which require repeated learning experiences and structured guidance (Hidayah et al., 2025; Purnama et al., 2021). Therefore, future science instruction should provide more opportunities for students to practice planning, implementing, and evaluating solutions through inquiry- and problem-based learning activities. Overall, Class 1 tended to excel

at the advanced problem-solving stage, while Class 2 was stronger at the initial stage of understanding the problem, so a balanced learning strategy is needed to optimally develop all indicators of students' problem-solving skills.

The results of this study indicate that science evaluation questions compiled in accordance with learning indicators and the characteristics of elementary school students can be used as an effective instrument for measuring learning outcomes. Good questions not only serve as a final assessment tool, but also as a means of objectively determining the development of students' conceptual understanding (Destiana et al., 2020; Hidayah et al., 2025; Wangsa et al., 2021). These findings strengthen previous evidence that assessment quality plays an important role in improving learning outcomes and supporting meaningful science learning at the elementary school level. Therefore, teachers are expected to pay more attention to the suitability between learning objectives, indicators, and the types of evaluation questions used.

Conclusion

The science evaluation questions on animal classification were effective in measuring the learning outcomes of third-grade elementary school students. This effectiveness was indicated by improvements in students' learning outcome scores, with N-gain values of 0.37 (moderate category) for the first class and 0.25 (low category) for the second class. The evaluation questions also measured students' problem-solving skills across four indicators: understanding the problem, planning solutions, implementing solutions, and drawing conclusions. These findings indicate that science evaluation questions developed in accordance with learning indicators and the cognitive characteristics of third-grade elementary school students can effectively assess both learning outcomes and problem-solving skills.

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Conflicts of Interest
The authors declare no conflict of interest.

References

Ahmad, S., Phil, M., & Malik, M. (2016). Play and Cognitive Development: Formal Operational Perspective of Piaget's. *Journal of Education and Practice*, *7*(28), 72–79. www.iiste.org

Alang, A., Hardoko, A., Masruhim, M. A., & Maasawet, E. T. (2024). Evaluasi Instrumen Penilaian Kompetensi Keterampilan Proses Mata Pelajaran IPA Biologi di SMP PGRI 1 Samboja. *Jurnal Pendas Mahakam*, *9*(September), 174–184.

Amrin, A., Pendi, Syahrul, & Siregar, I. (2025). Implementasi dan Tantangan Evaluasi Pembelajaran IPA di Sekolah. *Moral : Jurnal Kajian Pendidikan Islam*, *2*(2), 279–287.

Andriliyani, S., Moro, H. K. E. P., & Purwanto, P. (2021). Penyusunan Booklet Hasil Penelitian Etnozoologi Di Pasar Kliwon Kalibening Banjarnegara Sebagai Sumber Belajar Biologi Kelas X Materi Keanekaragaman Hayati. *Borneo Journal of Biology Education (BJBE)*, *3*(2), 130–151. https://doi.org/10.35334/bjbe.v3i2.2428

Destiana, D., Suchyadi, Y., & Anjaswuri, F. (2020). Pengembangan Instrumen Penilaian Untuk Meningkatkan Kualitas Pembelajaran Produktif di Sekolah Dasar [Development of Assessment Instruments to Improve the Quality of Productive Learning in Elementary Schools]. *Jurnal Pendidikan Dan Pengajaran Guru Sekolah Dasar (JPPGuseda)*, *3*(2), 119–123. https://journal.unpak.ac.id/index.php/JPPGuseda/article/view/2720

Devianti Komalasari, F., & Ketut Widada, I. (2022). Kesulitan Guru dalam Melaksanakan Pembelajaran Matematika dengan Kurikulum 2013 Masa Pandemi Covid-19. *Journal of Classroom Action Research*, *4*(1). https://doi.org/10.29303/jcar.v4i1.1388

Ernita Pasaribu, Monica Intan Reni, Nadya Tesalonika Simbolon, Niko Alriadi Sinaga, Putri Nurul Auliya, & Tetty Aprilya Rezeki Simatupang. (2024). Analisis Kognitif dan Pemahaman Siswa Mengenai Pembelajaran IPA Pada Kelas 6C SDN 101766 Bandar Setia dengan Soal Berbasis HOTS. *Harmoni Pendidikan : Jurnal Ilmu Pendidikan*, *2*(1), 63–72. https://doi.org/10.62383/hardik.v2i1.974

Hayati, Y., Ramdani, A., & ... (2023). Analisis Butir Soal Pada Rencana Pelaksanaan Pembelajaran Guru Biologi SMA Negeri di Kabupaten Lombok Tengah Tahun Ajaran 2021/2022. *Journal of Classroom …*, *5*. https://jppipa.unram.ac.id/index.php/jcar/article/view/4694%0Ahttps://jppipa.unram.ac.id/index.php/jcar/article/download/4694/3004

Hidayah, R. U., Padmarini, R. R. E. E. I. P., & Pramesti, F. A. (2025). Penggunaan Media Visual dan Sortir Kartu untuk Meningkatkan Kemampuan Klasifikasi Siswa SD. *Basica Academica: Jurnal Pendidikan Anak Sekolah Dasar*, *1*(2), 146–154.

Karengga, F. I., Rizko, U., & Bashith, A. (2025). Analisis Problematika Pelaksanaan Evaluasi Pembelajaran IPA dalam Mencapai Tujuan Pendidikan pada Kurikulum Merdeka SD/MI. *Al-Madrasah Jurnal Pendidikan Madrasah Ibtidaiyah*, *9*(2), 533. https://doi.org/10.35931/am.v9i2.4401

Muhadi, Jarir, Khairina, Rajuna, & Prasetyo, E. (2025). Evaluasi Perencanaan Desain Pembelajaran , Pelaksanaan Proses. *Edu Society: Jurnal Pendidikan, Ilmu Sosial, Dan Pengabdian Kepada Masyarakat*, *5*(2)

Ndiung, S., & Jediut, M. (2020). Pengembangan instrumen tes hasil belajar matematika peserta didik sekolah dasar berorientasi pada berpikir tingkat tinggi. *Premiere Educandum : Jurnal Pendidikan Dasar Dan Pembelajaran*, *10*(1)

Polya, G. (1981). *Mathematical discovery on understanding, learning and teaching problem solving: Combined edition* (S. University (ed.)). John Wiley & Sons.

Purnama, A. Y., Kuswanto, H., Rani, S. A., Putranta, H., & Winingsih, P. H. (2021). Simulasi Difraksi Fraunhofer Menggunakan Media Spreadsheet dan GNU Octave Sebagai Alternatif Pembelajaran dimasa Pandemi. *Kappa Journal*, *5*(2), 158–165. https://doi.org/10.29408/kpj.v5i2.3695

Purnama, A. Y., Sulistyowati, F., Widodo, W., Khaharsyah, A., & Saputri, R. (2026). *Development of a Fourier Transform-Based Gamelan Signal Processing Simulation Using Python and GNU Octave to Support Problem-Solving Skills and Independent Learning*. *3*(3), 192–207.

Putri Liani, D., & Hamdian Affandi, L. (2023). Analisis Kemampuan Guru Dalam Menggunakan Media Gambar Pada Pembelajaran IPA. *Journal of Classroom Action Research*, *5*(4). http://jppipa.unram.ac.id/index.php/jcar/index

---

Rahmat, M. (2024). *Pendidikan IPA di SD*. Nasmedia.

Rudini, M. (2020). Efektivitas Analisis Butir Soal Mata Pelajaran Matematika Pada Siswa Kelas IV Dalam Meningkatkan Kualitas Guru Di SDN Sabang. *Tolis Ilmiah; Jurnal Penelitian*, *2*(1), 17–27. https://ojs.umada.ac.id/index.php/Tolis_Ilmiah/article/view/90

Saputri, R., Wilujeng, I., Jumadi, J., Nurohman, S., & Purnama, A. Y. (2023). Development of PBL Modul-El to Improve Problem Solving Students of Physics Education Program. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8376–8382. https://doi.org/10.29303/jppipa.v9i10.4092

Savika, H. I., & Zuhriyah, I. A. (2024). Peran Analisis Butir Soal Terhadap Kualitas Soal, Kompetensi Guru, Dan Prestasi Belajar Peserta Didik Di Sekolah Dasar. *PANDU : Jurnal Pendidikan Anak Dan Pendidikan Umum*, *2*(2), 43–51. https://doi.org/10.59966/pandu.v2i2.856

Wangsa, A. S., Dantes, N., & Suastra, I. W. (2021). Pengembangan Instrumen Kemampuan Berpikir Kritis Dan Hasil Belajar Ipa. *PENDASI: Jurnal Pendidikan Dasar Indonesia*, *5*(1), 139–150.

Winingsih, P. H., Kuswanto, H., Saputro, H., Purwanto, J., Erlangga, S. Y., Purnama, A. Y., Sebastian, R., & Silvia, S. (2023). Analysis of understanding of physics concepts through problem solving units review in free fall motion materials. *Revista Mexicana de Fisica E*, *20*(2), 1–6. https://doi.org/10.31349/RevMexFisE.20.020205