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Field-Based Learning Using a Guided Inquiry Approach to Support Elementary School Students' Understanding of Cardinal Directions

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Abstract:
Cardinal directions are often taught in elementary school through explanations and illustrations, so children have little direct experience with spatial orientation. This qualitative case study examines how field-based guided inquiry learning helps third-grade students understand cardinal directions in the Natural and Social Sciences (IPAS) course under the Merdeka Curriculum, as well as how differentiated support accommodates students with diverse abilities. This research was conducted at SDI Al-Hasni, Sumenep, during the 2025–2026 school year, involving 21 students (10 regular students and 11 students with low learning abilities), along with the teacher and the principal. Data collected through observation notes, interviews, documentation, worksheets, and reflections were analyzed through the stages of data reduction, presentation, and drawing conclusions, and were subsequently validated using triangulation. In a single learning session lasting 2 × 35 minutes, students observed the position of the sun in the schoolyard, then matched the directions they identified with a compass diagram and a map.The results of the observations and reflections indicate that direct observation provides concrete references for students, while step-by-step guidance, visual aids, and repeated instructions enable students with low academic abilities to participate according to their capacities. This study contributes a series of field-based inquiry activities that link the observation of the sun's position to map orientation. Given that this study involved only one session without any testing, these findings are descriptive and preliminary.

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Introduction (مقدمة)

Natural and Social Sciences (Ilmu Pengetahuan Alam dan Sosial, IPAS) joins science and social studies in the elementary curriculum. It is expected to develop critical thinking and environmental understanding, and it is increasingly seen as a setting for early spatial reasoning, which supports 21st-century skills (Lee, 2023). Under the Merdeka Curriculum, students are meant to build knowledge by observing, exploring, and solving problems drawn from everyday life (Irma Inesia Sri Utami & Anggraeni, 2025). (Amalia et al., 2025) add that the curriculum favors contextual, student-centered processes because these help learners reach higher-order thinking. This stance echoes Piaget's view that children construct understanding through active interaction with their surroundings (Khoiruzzadi & Prasetya, 2021). IPAS lessons should therefore do more than transmit concepts; they should prepare students to use those concepts in real situations.

Understanding cardinal directions is one of the competencies in which these aims meet. Knowing which way one faces and how places relate to one another is a basic spatial skill used every day (Hardiansyah et al., 2026). Spatial thinking is also regarded as a support for STEM learning and problem solving (Newcombe, 2017), and (Glorya Mona Taunino, 2026) note that grasping spatial orientation helps children make sense of social and environmental phenomena in concrete terms. For this reason, cardinal directions are best taught in ways that let children observe and experience orientation for themselves, so that school knowledge becomes connected with the world around them.

Practice, however, often lags behind the curriculum's intentions. Elementary IPAS lessons are still frequently dominated by lectures and rote learning, which gives students little reason to explore knowledge on their own (Fadlurrahman et al., 2026). Abstract content is hard to grasp when it is taught only in theory (Viratama et al., 2025), and spatial orientation and cardinal directions are typical examples. Students then tend to memorize ideas instead of seeing how they apply in daily life (Virginia Saragih et al., 2023), and their critical thinking and spatial skills receive little support (Juwita.et.al, 2026). Contextual learning under the Merdeka Curriculum has likewise not been fully realized (Rizki Ayuanita Putri et al, 2026).

Preliminary observations and interviews with several third-grade students at SDI Al-Hasni in Sumenep Regency pointed to the same pattern. The lesson on cardinal directions within the topic "Layout Map of Where I Live" (Denah Tempat Tinggalku) was taught through verbal explanation and classroom pictures, without any practice on the school grounds. The teacher relied mostly on lectures and written assignments, so students had few concrete experiences to draw on. Some students still found it hard to name compass directions or to describe the spatial relations around them, and their engagement during lessons was low. Nothing in the lessons invited them to observe, explore, or inquire, which are the defining features of guided inquiry.

The gap between intention and practice is therefore clear. For Phase B, the curriculum expects students to use process skills such as observing, investigating, analyzing, evaluating, and communicating results (Kemdikdasmen, 2025). Yet lessons remain centered on lectures and the transfer of information, even though science learning calls for deeper exploration (Hidayatulloh & Anshori, 2024). Direct observation of the surroundings helps students grasp spatial orientation concretely(Aulya.et.al, 2025), and learning built on firsthand experience promotes deeper and more meaningful understanding (Rahma Dewi et al., 2025). Therefore, what is needed is an approach that combines inquiry, direct experience, and the school environment as a learning resource.

Guided inquiry offers one way to close this gap, and it fits the constructivist orientation of IPAS in the Merdeka Curriculum (Zidane et al., 2025). Students discover knowledge by observing, asking questions, investigating, and drawing conclusions, while the teacher acts as a facilitator. Inquiry-based learning is also counted among the student-centered methods that strengthen cognitive skills and critical thinking in curricula designed to meet 21st-century demands (Fitrianto & Hidayat, 2024).The model suits elementary students, who still need

scaffolding (Ramadhan, 2021), and a meta-analysis of 72 studies concluded that adequate guidance is what makes inquiry effective (Lazonder, Ard W.; Harmsen, 2016). Inquiry typically moves through recognizable phases, from orientation and investigation to conclusion and discussion (Pedaste et al., 2015).

A systematic literature review reported that guided inquiry fosters engagement and critical thinking because the investigation is structured (Indahyani et al., 2025), and the model has been used to improve learning outcomes in elementary schools (Shandra & Movitaria, 2022). For cardinal directions in particular, practice-based inquiry lets students understand orientation through observation of their surroundings (Adityatama.et.al, 2025) (Raden Adinda Zalfa et al., 2023). Besides a compass (Wahyuningrum, 2015), the sun is a natural instrument from which students can read directions, and using the natural environment as a learning resource gives them real experiences that keep them involved (Nimas Anindita & Monika Sidabutar, 2020).

Earlier studies point in the same direction. An inquiry learning model improved learning outcomes in grade V natural and social science lessons (Rahmawati, Surahman, et al., 2025). Outdoor learning has been used to cultivate scientific attitudes (Rahmawati, Ristiana, et al., 2025) and science skills (La Sisi & Chairan Zibar L. Parisu, 2025), and its use in elementary science teaching has been reviewed systematically (Putri et al., 2025). Differentiated guided inquiry can make science lessons more inclusive(Khoirunnisa.Et.al, 2025), learning organized around the local environment has strengthened problem solving (Sukmawati.Et.al, 2023), and field-based learning raises engagement (Afianti.Et.al, 2025). Inquiry has also been used to build science inquiry skills in early childhood (Munawar et al., 2025), to sharpen observation and problem solving when it rests on direct experience (Khilda Dalilah et al., 2025), and to tie concepts to real conditions when the environment serves as the learning resource (Asfiana et al., 2025).

Compared to those studies, this research differs in three ways. First, guided inquiry and outdoor learning are mostly assessed through learning outcomes, attitudes, or general science skills (Rahmawati, Ristiana, et al., 2025),(Rahmawati, Surahman, et al., 2025), (Shandra & Movitaria, 2022), whereas this study examines how students progress from observing the sun to orienting a map—a task involving spatial reasoning. Second, research on spatial abilities in elementary school largely employs digital media, project-based learning, or map analysis (Aulya.Et.al, 2025), (Hardiansyah et al., 2026), (Glorya Mona Taunino, 2026), here, the position of the sun serves as a natural reference point for direction. Third, (Khoirunnisa.Et.al, 2025) combined guided inquiry with inclusive science learning, but did not include field observations for spatial orientation. This study therefore combines field-based learning, guided inquiry, and differentiated support in a single IPAS lesson on compass directions. Orienting a map requires students to translate the directions they experience in real space into a drawing, and this lesson is designed to facilitate that process.

This study addresses this gap by combining curriculum analysis, the development of guided inquiry modules, and field activities centered on the sun's position into a single contextual learning process aligned with the Merdeka Curriculum. This study addresses three questions: (1) how does a field-based lesson on compass directions using guided inquiry take place in third-grade IPAS classes; (2) how do students respond—specifically, in terms of their engagement and ability to connect the sun's position with compass directions and maps; and (3) how is differentiated support implemented for students with low learning abilities, and what challenges arise.

Method (منهج)

Research Design

This study used a qualitative case study design. The approach was chosen because the focus was an in-depth account of field-based guided inquiry as it took place in an ordinary

elementary school (Creswell, J. W., & Creswell, J. D 2018). A case study allows researchers to follow activities, interactions, and learning experiences in their natural setting (K.Yin, 2018). The work began with an analysis of the IPAS curriculum and the teacher's instructional materials, after which a teaching module based on guided inquiry and contextual learning was developed. Contextual learning was adopted because it helps students link lesson content to experiences in their surroundings, which makes learning more meaningful (Dini Pepilina et al., 2025). The case was bounded by one class, one school, and one lesson session, which allowed close observation of how the lesson unfolded.

Participants and Setting

This study was conducted at SDI Al-Hasni, an elementary school in Sumenep, Indonesia, during the 2025/2026 academic year. Participants were selected purposively. The principal was included because the principal oversees how the Merdeka Curriculum is implemented at the school, the third-grade IPAS teacher was included because the teacher taught the class and used the existing instructional materials; and all 21 students in the class took part, because the study followed one intact class. Ten of them were regular students and 11 had low learning ability (slow learners), as identified from the classroom teacher account in an interview. Two students were interviewed, one regular student and one student with low ability. The lesson took place on 29 April 2026 at 09:00.

Data Collection

Four instruments were used in this study. First, observation: the first author and co-author recorded student activities in field notes during the sessions, both inside and outside the classroom. The focus of the observation included student attention, questions asked, participation in discussions, and the ability to follow instructions, using the teacher note format and performance criteria in the module as observation guidelines. Second, interviews: semi-structured interviews were conducted with the principal, teachers, and two students (one regular student and one student with low academic ability). The interviews covered topics regarding current teaching practices, the use of the Kurikulum Merdeka module, challenges in implementing the curriculum, and students' experiences during the learning process. Responses from the interview were quoted directly and translated from Indonesian into English for reporting purposes.

Third, documentation: this includes teaching modules along with their formative assessment rubrics, student worksheets (LKPD) completed by the students, and photographs taken during the learning activities. Fourth, reflection: at the end of the lesson, students answer two reflective questions about their feelings and what they have learned. Quotes from student reflections are coded as R (for regular students) or L (for students with low ability), followed by a number; for example, R1 refers to one of the regular students, while L1 refers to one of the students with low ability. The use of these various techniques aims to deepen the data and strengthen validity through triangulation.

Learning Activity

The lesson followed a teaching module prepared by the first author for Phase B (Grade III) on the topic "Layout Map of Where I Live" (Denah Tempat Tinggalku). It was delivered in one session of 2 × 35 minutes, consisting of a 10-minute opening, a 50-minute core activity, and a 10-minute closing. The module combined guided inquiry with differentiation of process, content, and scaffolding, a contextual teaching and learning strategy, and the deep learning principles of mindful, meaningful, and joyful learning (Rahma Dewi et al., 2025).

Differentiation was applied in this learning activity because 11 students with low learning abilities were expected to require concrete materials and more intensive guidance to understand the concepts of direction and maps, while the other 10 students could grasp these concepts more independently. All students participated in the same field activity, thus, differentiation was implemented through process, content, and scaffolding, rather than through different

assignments (Table 1). This design aligns with the view that learning is supported by guidance that is within the students' capabilities (Khoiruzzadi & Prasetya, 2021), as well as the principle that teachers need to adapt strategies, processes, and learning experiences based on students' readiness (Fauziyah et al., 2025).

The core activity follows five stages of inquiry: problem orientation, student organization, investigation guidance, development and presentation of results, and analysis and evaluation. During the field activity, students went to the school grounds and observed the position of the sun to determine the cardinal directions. After returning to the classroom, they matched those directions with the compass diagram and simple map printed on the worksheet. Field activities were chosen because direct observation of the surrounding environment makes spatial concepts and orientation more concrete (Aulya.Et.al, 2025).

Table 1. Differentiation of process, content, and scaffolding in the module

Aspect	Regular students (n = 10)	Students with low ability (n = 11)
Process	Observed the sun and discovered the directions largely on their own, guided by the teacher's questions	Same field activity, with direct guidance, step-by-step directions, and simpler explanations
Content	Concepts of direction and layout map, linked to daily life	The four basic directions (north, south, east, west) and simple positions, through concrete examples
Scaffolding	Teacher feedback on the accuracy of concepts and analysis	Picture of the cardinal directions, simple layout map, teacher accompaniment, repeated instructions, positive reinforcement
Assessment focus	Determine directions from the sun and explain the link to the layout map; complete the worksheet fully	Show or name the basic directions with help; complete a simplified worksheet with help

Source: Researchers' teaching module (2026)

Data Analysis and Trustworthiness

The data were analyzed with the interactive model of (Johnny Saldaña, Matthew B. Miles, 2020) in three steps. In data reduction, the observation notes, interview transcripts, reflections, and worksheet answers were read repeatedly, coded, and grouped under three themes: engagement, understanding of directions, and differentiated support. In data display, the findings were arranged in narrative form and in tables. In conclusion drawing, each conclusion was checked against the raw data. Credibility was supported by methodological triangulation, which compared what the observation notes recorded with what students wrote on worksheets and said in reflections and interviews, and by source triangulation, which compared the accounts of the principal, the teacher, and the students (Sugiyono, 2022).

Result (نتائج)

Curriculum Analysis and Redesign of the Teaching Module

The analysis of the IPAS curriculum and teaching materials showed that SDI Al-Hasni has adopted the Merdeka Curriculum. On paper, the modules lean toward differentiated instruction and contain learning outcomes, objectives, assessments, and exploratory activities that match the curriculum's emphasis on meaningful, flexible, and contextual learning. Observation of actual lessons, however, showed that the in-depth learning described in the modules was not yet visible. Teachers mostly lectured and used brief question-and-answer exchanges, and student activity stayed limited. In interviews, the teacher showed a grasp of the basics of the Merdeka

Curriculum, particularly differentiated instruction and 21st-century competencies, but reported difficulty in choosing strategies that serve students with different needs. Limited time, classroom management problems, and the habit of conventional methods kept the lessons designed in the modules from being carried out fully.

> "Yes, differentiated instruction means we divide students into groups, each with students of low, moderate, and high understanding. But because Al-Hasni is a private school, our teaching materials are still not very complete," said the third-grade IPAS teacher.
>
> The principal confirmed that some teachers still use conventional methods.
>
> "Our teaching methods still partly follow the way we were taught ourselves, and we have not fully adopted the current curriculum," he explained.

These findings agree with reports that implementing the Merdeka Curriculum in elementary schools still meets obstacles in classroom practice, especially in applying differentiation and deep learning consistently (Rizki Ayuanita Putri, 2026). Classroom observation showed that lessons consisted mostly of listening to the teacher and completing simple textbook tasks. Students did take part in group discussions, but the activities left little room for exploration, investigation, or independent problem-solving. Lessons thus stayed at the level of basic activities and did little to build critical thinking, even though the curriculum calls for active, reflective, and contextual learning.

An interview with a third-grade student confirmed that IPAS learning relies more on teacher explanations than on hands-on activities or observations within the school environment. The student also stated that he understands the material better through observation and hands-on practice than by reading textbooks or listening to explanations.

> "Our science teacher usually asks us to write and gives us homework, but the lessons are rarely fun, and we almost never do hands-on activities," and "Yes, the teacher usually just teaches in the classroom and only asks us to write," said the third-grade student at SDI Al-Hasni.

The mismatch between this conventional teaching and what the curriculum envisions left students less active in exploring concepts and less engaged overall. On the basis of this analysis, the researchers reconstructed the teaching module to bring guided inquiry, contextual learning, and fieldwork into IPAS lessons through hands-on field activity. Activities were adapted to the students' learning needs, to the nature of the topic, and to the school's surroundings as a learning resource. Students were meant to take part in observing, questioning, investigating, and concluding rather than only to receive information. The field activity was a solar observation on the school grounds, intended to make compass directions and spatial orientation tangible.

Implementation of Field-Based Guided Inquiry

After the curriculum analysis and the revision of the module, the IPAS lesson was carried out as a guided inquiry on the school grounds and adjusted for third-grade students. The lesson used the sun's position as a natural learning medium for cardinal directions and spatial orientation. Experience-based learning can make abstract concepts more concrete and meaningful (Khilda Dalilah et al., 2025), and learning through the environment gives students opportunities to build knowledge through observation, investigation, and reflection (Asfiana et al., 2025).Table 2. outlines the stages of the lesson.

Table 2. Stages of field-based guided inquiry in the IPAS lesson

Inquiry stage	Student activity	Learning indicator
1. Problem orientation	Responding to the opening questions	Shows curiosity about cardinal directions
2. Organizing students	Joining small groups and receiving the worksheet	Understands the task instructions

3. Guided investigation	Observing the sun on the school grounds; matching directions to the compass picture and layout map	Determines cardinal directions from the sun's position
4. Developing and presenting results	Completing the worksheet and retelling the findings	Places locations on the layout map
5. Analysis and evaluation	Drawing conclusions and reflecting with the teacher	Explains what was learned and how it felt

Source: Researchers' teaching module (2026)

In the first stage problem orientation students are presented with questions about how a person can determine direction without using a compass or a digital app, and these questions are linked to the students' everyday experiences to make them feel relevant. One of the questions is:

> "How do we figure out the direction of a place around us? If we don't know the direction, and we don't have a compass or a digital app like Maps, what can we use to figure it out?"

These questions encouraged the students to think and reflect on their previous experiences. Although only one student attempted to answer, most of the students began to show curiosity about the cardinal directions. In the second stage, the class was divided into small groups, and each group received a guided inquiry-based student worksheet (LKPD), the instructions for which were explained by the researcher. In the third stage the guided investigation students went out to the schoolyard and, under guidance, observed the position of the sun to identify east and west, and relate them to north and south. At this stage, they were guided step by step so they could understand how the sun's position relates to the spatial layout of their surroundings. Students appeared more active outdoors than they did in the classroom because they were directly involved in the observation activity (Figure 1).



Figure 1. Students making direct observations on the school grounds

Back in the classroom, the students examined the picture of a compass and the layout map on their worksheets. With guidance, they matched the directions they had identified with the locations of various places on the layout map (Figure 2). In the fourth step, they completed the worksheet and presented their results to the class using simple sentences. Students who were struggling were given step by-step guidance and assistance, particularly those who were having difficulty. Because this lesson employs a differentiated instruction approach, 10 regular students and 11 students with low academic ability were able to participate according to their respective ability levels.

regular students had more room to discover concepts independently, while students with low academic ability received direct guidance, visual aids, repeated instructions, and concrete examples. Observation results showed that group discussions and the use of field-based worksheets were effective in increasing student engagement. Most students asked questions, discussed, and shared their findings; they also began to make simple connections between the sun's position and the cardinal directions. In addition to conceptual understanding, this guided inquiry activity also supported their communication and collaboration skills.



Figure 2. Students working on their worksheets

The field notes record how students participation developed across the stages. In problem orientation, only one student answered the opening question, saying, "Yes, if you don't know the direction, you can just ask someone," while the other students were unsure how to answer. During the field investigation, the notes and Figure 1 show students working in small groups on the school grounds, with one student pointing out a direction while the others looked on and wrote on their worksheets.

At the worksheet stage, two completed worksheets on the eight compass directions (Figure 3) show different patterns. The regular student placed all eight directions correctly, writing each one as a full word. The student with low ability labeled the four main directions correctly (north, east, south, and west) but swapped the intermediate directions in pairs, writing southeast where northeast belongs and northwest where southwest belongs (and the reverse in the other two boxes), and crossed out an earlier entry at the top before writing "north". For the student with low ability, the main directions, which students had observed directly, were secure, whereas the intermediate directions, which cannot be read directly from the sun's position, were not; for the regular student, both were secure. The examples are illustrative and should not be generalized.

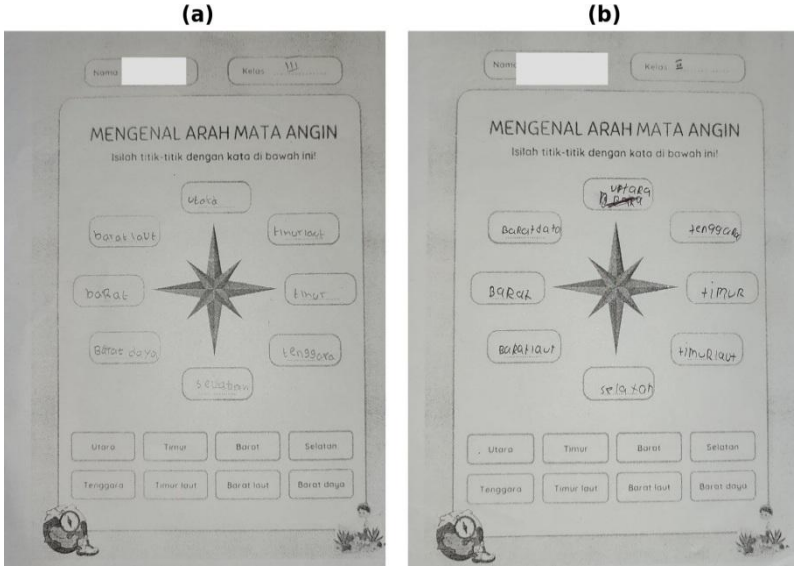

Figure 3. Completed worksheets on the eight compass directions: (a) a regular student and (b) a student with low ability

The notes also show differences between the two groups. The regular students worked largely on their own and explained their answers to group members, whereas the students with low ability relied on the teacher's guidance, the picture of the cardinal directions, and repeated instructions. With this support, they took part in the observation and in the map task. Because

this study is qualitative, these differences are reported as descriptions of what was observed, not as measured scores.

The fifth stage, analysis and evaluation, closed the lesson (Figure 4). The students jointly drew conclusions about compass directions and the use of layout maps, and they answered two reflective questions about their feelings and what they had learned. Based on these reflections, the students felt that compass directions were easier to understand when they learned through direct observation outside the classroom. Some said that the lesson was more enjoyable because they could learn while observing their surroundings.

In their closing reflections, the students gave similar answers to both reflective questions. For the first question about their feelings, regular students replied, "I prefer learning through hands-on practice," while student Students with low ability replied, "Learning outside the classroom is fun." For the second question about what they had learned, student regular students answered, "Today I have a better understanding of and have mastered determining compass directions using the sun's position compared to just learning in the classroom," and student Students with low ability answered, "The material I understood was about determining directions using the sun." Student Students with low ability also added, "Learning through hands-on practice is fun and easy to understand…".

Meanwhile, in interviews, students with average academic ability stated that learning about compass directions felt easier and more enjoyable through hands-on practice. Students with lower academic ability also showed great enthusiasm for learning through hands-on practice, although they still required guidance. Even students with weaker academic abilities participated more actively because this learning approach involved the use of concrete materials and collaboration. These observations indicate that field-based guided inquiry supports students' understanding of compass directions and spatial orientation and has the potential to increase their motivation and engagement in the IPAS subject.



Figure 4. The students reflected together on the activities that had been carried out

Discussion (مناقشة)

The findings suggest that direct observation gave students a concrete reference for each direction before they met the more abstract representation on the layout map. This fits Piaget's view that children of this age reason best from concrete experience, and the Vygotskian idea that guidance within the learner's reach carries students from what they can observe to what they can represent (Khoiruzzadi & Prasetya, 2021). In spatial terms, the lesson asked students to translate directions experienced in real space into a drawn map, a translation that classroom explanation alone gave little chance to practice, as the preliminary observations suggested.

The guidance supplied at each stage is consistent with evidence that inquiry works best when students are adequately supported (Lazonder, Ard W.; Harmsen, 2016), and the sequence of orientation, investigation, conclusion, and discussion mirrors the inquiry phases described by (Pedaste et al., 2015). Compared with earlier work, the findings are consistent with studies linking guided inquiry to spatial thinking (Adityatama.et.al, 2025) and to spatial literacy in elementary

schools (Raden Adinda Zalfa et al., 2023). They differ from studies that relied on digital media (Hardiansyah et al., 2026) or map analysis (Glorya Mona Taunino, 2026) in that the reference for direction was the sun itself, which needs no equipment but depends on conditions discussed below. They also complement (Wahyuningrum, 2015) study of first-graders' ability to determine directions by describing one way of teaching that skill.

Engagement appeared to rise during the field-based lesson, as shown by greater participation in observation, discussion, and the presentation of findings. Inquiry gives students room to look for and process information themselves, so lessons are no longer entirely teacher-centered. This fits Hmelo-Silver's position as cited in (Ulya Ainur Rofi'ah & Tining, 2025) that inquiry develops critical thinking through active investigation and problem solving. Group discussion further indicates that inquiry affects more than cognition: communication and collaboration also developed, and these are skills that 21st-century education aims to cultivate from the early grades (Hafiz et al., 2024).

Differentiation is primarily implemented through scaffolding rather than through distinct tasks; both groups engage in the same fieldwork activities, ensuring that students with lower proficiency are not excluded from the inquiry process itself. The use of concrete materials, visual aids such as compass rose diagrams, and repetitive instruction provides these students with the necessary access. This approach aligns with the perspective that differentiation involves adjusting strategies and learning experiences based on student readiness (Fauziyah et al., 2025), and it is consistent with research on inclusive guided inquiry in primary science education (Khoirunnisa.Et.al, 2025).

It should be noted that individual support is provided only partially rather than comprehensively, which limits the time available for one-on-one guidance. As learning outcome data for individual students are unavailable, the effectiveness of this support cannot yet be definitively established; therefore, these conclusions remain preliminary. Within the context of the "Kurikulum Merdeka" (Independent Curriculum), the integration of guided inquiry with differentiation is highly relevant, as it fosters a flexible, participatory, and student-centered approach to learning.Taken together, the results suggest that the school environment can be a valuable resource for IPAS. Drawing on the environment in this way is consistent with the curriculum's call for contextual lessons and authentic experiences (Asfiana et al., 2025).

Using the sun as a learning medium also has practical limits. The first concerns accuracy. The sun rises due east and sets due west only near the equinoxes. At the latitude of Sumenep (about 7° S), the sunrise and sunset points shift by roughly 24° north or south of the east–west line over the year, so the directions students found were approximate.

Close to midday, the high tropical sun makes it hard to fix north and south accurately, so the activity works best in the early morning or late afternoon. The lesson took place at 09:00 on 29 April 2026, when the sun was already fairly high, roughly 45–50° above the horizon, and about 30° north of due east. At this latitude and date, the sun rises about 15° north of due east, so the sun at the time of the lesson was a rougher guide to east than it would have been shortly after sunrise. Because directions were fixed from the sun alone, without checking against a compass, the results should be treated as approximate. A second limitation is time: moving 21 students from the classroom to the school yard, forming groups, and completing the worksheet within 70 minutes left little room for repeated observation, while the sun kept rising during the activity. Weather such as thick cloud or rain could also cancel the activity altogether.

The third concerns sustainability: the activity depends on a suitable time of day, weather, and a teacher able to manage outdoor groups, and the Results show that time and classroom management already limited the school's existing lessons. Schools could address these limits by scheduling the lesson in the morning, preparing a backup activity for cloudy days (for example,

a compass rose drawn on the floor), marking fixed directions on the school grounds, and placing the activity in the IPAS term plan. These are suggestions for further studies to test.

Several limitations should be noted. The study covered one 70-minute session in a single class and relied on qualitative evidence, so its findings are preliminary and capture immediate responses only; they say nothing about retention or later transfer. Because the evidence consists of observation notes, worksheet answers, and students' reflections, statements about gains in understanding describe what was observed and cannot be treated as measured effects. The ability grouping relied on the classroom teacher's account rather than on a test, and the researchers also led the lesson, which may have shaped what they observed. Future studies could run several sessions, add test-based measures and a comparison class, and extend the approach to other IPAS topics.

Conclusion (خاتمة)

A single field-based guided inquiry session on cardinal directions showed how contextual learning can narrow the gap between what the Merdeka Curriculum asks for and what happens in elementary classrooms. A lesson format that had been dominated by lectures and theory became more active through observation, investigation, group discussion, and reflection grounded in the school environment. Students did more than receive information: with guidance, they observed, questioned, investigated, and drew conclusions, as inquiry learning intends.

Observing the sun's position gave students a natural tool for understanding cardinal directions and spatial orientation more concretely, and the lesson appeared to raise engagement, communication, and collaboration. Differentiated support let students of varied ability take part according to their needs, which made the lesson more inclusive and participatory. The school surroundings, as part of God's creation, can serve as a valuable resource for IPAS. The sun, however, gives only approximate directions: at the latitude of Sumenep its rising and setting points shift by up to roughly 24° north or south of due east and west over the year, and the activity also depends on the time of day, the weather, and a teacher able to manage outdoor groups within limited lesson time. Because the evidence is qualitative and drawn from one session in one class, further work should test the approach over several sessions with measured learning outcomes.

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