# Plagiarism Report

## 2946-Article Text-12682-1-10-20261019.pdf

### Document Details

Submission ID
**6ae0094daa2f730f1483e300**

File Size
**368.3 KB**

File Name
**2946-Article Text-12682-1-10-20261019.pdf**

Total Pages
**12 Page**

Account Name
**ITentix Plagiarism**

Tota Words
**6,005 Words**

Submission Date
**27 Oct 2026, 09:15 GMT+7**

Tota Characters
**46,805 Characters**

Release Date
**27 Oct 2026, 09:17 GMT+7**

### Filter Options

Filter settings used in this submission report.

- Exclude Bibliography

# 7%
Similarity

# 49
Matched Sources

## Match Group

0% Internet sources
7% Publications
0% Submitted works (Student papers)

## Top Sources

The sources with the highest number of matches within the submission.

| | | |
|---|---|---|
| 1 | Publication | <1% |
| jppipa.unram.ac.id | | |
| 2 | Publication | <1% |
| eprints.unm.ac.id | | |
| 3 | Publication | <1% |
| mental.jmir.org | | |
| 4 | Publication | <1% |
| journal.uinsgd.ac.id | | |
| 5 | Publication | <1% |
| e-journal.iain-palangkaraya.ac.id | | |
| 6 | Publication | <1% |
| jppipa.unram.ac.id | | |
| 7 | Publication | <1% |
| springerplus.springeropen.com | | |
| 8 | Publication | <1% |
| ejournal.almaata.ac.id | | |
| 9 | Publication | <1% |
| dergipark.org.tr | | |
| 10 | Publication | <1% |
| www.nature.com | | |
| 11 | Publication | <1% |
| journals2.ums.ac.id | | |

| | | |
|---|---|---|
| 12 Publication<br>journal.uny.ac.id | | <1% |
| 13 Publication<br>primary.ejournal.unri.ac.id | | <1% |
| 14 Publication<br>www.frontiersin.org | | <1% |
| 15 Publication<br>jurnal.uns.ac.id | | <1% |
| 16 Publication<br>siducat.org | | <1% |
| 17 Publication<br>jppipa.unram.ac.id | | <1% |
| 18 Publication<br>vestnik.tspu.edu.ru | | <1% |
| 19 Publication<br>www.cambridge.org | | <1% |
| 20 Publication<br>link.springer.com | | <1% |
| 21 Publication<br>www.frontiersin.org | | <1% |
| 22 Publication<br>jppipa.unram.ac.id | | <1% |
| 23 Publication<br>journal.univetbantara.ac.id | | <1% |
| 24 Publication<br>journal.unnes.ac.id | | <1% |
| 25 Publication<br>etheses.uin-malang.ac.id | | <1% |

| | | |
|---|---|---|
| 26 | Publication | <1% |
| www.frontiersin.org | | |
| 27 | Publication | <1% |
| journal.unm.ac.id | | |
| 28 | Publication | <1% |
| www.dovepress.com | | |
| 29 | Publication | <1% |
| www.bio-conferences.org | | |
| 30 | Publication | <1% |
| www.jstage.jst.go.jp | | |
| 31 | Publication | <1% |
| wjso.biomedcentral.com | | |
| 32 | Publication | <1% |
| www.nature.com | | |
| 33 | Publication | <1% |
| ijbnpa.biomedcentral.com | | |
| 34 | Publication | <1% |
| journal.uny.ac.id | | |
| 35 | Publication | <1% |
| ojs.uniska-bjm.ac.id | | |
| 36 | Publication | <1% |
| ijmmu.com | | |
| 37 | Publication | <1% |
| jppipa.unram.ac.id | | |
| 38 | Publication | <1% |
| primary.ejournal.unri.ac.id | | |
| 39 | Publication | <1% |
| link.springer.com | | |

| | | |
|---|---|---|
| 40 Publication<br>repository.uin-malang.ac.id | | <1% |
| 41 Publication<br>repository.uwtsd.ac.uk | | <1% |
| 42 Publication<br>ojs.um-palembang.ac.id | | <1% |
| 43 Publication<br>journal.uinsgd.ac.id | | <1% |
| 44 Publication<br>www.frontiersin.org | | <1% |
| 45 Publication<br>www.nature.com | | <1% |
| 46 Publication<br>discovery.ucl.ac.uk | | <1% |
| 47 Publication<br>journals.plos.org | | <1% |
| 48 Publication<br>bmcpsychology.biomedcentral.com | | <1% |
| 49 Publication<br>bohrpub.com | | <1% |

ISEJ Indonesian Science Education Journal

ISSN Online: 2716-3350
https://siducat.org/index.php/isej/
Published by Yayasan Darussalam Bengkulu
This article licensed under CC BY 4.0 International
OPEN ACCESS ARTICLE

# The Effect of a Guided Inquiry Learning Model Integrated with the Jelajah Alam Sekitar Approach on the Cognitive Abilities and Communication Skills of Grade VII Students at Junior High School

**Nanda Rayani, Fitri Arsih*, Rahmawati D., Elsa Yuniarti**
Department of Biology Education, Universitas Negeri Padang, Padang, Indonesia
E-mail Corresponding: fitribio@fmipa.unp.ac.id

Received: June 12, 2026 | Revised: September 8, 2026 | Accepted: October 16, 2026

**Abstract**
Science learning in rural schools with limited laboratory facilities requires contextual experiences that develop students' cognitive abilities and communication skills simultaneously. This study aimed to determine the effect of the guided inquiry learning model integrated with the *Jelajah Alam Sekitar* (JAS) approach on the cognitive abilities and the oral and written communication skills of seventh-grade students at SMPN 48 Tanjung Jabung Barat. A quantitative pre-experimental method with a one-group pretest–posttest design was used. The sample consisted of 23 students selected through total sampling. The instruments were a 15-item multiple-choice test of cognitive ability (levels C3–C6), an eight-item essay test of written communication, and observation sheets for oral communication and student worksheets; all instruments had been validated by experts and tested empirically. The data were analyzed using the paired-samples *t*-test and Cohen's *d*. The mean cognitive score increased from 46 to 64 (39.5%), the mean oral communication score from 47 to 72 (53%), and the mean written communication score from 45 to 70 (55.5%). Statistically significant pre–post improvements were observed in cognitive ability ($p < 0.001$; $d = 1.03$, large) and in oral and written communication skills ($p < 0.001$; $d = 2.77$ and 2.78, respectively; both large). These findings indicate that guided inquiry integrated with JAS provides meaningful opportunities for students to explore their surroundings, build scientific knowledge, and communicate their findings. Therefore, this model can be considered a contextual learning alternative to support cognitive abilities and communication skills in junior high school science learning.

**Keywords:** Cognitive Abilities; Communication Skills; Guided Inquiry Learning Model; Jelajah Alam Sekitar (JAS) Approach

## INTRODUCTION

Science education plays an important role in developing students' ability to understand natural phenomena, construct scientific knowledge, and apply scientific concepts to real-life situations. In the context of 21st-century education, learning is no longer expected to focus solely on the acquisition of factual knowledge but should also develop higher-order thinking skills, creativity, communication, and collaboration. These competencies are essential because students are increasingly required to analyze information, solve problems, communicate ideas, and actively construct knowledge rather than simply memorize information (Mahrunnisya, 2023; Santiani et al., 2024). In science learning, cognitive ability is particularly important because it enables students to reason logically, analyze information, understand relationships among scientific concepts, and make decisions based on evidence (Setiawan et al., 2026). Therefore, science learning should provide meaningful experiences that simultaneously facilitate the development of students' cognitive abilities and communication skills.

Science learning is essentially concerned not only with scientific products but also with scientific processes, attitudes, and applications. Science concepts are closely related to real

phenomena in students' surroundings and should be constructed through inquiry-based activities that position students as active learners (Elisa et al., 2023). Through scientific inquiry, students are encouraged to identify problems, formulate hypotheses, collect and analyze data, and draw conclusions based on evidence. Such activities can strengthen students' cognitive abilities because they require students to engage in systematic thinking and problem solving. At the same time, science learning provides opportunities for students to communicate their observations, arguments, findings, and conclusions. Communication is therefore an important learning outcome in science because it supports students in expressing scientific ideas, interacting with peers, and developing problem-solving abilities (Angganing et al., 2022; Kusmiarti et al., 2020). Previous research has also demonstrated that communication skills are positively associated with students' cognitive learning outcomes and academic achievement (Hidayati et al., 2020; Sari et al., 2025). Students with strong cognitive abilities but limited communication skills may still struggle to articulate and share their ideas with others (Diezmann & Watters, 1995; Haryanti & Suwarma, 2018).

However, the expected condition is not fully reflected in the learning process at SMPN 48 Tanjung Jabung Barat. The school is located in a relatively remote area characterized by limited internet connectivity and geographical conditions surrounded by plantations, rivers, and small waterways. Initial observations conducted on February 10, 2026, indicated that the utilization of laboratory facilities for science practicum was still limited. Although simple practical activities could be conducted using materials available in students' daily environment, laboratory-based learning had not been optimally implemented. Although the school had received a digital interactive board, teachers could not fully rely on it because its features required a stable internet connection, which was not available in the area. Interviews with the science teacher also indicated that seventh-grade students tended to be passive during learning activities and rarely asked questions or expressed arguments during discussions. This condition was reflected in their low oral communication skills, particularly in their difficulty expressing ideas systematically (Pusvita et al., 2023). Furthermore, the daily assessment results showed that 16 of 25 students, or 64%, had not achieved the expected learning mastery. During classroom discussions, only seven students were consistently active in asking and answering questions, while other students tended to remain silent because they felt embarrassed, were afraid of making mistakes, or experienced difficulties in expressing their ideas.

The learning problems were also associated with the limited contextualization of science learning. Classroom activities were still frequently dominated by standard textbooks, while the learning materials were not sufficiently connected to students' immediate environment. This was particularly problematic when learning biodiversity, even though biodiversity could be directly observed in the natural environment surrounding the school. The geographical characteristics of Tanjung Jabung Barat provide abundant natural resources that can function as authentic learning resources; however, these resources had not been systematically integrated into science learning. Learning had already used models such as Problem-Based Learning, Project-Based Learning, and inquiry, but their implementation was not optimal because activities were often procedural, with insufficient emphasis on investigation, reflection, and contextualization; consequently, students could complete tasks without fully understanding the underlying problems. Contextual learning can help students connect academic knowledge with real-life situations and encourage them to relate what they learn to their everyday experiences (Zidny & Eilks, 2022; Azhari et al., 2025). Consequently, utilizing the surrounding environment as a learning context is particularly relevant for students in rural and geographically distinctive areas.

One instructional approach that can address these challenges is guided inquiry. Guided inquiry is a student-centered learning model in which students construct knowledge through

investigation while receiving appropriate guidance from the teacher. The teacher functions as a facilitator who provides problems, questions, directions, and scaffolding to support students throughout the inquiry process (Azizah & Ismono, 2020; Muhammad et al., 2025). The guided inquiry process requires students to formulate questions or hypotheses, collect information, observe phenomena, analyze data, and formulate conclusions. Such activities provide opportunities for students to develop cognitive abilities through systematic investigation while simultaneously encouraging them to communicate their ideas and findings. Previous studies have demonstrated that guided inquiry can improve students' analytical abilities (Fauziah & Novita, 2021), critical thinking and learning outcomes (Muhan & Nasrudin, 2021), and scientific communication skills (Rizki et al., 2021). In addition, the use of scaffolding within guided inquiry can support students in organizing their investigation and communicating their findings more systematically (Rahayu & Putri, 2023).

The effectiveness of guided inquiry can be strengthened by integrating it with a contextual learning approach that utilizes students' surrounding environment. One such approach is *Jelajah Alam Sekitar* (JAS), which utilizes the physical, social, and cultural environment as a learning resource. The integration of JAS with guided inquiry allows students not only to conduct investigations within the classroom but also to explore authentic objects and phenomena directly in their surroundings. This experience can make abstract scientific concepts more concrete and meaningful because students construct knowledge based on phenomena that they can directly observe (Tanjung et al., 2023; Poli et al., 2025). Moreover, the contextual nature of JAS can provide students with concrete experiences that facilitate oral and written communication because students discuss and explain phenomena that are familiar to them (Zidny & Eilks, 2022). Thus, integrating guided inquiry with JAS has the potential to simultaneously address cognitive development and communication skills.

Previous studies have provided evidence regarding the potential of guided inquiry and JAS, but important limitations remain. Tanjung et al. (2023) found that guided inquiry integrated with JAS significantly influenced students' cognitive abilities in biodiversity learning; however, the study involved tenth-grade senior high school students and did not specifically examine communication skills. Similarly, Poli et al. (2025) reported a positive influence of the JAS approach on students' cognitive abilities, but their study focused on transversal wave material at the senior high school level. Meanwhile, Suri and Alberida (2026) reported an influence of guided inquiry on students' communication skills in biology learning, but their study did not integrate the JAS approach. Rizki et al. (2021) also demonstrated the positive contribution of guided inquiry to students' communication skills, while Suryati et al. (2024) reported that integrating constructivist strategies into inquiry-based learning increases students' active engagement through interaction and collaboration in groups. Nevertheless, previous research has rarely examined the simultaneous influence of guided inquiry integrated with JAS on both cognitive abilities and communication skills among junior high school students.

Another gap concerns the learning context. Previous guided inquiry studies have generally used problems or learning contexts that are relatively general and abstract, while the specific environmental characteristics of rural schools have received limited attention (Sujana et al., 2026). The present study addresses this gap by incorporating the distinctive natural environment of Tanjung Jabung Barat into science learning. The novelty of this study lies in the specific integration of the local natural potential, including the flora and fauna surrounding the Pengabuan River area, into the formal stages of guided inquiry. Rather than relying primarily on laboratory-based activities, the learning process utilizes students' immediate environment as an authentic source of scientific investigation.

Therefore, integrating guided inquiry with the JAS approach is expected to provide a contextual, student-centered, and meaningful science learning experience. Through direct exploration of the surrounding environment, students are given opportunities to observe real

phenomena, formulate questions, collect evidence, discuss findings, communicate ideas, and construct scientific conclusions. Such learning experiences are expected to strengthen students' cognitive abilities while simultaneously developing their oral and written communication skills. Based on these considerations and the identified research gap, this study aims to analyze the effect of guided inquiry integrated with the *Jelajah Alam Sekitar* (JAS) approach on the cognitive abilities and communication skills of seventh-grade students at SMPN 48 Tanjung Jabung Barat. Two hypotheses were tested: the guided inquiry model integrated with JAS has a significant effect on students' cognitive ability, and it has a significant effect on students' oral and written communication skills.

## METHODS

### Research Design

This study employed a quantitative approach using a pre-experimental method with a one-group pretest–posttest design. The design involved one experimental group that received a pretest ($O_1$) before the treatment (X) and a posttest ($O_2$) after the treatment to examine pre–post changes associated with the intervention (Sugiyono, 2021). The treatment was the guided inquiry learning model integrated with the *Jelajah Alam Sekitar* (JAS) approach in science learning, using the natural environment of Tanjung Jabung Barat. The integration of JAS was intended to make the learning process more contextual and meaningful.

The syntax of guided inquiry followed Ong and Borich (2006), consisting of the stages of Ask, Investigate, Create, Discuss, and Reflect, which were integrated with the JAS phases of exploration, interaction, communication, reflection, and evaluation. The JAS approach uses the physical, social, cultural, and technological environment as the object of learning (Alimah & Marianti, 2016). In this study, students explored objects related to biodiversity in their surroundings in groups, discussed their findings, and reported the results in student worksheets (LKM 1 and LKM 2) and oral presentations.

### Participants

The population comprised all seventh-grade students at SMPN 48 Tanjung Jabung Barat. Since the seventh grade consisted of only one class, total sampling was employed, and all 23 students were included as the research sample. The instrument try-outs involved 30 eighth-grade students of the same school who had already studied biodiversity in the seventh grade.

### Instruments

The research instruments comprised test and non-test measures of cognitive ability and communication skills. Cognitive ability was measured using a 15-item multiple-choice test with four answer options, covering cognitive levels C3–C6 and adapted to the Merdeka Curriculum and the JAS-integrated biodiversity material. Written communication skills were measured using an eight-item essay test whose indicators were adapted from Sonseca (2015); the students' answers and worksheets were scored with a written communication assessment rubric. Oral communication skills were assessed by observing students' presentations with an oral communication assessment sheet. Both the written rubric and the oral sheet were adapted from Sonseca (2015) and used a 1–5 rating scale from not yet competent to very competent (Table 1).

**Table 1**. Aspects of the oral and written communication skill assessment

| Communication skill | Aspects assessed | Items |
|---|---|---|
| Oral | Effective introduction; argumentation and data analysis; purpose and main ideas; conclusion; analysis and question–answer; vocal; non-verbal | 11 |
| Written | Presentation of observation data; argumentation and data analysis; formulation of conclusions; use of scientific terminology; grammar and spelling; integration of contextual phenomena | 14 |

*Note.* Aspects were adapted from Sonseca (2015) and modified to the needs of this study.

Before use, all instruments underwent expert validation by lecturers and teachers. The content-validity score, calculated as the score obtained divided by the maximum score multiplied by 100, was 96.8 for the cognitive ability test, 92 for the essay test, and 94.4 for the oral communication assessment sheet, all of which were categorized as very valid according to Ridwan (2015). The instruments were then pilot-tested, and the item validity was tested using the Pearson product-moment correlation at the 5% significance level. Of the 25 trial items of the cognitive ability test, 17 items were valid; two valid items in the low category were discarded, leaving 15 items with moderate to high validity. All eight essay items, all 14 items of the written communication rubric, and all 11 items of the oral communication sheet were valid. Reliability was tested using Cronbach's alpha ($\alpha \geq 0.70$ was considered reliable), and the agreement between raters on the assessment instruments was tested using the intraclass correlation coefficient (ICC). As shown in Table 2, all instruments were valid and reliable.

**Table 2**. Validity and reliability of the research instruments

| Instrument | Number of items | Item validity | Cronbach's α | ICC |
|---|---|---|---|---|
| Cognitive ability test (multiple-choice) | 15 (from 25 trial items) | 17 of 25 items valid; 15 items with moderate to high validity retained | 0.838 (high) | – |
| Written communication test (essay) | 8 | 8 of 8 valid (2 moderate, 4 high, 2 very high) | 0.842 (high) | – |
| Written communication assessment rubric | 14 | 14 of 14 valid (3 moderate, 8 high, 3 very high) | 0.899 (very high) | 1.000 |
| Oral communication assessment sheet | 11 | 11 of 11 valid (4 high, 7 very high) | 0.936 (very high) | 0.946 |

*Note.* ICC = intraclass correlation coefficient (inter-rater, average measures). Item validity was categorized following Arikunto (2015).

## Data Collection

Data were collected through tests and observations. The cognitive ability test and the written communication test were administered as a pretest before the intervention and as a posttest after the intervention, using the same items, with item order randomized to reduce order effects. Observations were conducted before, during, and after the learning process to obtain data on students' oral and written communication skills, including the scoring of the student worksheets to monitor the progress of written communication. The researcher was assisted by a peer observer to maintain the objectivity of the assessment in each learning session.

## Data Analysis

The data were analyzed using SPSS 26. Because the study involved fewer than 50 students, the normality of the data was tested using the Shapiro–Wilk test, and the data were considered normally distributed when the significance value was greater than 0.05. A homogeneity test was not required because only one group was involved. A paired-samples *t*-test was then used to compare the pretest and posttest scores of cognitive ability and of oral

and written communication skills; the null hypothesis was rejected when the significance value was less than 0.05. The strength of the effect was determined using Cohen's *d* calculated with the pooled standard deviation (Cohen, 1988) and interpreted using the criteria in Table 3.

**Table 3**. Interpretation criteria for effect size (Cohen's d)

| Effect size (*d*) | Percentile | Category |
|---|---|---|
| $0.8 < d \leq 2.0$ | $79\% < d \leq 97.7\%$ | High |
| $0.5 < d \leq 0.8$ | $69\% < d \leq 76\%$ | Medium |
| $0.2 < d \leq 0.5$ | $58\% < d \leq 66\%$ | Low |

*Note.* Criteria follow Baker (2000).

## RESULT AND DISCUSSION

### Result

#### *Students' Cognitive Ability and Communication Skills Before and After the Intervention*

The descriptive statistics of the pretest and posttest scores are presented in Table 4. Before the intervention, students' cognitive ability was relatively low, with a mean score of 46 (SD = 17.5) and scores ranging from 7 to 80. After the implementation of guided inquiry integrated with JAS, the mean score increased to 64 (SD = 17.7), an increase of 39.5%. The oral communication mean score increased from 47 (SD = 8.72) to 72 (SD = 8.79), an increase of 53%, and the written communication mean score increased from 45 (SD = 8.22) to 70 (SD = 9.98), an increase of 55.5%. The scores of the student worksheets also increased from a mean of 65 in LKM 1 to a mean of 80 in LKM 2.

**Table 4**. Descriptive statistics of students' cognitive ability and communication skills

| Variable | Test | *N* | Min. | Max. | Mean | SD | Median |
|---|---|---|---|---|---|---|---|
| Cognitive ability | Pretest | 23 | 7 | 80 | 46 | 17.5 | 40 |
| | Posttest | 23 | 13 | 92 | 64 | 17.7 | 67 |
| Oral communication | Pretest | 23 | 29 | 60 | 47 | 8.72 | 48 |
| | Posttest | 23 | 58 | 89 | 72 | 8.79 | 71 |
| Written communication | Pretest | 23 | 34 | 66 | 45 | 8.22 | 44 |
| | Posttest | 23 | 51 | 89 | 70 | 9.98 | 70 |
| | LKM 1 | 23 | 46 | 76 | 65 | 8.87 | 67 |
| | LKM 2 | 23 | 60 | 89 | 80 | 8.61 | 80 |

*Note.* The ideal score was 100. LKM = student worksheet.

The achievement of cognitive ability at each cognitive level is summarized in Table 5. The percentage of students who mastered the items increased at all levels, from the applying level (C3) to the creating level (C6). The largest increases occurred at the evaluating level (C5, 27.7%) and the creating level (C6, 23.9%), whereas the increases at the applying level (C3, 17.3%) and the analyzing level (C4, 15.4%) were smaller.

**Table 5**. Achievement of cognitive ability by cognitive level (N = 23)

| Cognitive level | Number of items | Pretest: students mastering (%) | Posttest: students mastering (%) | Increase (%) |
|---|---|---|---|---|
| C3 (applying) | 2 | 41.3 | 58.6 | 17.3 |
| C4 (analyzing) | 9 | 47.8 | 63.2 | 15.4 |
| C5 (evaluating) | 2 | 43.4 | 71.1 | 27.7 |
| C6 (creating) | 2 | 45.6 | 69.5 | 23.9 |

*Note.* Percentages are the proportion of students who mastered the items at each level.

### *Prerequisite and Hypothesis Testing*

Before the hypotheses were tested, the normality of the data was examined using the Shapiro–Wilk test. As shown in Table 6, the significance values of the pretest and posttest data of cognitive ability, oral communication, and written communication ranged from 0.065 to 0.886 and were all greater than 0.05. Therefore, all data were normally distributed, and the parametric paired-samples *t*-test was appropriate.

**Table 6**. Results of the Shapiro–Wilk normality test

| Variable | Test | *N* | Sig. (*p*) | Distribution |
|---|---|---|---|---|
| Cognitive ability | Pretest | 23 | 0.286 | Normal |
| | Posttest | 23 | 0.065 | Normal |
| Oral communication | Pretest | 23 | 0.069 | Normal |
| | Posttest | 23 | 0.135 | Normal |
| Written communication | Pretest | 23 | 0.226 | Normal |
| | Posttest | 23 | 0.886 | Normal |

*Note.* α = 0.05; data are normally distributed when $p > 0.05$.

The results of the paired-samples *t*-test are presented in Table 7. The reported value was $p < 0.001$ for cognitive ability, oral communication, and written communication; therefore, the null hypothesis was rejected. The negative mean differences indicate that the posttest scores were higher than the pretest scores. These results show that the guided inquiry learning model integrated with the JAS approach was associated with statistically significant pre–post improvements in students' cognitive ability and in their oral and written communication skills.

**Table 7**. Results of the paired-samples t-test of pretest and posttest scores

| Variable | Mean difference | *t* | *df* | Sig. (2-tailed) | Remarks |
|---|---|---|---|---|---|
| Cognitive ability | −18.191 | −9.689 | 22 | < 0.001 | Significant |
| Oral communication | −24.261 | −13.996 | 22 | < 0.001 | Significant |
| Written communication | −25.392 | −19.666 | 22 | < 0.001 | Significant |

*Note.* Pretest–posttest pairs; α = 0.05.

The strength of the effect is shown in Table 8. The effect size was 1.03 for cognitive ability, 2.77 for oral communication, and 2.78 for written communication, all indicating large standardized pre–post differences ($d \geq 0.8$). These estimates indicate substantial changes in students' cognitive ability and communication skills following the intervention.

**Table 8**. Effect size of the guided inquiry model integrated with JAS

| Variable | Effect size (Cohen's *d*) | Category |
|---|---|---|
| Cognitive ability | 1.03 | High |
| Oral communication | 2.77 | High |
| Written communication | 2.78 | High |

*Note.* Categories follow the criteria in Table 3.

## *Discussion*

### *The Effect of Guided Inquiry Integrated with the Jelajah Alam Sekitar Approach on Students' Cognitive Ability*

The results indicate that the implementation of guided inquiry integrated with the *Jelajah Alam Sekitar* (JAS) approach was associated with a statistically significant improvement in the cognitive ability of seventh-grade students at SMPN 48 Tanjung Jabung Barat. At pretest, students' mastery of biodiversity concepts was very low, and most students had not reached the expected mastery criterion, which indicates that they did not yet have an adequate basic understanding of the material and needed structured guidance. A closer examination of the

assessment results showed that the low achievement was not caused purely by the complexity of the science material but by a fundamental barrier in students' basic literacy: some students could not read fluently, which distorted their ability to construct meaning from the test items and made it difficult for them to reason and answer correctly. This finding shows that the initial performance was strongly influenced by an unresolved reading gap and that a more adaptive and concretely guiding learning model was needed.

Despite the low starting point, the intervention produced a measurable improvement. The mean score increased from 46 to 64, the paired-samples *t*-test showed a significant difference ($p < 0.001$), and the effect size of 1.03 was large, indicating a substantial standardized pre–post difference in cognitive ability. This is consistent with Tanjung et al. (2023), who reported a significant effect of guided inquiry integrated with JAS on students' cognitive ability in biodiversity learning, although their study involved tenth-grade students.

The improvement can be explained by the characteristics of guided inquiry, which positions students as active participants in constructing knowledge. Students are guided to formulate questions, investigate phenomena, collect evidence, analyze information, and draw conclusions, while the teacher provides scaffolding so that they can investigate systematically and gradually become more independent. This is consistent with Suryati et al. (2024), who explained that inquiry-based learning can increase active student engagement and support deeper conceptual understanding through exploration. The JAS approach adds a contextual dimension: instead of learning biodiversity only through textbooks, students investigate objects and phenomena in their surroundings, so they can observe, classify, analyze, and draw conclusions based on actual environmental conditions (Ulvah & Ridha, 2021). From the perspective of experiential learning, Kolb (1984) emphasized that direct experience is an important source of knowledge and understanding; in this study, students' direct observation of biodiversity provided concrete experiences that could be connected with the scientific concepts discussed in the classroom.

The positive effect was distributed across all levels of higher-order thinking skills, from applying to creating (Table 5). The most notable finding is the pattern of improvement: the evaluating (C5) and creating (C6) levels showed a greater increase (27.7% and 23.9%) than the applying (C3) and analyzing (C4) levels (17.3% and 15.4%). This may be related to the authentic character of the JAS approach. When students are confronted directly with biodiversity objects in their surroundings, they are not only required to transfer knowledge or dissect ecosystem components but are also stimulated to make critical judgments, such as evaluating the balance of the ecosystem and the condition of biodiversity, which then leads to constructing ideas, formulating conservation ideas, and drawing new conclusions, as shown at the creating level. The more moderate increase at the applying and analyzing levels suggests that these basic information-processing abilities had already begun to develop at the start of the intervention. Thus, the core strength of integrating guided inquiry with JAS appears to lie in facilitating students' progress toward more complex levels of higher-order thinking.

### *The Effect of Guided Inquiry Integrated with the Jelajah Alam Sekitar Approach on Students' Communication Skills*

Students' communication skills were initially limited. In oral communication, a small proportion of students were categorized as less competent, while most were moderately competent; overall, the class demonstrated only modest oral communication skills at baseline. Written communication was also generally concentrated at a low to medium level, as measured through the essay test and the student worksheets. After the intervention, both oral and written communication improved significantly ($p < 0.001$), with very large effect sizes ($d = 2.77$ and $d = 2.78$), indicating substantial improvements in students' communication skills following the intervention.

The significant improvement can be understood from the learning activities embedded

in guided inquiry. Inquiry requires students to communicate their ideas throughout the investigation: they express their initial ideas when formulating questions and hypotheses, coordinate with group members and exchange information during the investigation, and organize their findings into written reports and oral presentations at the end. Thus, communication is not an additional activity but an integral component of the inquiry process. This finding is consistent with Rizki et al. (2021) and Suri and Alberida (2026), who reported that guided inquiry has a positive influence on students' communication skills, and with Muhammad et al. (2025), who found that guided inquiry supported by scaffolding is effective in improving communication skills. Angio et al. (2025) likewise stated that communication skills develop through discussion, presentation, and argumentation during the learning process.

From a pedagogical perspective, the integration of JAS pushes students to become active communicators who must report their findings from the natural environment rather than passive recipients of information. Because students discuss objects that they have directly observed, they have a concrete reference for expressing their ideas in spoken and written form (Zidny & Eilks, 2022), and the integration of inquiry and JAS makes scientific exploration more relevant to their daily lives (Ulvah & Ridha, 2021). The process of constructing reports in the student worksheets (written communication) and presenting the results of group discussions verbally (oral communication) are inherent features of guided inquiry that train these skills intensively. The increase in the mean worksheet score from 65 (LKM 1) to 80 (LKM 2) suggests that students' written reports became better as the inquiry activities were repeated. Students' initial reluctance to speak because they were embarrassed or afraid of making mistakes may also have been reduced in this learning setting, since a supportive classroom atmosphere encourages students to speak without fear of mistakes (Berliana & Habiby, 2024) and good communication skills build students' confidence in presenting their arguments (Toifur & Kurniawan, 2022).

Overall, the findings demonstrate that guided inquiry integrated with JAS has a dual contribution to science learning. First, it provides students with direct experiences that stimulate cognitive processes such as observation, classification, analysis, evaluation, and conclusion drawing. Second, it creates repeated opportunities for students to communicate their findings through discussion, written work, and presentations. This combination is important because cognitive development and communication skills are mutually supportive components of contemporary science learning.

The results are particularly meaningful in the context of SMPN 48 Tanjung Jabung Barat, where laboratory facilities and internet connectivity are limited. The JAS approach enables the surrounding natural environment to function as an accessible learning resource, while guided inquiry provides the methodological structure needed to transform environmental exploration into systematic scientific learning. Therefore, the integration of the two approaches is a contextual instructional strategy that can be implemented even when formal laboratory facilities are limited.

In relation to previous research, the findings confirm the relevance of guided inquiry integrated with JAS for developing students' cognitive ability, as demonstrated by Tanjung et al. (2023), and are consistent with studies showing the contribution of JAS to learning outcomes (Poli et al., 2025). At the same time, the present study extends previous research by examining not only cognitive ability but also oral and written communication skills among junior high school students, and by integrating the local natural environment of Tanjung Jabung Barat into the stages of guided inquiry. This addresses the research gap identified in this study, namely that previous studies on guided inquiry integrated with JAS had focused on cognitive outcomes and had not simultaneously examined communication skills.

Several limitations should be considered. The one-group pretest–posttest design has no control group, so the improvement cannot be attributed to the treatment alone. The study involved a single class of 23 students in one school and used biodiversity as the learning material, which limits the generalization of the findings. In addition, students' limited reading

ability may have affected their performance on the written tests. Future research may therefore examine further optimization of the model in other relevant science topics and with other variables.

## CONCLUSION

Based on the results of the study, it can be concluded that the guided inquiry learning model integrated with the *Jelajah Alam Sekitar* (JAS) approach was associated with significant improvements in both cognitive ability and communication skills among Grade VII students at SMPN 48 Tanjung Jabung Barat. The integration provided students with opportunities to explore their surrounding environment, conduct investigations, discuss and communicate their findings, and construct scientific understanding based on real and contextual experiences. Regarding cognitive ability, the paired-samples *t*-test showed a significant difference between the pretest and posttest scores ($p < 0.001$), with a large effect size of 1.03. The mean score increased from 46 to 64, and the increase was most pronounced at the evaluating and creating levels. Regarding communication skills, statistically significant pre–post improvements were observed in both oral and written communication ($p < 0.001$), with large effect sizes of 2.77 and 2.78, respectively. The mean score increased from 47 to 72 for oral communication and from 45 to 70 for written communication. Based on these findings, the guided inquiry model integrated with JAS can be recommended as an alternative instructional model for contextual science learning, especially in schools with strong environmental potential but limited laboratory facilities, and it can be used for other relevant science topics. Future studies are suggested to examine the effect of the model on other variables such as learning motivation or critical thinking skills at the same or different educational levels, and to investigate how the model can be further optimized to support cognitive ability and communication skills.

## REFERENCE


Alimah, S., & Marianti, A. (2016). Jelajah Alam Sekitar: pendekatan, strategi, model, dan metode pembelajaran biologi berkarakter untuk konservasi. Semarang: FMIPA UNNES.

Angio, S. T., Pitaloka, W. P., Sitopu, J. W., Naibaho, T., Rizqi, V., Saragi, D. P. (2025). Integrasi Keterampilan 4c (Critical Thinking, Creativity, Communication, Collaboration) Dalam Kurikulum Berdampak Untuk Pembelajaran Matematika. Jurnal Edu Research Indonesian Institute For Corporate Learning And Studies (IICLS), 6(2), 113–122. https://www.iicls.org/index.php/jer/article/view/1174/1047

Azhari, P., Azhari, M., & Munte, H. (2025). Penerapan Pendekatan Kontekstual Metode Tanya Jawab untuk Meningkatkan Prestasi Belajar IPA Siswa Kelas IV. Indonesian Journal of Multidisciplinary Scientific Studies, 3(2), 95–114. https://ojs.staira.ac.id/index.php/IJOMSS/article/download/443/172

Azizah, H., & Ismono. (2020). Implementation of Guided Inquiry Model in Reaction Rate Matter to Train Critical Thinking Skill. UNESA Journal of Chemical Education, 9(1), 172–178. https://ejournal.unesa.ac.id/index.php/journal-of-chemical-education/article/view/32063/29083

Berliana, R. P., & Habiby, W. N. (2024). Teacher Perseption and Implementation of a Democratic Classroom Atmosphere in Elementary School. Jurnal Cakrawela Pendas, 10(2), 318–333. https://doi.org/10.31949/jcp.v10i2.8915

Diezmann, C. M., & Watters, J.J. (1995). Off with the fairies or gifted? The problems of the exceptionally gifted child. Queensland University of Technology.

Elisa, D. T., Juliana, Bundel, Bumbun, M., Silvester, & Purnasari, P. D. (2023). Analisis karakteristik hakikat pembelajaran IPA di sekolah dasar. Jurnal Pedagogik Pendidikan Dasar, 10(1), 37–44. https://ejournal.upi.edu/index.php/ppd/index

Fauziah, F. M., & Novita, D. (2021). Training the analysis skills of student through the application of guided inquiry learning models on reaction rate materials. JPPS (Jurnal Penelitian Pendidikan Sains), 10(2), 1932–1948. https://doi.org/10.26740/jpps.v10n2.p1932–1948

Haryanti, A., & Suwarma, I. R. (2018). Profil Keterampilan Komunikasi Siswa SMP dalam Pembelajaran IPA Berbasis STEM. Jurnal Wahana Pendidikan Fisika, 3(1), 49–54. https://doi.org/10.17509/wapfi.v3i1.10940

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice Hall. http://www.learningfromexperience.com/images/uploads/process-of-experiential-learning.pdf

Mahrunnisya, D. (2023). Keterampilan Pembelajaran di Abad Ke-21. JUPENJI: Jurnal Pendidikan Jompa Indonesia, 2(1), 101–109. https://pls.fip.unesa.ac.id/post/ilmu-dan-keterampilan-4c-abad-21-dalam-dunia-pendidikan

Muhammad, A. S., Harso, A., & Laka, A. F. (2025). Pengaruh Model Pembelajaran Inkuiri Terbimbing dengan Strategi Scaffholding untuk Meningkatkan Pemahaman Konsep Fisika dan Kemampuan Komunikasi. JagoMIPA: Jurnal Pendidikan Matematika dan IPA, 5(4), 1201–1214. https://bimaberilmu.com/jurnal/index.php/jagomipa/article/view/2649/1009

Muhan, L. A., & Nasrudin, H. (2021). The Correlation Analysis Between Critical Thinking Skills And Learning Outcomes Through Implementation Of Guided Inquiry Learning Models. JPS: Jurnal Pendidikan Sains, 9(1), 33–42. https://jurnal.unimus.ac.id/index.php/JPKIMIA/article/view/6846/pdf

Poli, D. N., Marianus, Rampengan, A. M., Rende, J. C., Tumimomor, F. R., & Tiwow, V. A. (2025). Pengaruh Pendekatan Jelajah Alam Sekitar (JAS) pada materi gelombang transversal terhadap hasil belajar peserta didik. Charm Sains: jurnal Pendidikan Fisika, 6(3), 209–216.

Pusvita, L. Y., Nurhasanah, & Indraswati, D. (2023). Keterampilan Komunikasi Siswa Kelas V SDN 13 Ampenan dan Hubungannya Dengan Hasil Belajar Pada Mata Pelajaran PPKn. Jurnal Educatio, 9(4), 2005–2010.

Rahayu, A., & Putri, R. S. (2023). Guided Inquiry-Based Basic Chemistry Practicum Guidlines and Its Impact on Student's Science Process Skills and Critical Thinking Skills. Jurnal Pendidikan Kimia Indonesia, 7(1), 1–9. https://ejournal.undiksha.ac.id/index.php/JPK/article/view/46212/26764

Rizki, I.Y., Surur, M., & Noervadilah, I. (2021). Pengaruh Model Inkuiri Terbimbing (Guided Inkuiry) terhadap Keterampilan Komunikasi Siswa. Visipena, 12(1), 124–138. https://doi.org/10.46244/visipena.v12i1.1433

Santiani, dkk. (2024). Paradigma Pembelajaran Kurikulum Merdeka. Deli Serdang: PT. Mifandi Mandiri Digital. https://jurnal.mifandimandiri.com/index.php/penerbitmmd/article/download/61/55

Sari, K. F. M., Irawati, M.H., & Santoso, H. (2025). Korelasi antara Keterampilan Komunikasi dengan Hasil Belajar Kognitif Peserta Didik Kelas X. SENTRI: Jurnal Risel Ilmiah, 4(12), 4119–4129. https://ejournal.nusantaraglobal.ac.id/index.php/sentri/article/view/5080/4072

Setiawan, R. A., Cahyani, I., & Kurniawan, K. (2026). Analisis Kemampuan Berpikir Kritis Siswa pada Pembelajaran Teks Eklsplanasi Kelas IX di MTsN 1 Subang. Jurnal Onoma: Pendidikan, Bahasa, dan Sastra, 12(1), 308–316. https://e-journal.my.id/onoma/article/download/7829/4979/36967

Sugiyono. (2021). Metode Penelitian Kuantitatif, Kualitatif, & R&D. Bandung: Alfabeta.

Sujana, I. N. M. B., Suardana, I. N., & Pujani, N. M. (2026). Tren Penelitian Etnosains dalam Pembelajaran IPA: Tinjauan Literatur Global dan Lokal. Jurnal Pendidikan, Sains Dan Teknologi, 5(1), 136–143. https://doi.org/10.47233/jpst.v5i1.4471

Suri, O. P., & Alberida, H. (2026). Pengaruh Model Pembelajaran Inkuiri Terbimbing terhadap Keterampilan Komunikasi Peserta Didik pada Materi Sistem Pernapasan Kelas XI di SMAN 3 Solok. Jurnal Bioshell, 15(01), 1–10. https://doi.org/10.56013/bio.v15i1.4847

Suryati, Adnyana, P. B., Ariawan, I. P. W., & Wesnawa, I. G. A. (2024). Integrating Constructivist and Inquiry Based Learning in Chemistry Education: A Systematic Review. Hydrogen: Jurnal Kependidikan Kimia, 12(5), 1166–1188. https://doi.org/10.33394/hjkk.v12i5.13571

Tanjung, I. F., Hartono, A., Siagian, N. H., Amanda, N. B., Marwani, A., Simanngklait, A. Z., & Hartady, A. (2023). Pengaruh inkuiri terbimbing terintegrasi JAS (Jelajah Alam Sekitar) pada materi keanekaragaman hayati untuk meningkatkan kemampuan kognitif siswa. INNOVATIVE: Journal of Social Science Research, 3(2), 11503–11517.

Toifur, A., & Kurniawan, W. D. (2022). Efektivitas metode pembelajaran teams games tournament (TGT) terhadap kemampuan komunikasi siswa. Jurnal Pendidikan Teknik Mesin, 11(2), 148.

Ulvah, R., & Ridha, N. (2021). Pengaruh metode jelajah alam sekitar (JAS) berbasis inkuiri terhadap hasil belajar peserta didik materi Spermatophyta kelas VII MTs Darul Amin Palangka Raya. Jurnal JPDP, 1(1).

Zidny, R., & Eilks, I. (2022). Learning About Pesticide Use Adapted from Ethnoscience a Contribution to Green and Sustainable Chemistry Education. Research in Science Education, 52(4), 1–22. https://doi.org/10.3390/educsci12040227