



Geo-Exploration Outdoors: Utilizing Green Open Spaces for Learning Geography Concepts

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Abstract: This study aims to analyze the effectiveness of the use of Green Open Space (RTH) as a contextual learning medium to improve students' understanding of geographic concepts at MAN 3 Kampar. The research employed a quasi-experimental design with a pretest-posttest one-group approach involving 32 tenth-grade students selected through purposive sampling. Learning activities integrated digital tools such as Google Earth, Google Maps, and Augmented Reality (AR) during three outdoor sessions conducted in August 2025. Data were collected using multiple-choice cognitive tests, observation sheets for the skills and affective domains, and student reflection questionnaires. Quantitative data were analyzed using descriptive statistics and N-Gain tests, while qualitative data from reflections supported the interpretation of students' learning engagement. The results showed a mean cognitive score improvement from 71.12 to 88.27 (N-Gain = 0.59, moderate) and an increase in the affective-skill score from 65.84 to 78.23. These findings indicate that RTH-based digital exploration effectively enhances geospatial literacy, critical thinking, and environmental awareness. Despite challenges such as limited equipment and weather variability, strategic preparation ensured smooth implementation. The study concludes that integrating outdoor and digital learning supports the Merdeka Curriculum's goals of contextual and meaningful education in madrasah settings.

Keywords: Contextual learning; Digital exploration; Geography education; Green open space; MAN 3 Kampar

Introduction

The use of outdoor environments as meaningful learning spaces has increasingly been recognized as an essential pedagogical approach to help students construct deeper geographical understanding. Geography as a discipline is inherently grounded in spatial observations, relationships between humans and their environment, and real-world contexts; therefore, placing learners outside the confines of the classroom provides an authentic setting that strengthens conceptual geography learning. Green Open Spaces (GOS), such as public parks, botanical gardens, riverbanks, and urban ecological areas, offer concrete

contexts where students can visualize spatial distributions, explore environmental patterns, and engage in active observation through direct interaction with the surroundings. Learning in such spaces shifts geography instruction from passive, text-based discussions to experiential learning where knowledge is anchored in lived experience, improving cognitive, affective, and psychomotor outcomes.

Research on outdoor learning has demonstrated that access to real environmental spaces elevates students' motivation, curiosity, and scientific literacy. Studies show that learning activities implemented outdoors foster stronger engagement and intrinsic motivation among students because the learning

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environment feels relevant and authentic rather than abstract (Farhana, 2021). Students experience enhanced reasoning when they are tasked with locating natural elements, mapping landscapes, identifying species distribution, or examining physical environmental processes occurring in real time. This connection between direct observation and conceptual development contributes to stronger knowledge retention, especially in topics such as landforms, vegetation patterns, urban morphology, and environmentally sustainable planning.

More recently, approaches that integrate multimedia and inquiry-oriented methods have also been incorporated into outdoor-based learning. In science-oriented fields, problem-based approaches using interactive multimedia have resulted in improved outcomes due to higher student involvement in constructing meaning from observed phenomena rather than the memorization facts superficially (Adhana & Andriani, 2024). Similar alignment exists in outdoor geography instruction in which students are guided to form questions about spatial distribution, ecological variation, or features of urban environments, followed by observation, data collection, and reflection. These experiential models align well with inquiry-based strategies that require students to interpret real-world conditions through measurable indicators or spatial relationships.

The concept of geo-exploration outdoors aligns with current trends in the integration of spatial thinking in education. Spatial reasoning involves the ability to recognize and interpret distances, directions, patterns, and geographic relationships, which strongly benefits from outdoor observation (Hickman, 2022). Such pedagogical efforts also align with the growing demand to develop geospatial competencies, a skill set that has been shown to support scientific literacy, technological readiness, and interdisciplinary thinking (Jaeger, 2024). When students learn geography outdoors, they naturally apply fundamental geospatial principles such as spatial orientation, topographic reading, area estimation, ecological systems analysis, and socio-environmental interaction.

Another important dimension connected to outdoor geography learning is its relationship to student independence and critical thinking. Learning activities placed in open spaces compel students to make decisions regarding route selection, location identification, or mapping representation. Research examining metacognitive-based instructional tools indicates that structured learning content supports student independence and critical reasoning skills because students must actively self-regulate the learning process (Jumanto et al., 2024). Similarly, the use of guided inquiry strategies in outdoor environments

strengthens students' ability to plan observations, justify interpretations, and evaluate the validity of collected information (Hasan, 2024). Geography learning is therefore transformed into an exploratory practice rather than a process of memorization.

The availability of GOS provides additional value beyond cognitive outcomes. Social and emotional learning emerges when students collaborate in analyzing environmental conditions, conducting surveys, or evaluating sustainability practices in their immediate surroundings. Collaborative experiences are important, especially for younger learners whose curiosity thrives in dynamic learning environments. Collaborative learning frameworks in outdoor conditions also demonstrate similarities to digital collaborative environments studied in geography education, where active interaction supports deeper conceptualization and problem-solving abilities (Jochecová et al., 2022). Outdoor learning thus enhances both academic rigor and interpersonal development.

Moreover, the presence of ecological characteristics in green spaces enables the integration of interdisciplinary content. Topics in environmental science, population distribution, conservation, urban planning, hydrology, and climate adaptation can be directly connected to the learning trajectory. Evidence indicates that engagement with environmental systems reinforces students' awareness of sustainability, which increasingly forms a central competency promoted in 21st-century education (Sepriyanti et al., 2022). Outdoor settings provide visibility of environmental degradation, waste management systems, biodiversity patterns, or water circulation, allowing students to critically connect natural and human-induced processes.

Technological integration in outdoor learning environments represents another contemporary dimension. Mobile-based platforms, augmented reality, location-based fieldwork systems, and GIS-based field mapping allow students to document observations, process geospatial data, and reflect on field phenomena through interactive visualization. Mobile virtual field trip applications have been shown to enhance complex spatial intelligence because students actively manipulate geographic layers and information (Salsabila et al., 2022). This technological mediation not only improves engagement but also equips students with relevant digital competencies that can be transferred to higher academic and professional domains.

Instructional innovations also demonstrate significant benefits when structured learning materials are incorporated. Outdoor learning supported by teaching aids, printed modules, experimental kits, diagnostic instruments, or performance assessment rubrics improves learning clarity and standardization. The development of structured teaching materials has

been proven to enhance mastery of scientific concepts, particularly when physical interaction occurs between students and learning media (Fauzi et al., 2024). When such tools are used outdoors, students are encouraged to engage with environmental evidence while still aligning their observations with curriculum-based criteria.

Developing independence and sustained curiosity is particularly critical within geography because geographical thinking requires continuous questioning of spatial phenomena. The implementation of instrument-based assessment has improved systematic evaluation of learning outcomes, especially when measuring aspects related to student independence, responsibility, or reflective capabilities (Sa'adah & Ikhsan, 2023). This aligns with the goals of geo-exploration outdoors because students must actively investigate rather than merely receive information.

Outdoor learning in geography also has implications for improving logical reasoning and problem-solving skills. Logical thinking is stimulated through measurement of environmental attributes, identification of relationships between physical structures, and synthesis of collected data into meaningful interpretations. Learning approaches that incorporate logic-oriented design have proven to elevate student analytical competencies (Setiawaty et al., 2022), indicating that outdoor spatial investigations provide fertile grounds for reasoning development.

Furthermore, scientific motivation increases when learning involves authentic interaction with nature rather than artificial simulation. Studies in technology-supported learning show that direct observation, even when mixed with simulation media, results in increased motivation and willingness to engage with abstract scientific concepts (Susilawati et al., 2022). Therefore, green open space serves as an immersive and emotionally stimulating pedagogical arena.

Ultimately, outdoor exploration activities in green spaces support the development of multiple abilities relevant to geography students: spatial orientation, environmental interpretation, collaborative communication, problem-solving, conceptual integration, and sustainability awareness. Geo-exploration outdoors brings learning closer to lived reality, bridging classroom knowledge with tangible environmental evidence. This orientation not only promotes academic outcome improvement but also fosters lifelong learning attitudes related to geography. Considering the contemporary need for sustainable environmental literacy and digital-based geospatial competency, optimizing learning in green open spaces becomes a strategic approach for improving the quality of geography education.

Method

The method employed in this study adopts a qualitative descriptive approach supported by field-based observation, structured task activities, and reflective analysis. This method is grounded in the principle that geography learning must be contextual, experiential, and reflective in order to deepen understanding of spatial concepts. Learning conducted in outdoor green open spaces requires systematic planning to ensure that students engage with geographic features, environmental structures, and socio-ecological conditions meaningfully. Therefore, this approach combines direct interaction with the physical environment, the use of structured learning instruments, and reflective inquiry to derive student comprehension and responses.

The initial stage of the method involved designing experiential learning activities by adapting strategies commonly applied in project-based learning and inquiry-based frameworks. Project-based learning instruments have been shown to stimulate the development of 21st-century skills through structured inquiry tasks (Marlina et al., 2025), while inquiry-oriented strategies enhance students' reasoning processes during direct observation (Hasan, 2024). In line with these principles, students were introduced to environmental features, spatial boundaries, and sample locations within the green open space before conducting exploration activities.

Next, learning modules and guiding sheets were prepared to assist students in documenting observed features. This step follows the prior development of structured instructional materials, which has proved effective for guiding scientific concept mastery because students receive direction for interpreting real-world conditions (Fauzi et al., 2024). Modules contained task items such as identifying vegetation distribution, mapping terrain characteristics, sketching physical objects, and noting anthropogenic modifications. Diagnostic instruments were also embedded in the process to assess conceptual understanding (Asnawi et al., 2023), particularly in distinguishing natural elements from built structures, conceptualizing scale, and identifying environmental interactions.

Observation activities were carried out through outdoor exploration sessions where students implemented systematic data collection. This process was aligned with geographic fieldwork methodology, which emphasizes active inquiry, stepwise exploration, and reflective evaluation of field conditions (Ruan et al., 2021). Students were placed in small groups to strengthen collaborative learning, following evidence suggesting that collaborative environments intensify conceptual understanding and reflective thinking

(Jochecová et al., 2022). They were encouraged to observe environmental characteristics, photograph spatial objects, and record descriptive notes capturing geographic relevance.

Spatial thinking development was supported through mapping exercises, orientation tasks, and interpretation of spatial distributions. This aligns with strategies employed to enhance geospatial competency through real-world interaction (Jaeger, 2024; Hickman, 2022). Students were guided to measure approximate distances, analyze directions, and explain spatial relationships between objects. This stage also incorporated the principle of geographic literacy, particularly the interpretation of surface patterns and environmental gradients (Juergens & Redecker, 2023).

In the next stage, data from field observations were processed through an analysis worksheet that captured student perceptions and interpretations. The worksheet format followed evaluative planning approaches previously developed to examine student reasoning and conceptual insight (Setiawaty et al., 2022). Students analyzed their findings by linking field observations with geography concepts they had learned such as landform classification, ecological zoning, or sustainability indicators. Environmental patterns appearing in the field were discussed critically during post-activity reflection, which stimulates scientific thinking and structured interpretation.

To support deeper conceptualization, selected groups used mobile-based mapping tools to overlay photos, notes, and location coordinates. Mobile digital integration has been proven to enhance spatial intelligence and allow students to better relate real conditions with conceptual structures (Salsabila et al., 2022). In addition, the use of mobile tools enabled students to record elevation differences, identify slope gradients, and compare vegetation density across sub-areas. This method is in line with practices used in virtual or location-based field activities where digital map interfaces guide observation trails and validate spatial interpretation (Koegst, 2022; Leininger-Frézal & Sprenger, 2022).

Documented findings from field activities were analyzed using thematic coding techniques. The purpose was to categorize student responses based on conceptual clarity, evidence-based reasoning, and depth of environmental interpretation. The coding scheme was adapted from competency-based assessment models that evaluate student independence, motivation, and reasoning quality (Sa'adah & Ikhsan, 2023). Responses were grouped into categories: spatial relationship recognition, environmental pattern awareness, interpretation of ecosystem interactions, and sustainability-based problem identification. This

systematic coding enables qualitative analysis that remains grounded in field-based evidence.

Reflection sessions were then conducted through discussion forums, allowing students to share individual and group interpretations. This stage was adapted from previously documented outdoor learning models that show significant increases in scientific enthusiasm and collective knowledge building during exchange of findings (Stagg et al., 2022). Students reported key observations, debated interpretations, and connected their real-world findings with theoretical frameworks. Instructor facilitation was essential for clarifying conceptual misconceptions and ensuring that student reflections aligned with curricular geography constructs.

The structured integration of outdoor activities, performance-based worksheets, spatial analytical tasks, and reflective interpretation ensures methodological rigor. Observational activities also followed ethical considerations where student safety, clarity of task instructions, and environmental preservation were prioritized. The outdoor venue was predetermined to support manageable accessibility, absence of hazardous zones, and availability of diverse natural features for spatial analysis. The organization of spatial exploration into defined zones mirrors previous structured outdoor study approaches that emphasize manageable environmental segmentation for field observation (Evelpidou et al., 2022).

Post-activity assessments included short narrative reflections evaluated for structural coherence, logical accuracy, and conceptual relevance. The assessment approach reflects earlier documented evaluation strategies involving authenticity-based assessment where knowledge is tested within real environmental contexts rather than isolated examinations (Dannwolf et al., 2020). This approach ensures that reported understanding reflects actual geographic reasoning emerging from tangible field experience rather than abstract procedural recall.

Finally, methodological validity was strengthened by aligning activity sequence, observation dimensions, and evaluation frameworks with documented pedagogical literature concerning engagement-oriented outdoor learning. Authentic geography learning requires didactic precision, learner-centered task assignment, and structured reflective cycles to guarantee measurable learning development. Through the application of these steps, the method operationalizes geo-exploration in green open spaces as an effective experiential pathway for conceptual geography learning grounded in observable environmental realities.

Results and Discussion

This study aims to address the issue of the lack of interactive learning media in geography teaching at MAN 3 Kampar through the utilization of Green Open Space (RTH) with a digital-based exploration method. Classroom Action Research (CAR) was conducted in three cycles during August 2025, involving 29 students of grades X-6. Each cycle consisted of planning, implementation, observation, and reflection stages, with a focus on the use of RTH as a natural laboratory and the integration of digital technologies such as Google Earth, Google Maps, and QR code-based quizzes. The results of the study showed a significant increase in understanding of geography concepts, student engagement, and environmental awareness, in line with the objectives of the Merdeka Curriculum and the values promoted in the learning framework.

In the planning stage of the first cycle, teaching modules and Student Worksheets (LKPD) were developed that integrate exploration methods with digital tools. These modules include exploration syntax for observing geographic phenomena such as soil types, vegetation, and spatial patterns in green open space areas, including grass fields, sand dunes, palm trees, and school roads. The LKPD was designed with step-by-step observation guides and digital-based tasks, such as scanning QR codes to access additional information about the local ecosystem. Applications like Canva for visual design and Google Maps for simple mapping were also introduced to enhance the learning experience.

The first cycle was conducted on August 26, 2025, with students divided into small groups to explore the green open space. Each group was tasked with observing and documenting geographic elements, such as land slope and vegetation types, using smartphones and digital applications. Observations showed that 80% of students were actively engaged in the activities, although some initially struggled to grasp basic geographic concepts due to a lack of field observation experience. Student feedback through an initial questionnaire indicated high interest in this approach, with 85% stating that learning in green open space was more engaging than conventional methods.

Reflections on the first cycle identified several challenges, such as limited equipment (e.g., compasses and GPS were not available to all groups) and unpredictable weather, which disrupted some outdoor activities. To address these challenges, the second cycle was improved by providing alternative smartphone-based tools, such as a digital compass app and Google Earth, and adjusting the activity schedule to avoid periods of extreme weather. The learning module was also refined by adding introductory simulations to help students understand basic concepts before exploration, thus increasing their preparedness.

In the second cycle, the learning implementation on September 1-2, 2025, showed an increase in student engagement of up to 90%, as recorded in the observation sheet. Students were more skilled in using digital tools, such as mapping observation locations with Google Maps and creating visual reports using Canva. The cognitive test in this cycle produced an average score of 85, with 70% of students achieving the Minimum Completion Criteria (KKTP) of 71. However, some students still faced difficulties in analyzing field data, such as connecting observations to geographic concepts, indicating the need to strengthen analytical skills.

The third cycle, held on September 8-9, 2025, focused on strengthening students' analytical skills through a project-based approach. Each group was asked to create an exploration report integrating observational data with geographic concepts, such as



Figure 1. Learning platform

human-environment interactions and spatial distribution. The use of simple augmented reality (AR) technology, such as scanning a QR code to display information about vegetation, increased student enthusiasm. Observations showed that 95% of students were actively engaged, and questionnaire responses indicated that 90% felt this method helped them understand geographic concepts more contextually.

average skill and affective scores reached 78.23, reflecting progress in observation skills, group collaboration, and environmental awareness. Students' exploration reports demonstrated a good understanding of 10 basic geographic concepts, such as location, distance, and spatial interaction, applied in local contexts, such as vegetation analysis in an oil palm area and land use within the school environment.

Qualitative analysis of student questionnaires revealed that the green open space-based exploration method increased learning motivation, with 92% of students stating that learning was more enjoyable and relevant to their daily lives. Testimonials from peer teachers also confirmed that this approach increased the positive perception toward geography, which is often perceived as a theoretical and boring subject. This approach also supports the Pancasila Student Profile, particularly the critical, creative, and environmental aspects, as students are encouraged to actively explore and care for the school environment.



Figure 2. Learning exploration process

The cognitive test results in the third cycle showed an average score of 88.27, with the highest score being 100 and the lowest being 80, indicating a significant improvement compared to the previous cycle. The

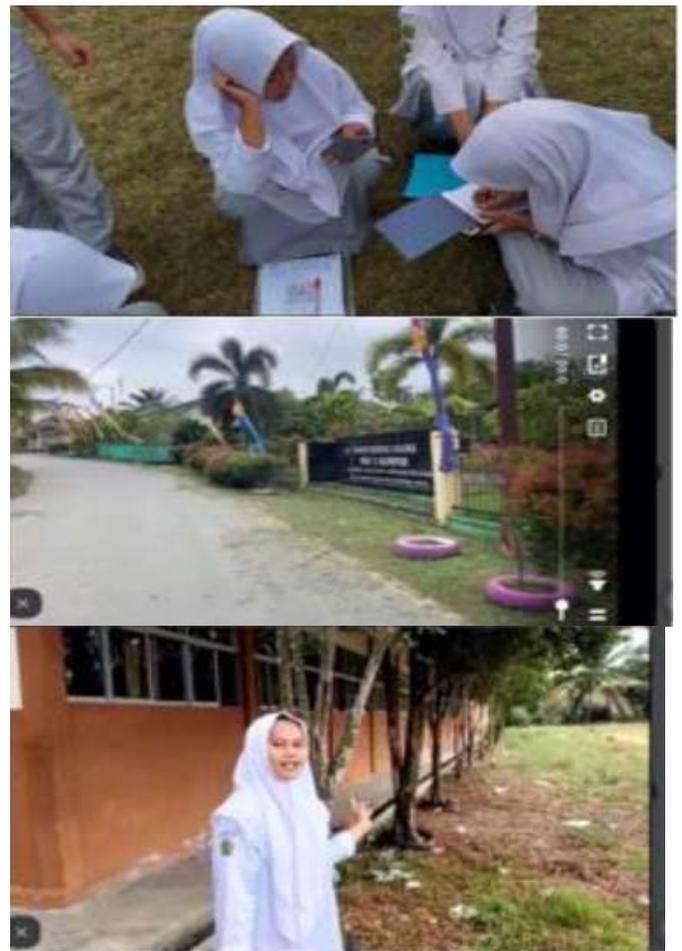


Figure 3. Output process

From the perspective of demonstrated competence in developing innovative learning media and adapting to technological challenges through utilizing free

applications such as Google Maps and Canva. Collaboration with mentors and fellow teachers in developing modules and evaluating activities also reinforced harmonious and collaborative values. Documentation of the activity, such as videos and publications on MAN 3 Kampar's Instagram account, enhanced the school's image as a progressive institution that supports digital transformation.

Major challenges during implementation included limited equipment, such as a lack of a compass and GPS, and weather disturbances such as light rain. Anticipation measures included using a smartphone app instead of conventional tools and adjusting the activity schedule to avoid inclement weather. Furthermore, noise in the green open space near the school road was addressed by selecting a quieter location and dividing students into small groups to maintain focus. Students' initial lack of understanding was addressed through introductory sessions and simulations prior to the exploration, which proved effective in enhancing learning readiness.



Figure 4. Output process open green space

Observation data at MAN 3 Kampar revealed that geography learning was still dominated by conventional methods such as lectures and textbook-based discussions. Teachers tended to emphasize theoretical explanations rather than practical applications, which resulted in low student engagement during lessons. Based on classroom observations in July 2025, 75% of students were found to be passive listeners, while only a small number of actively asked questions or contributed to discussions. Interactive digital media, such as GIS simulations, Google Earth, or augmented reality applications, had not yet been integrated into classroom activities. Learning resources were limited to printed textbooks and worksheets, which often presented geographic concepts abstractly without connecting them to real-world phenomena.

In terms of geospatial literacy, most students showed difficulty in interpreting spatial data and reading maps accurately. When given a simple mapping task using the school's local environment, only 40% of students could correctly identify spatial patterns or describe human-environment interactions. This finding indicates that the understanding of geospatial concepts remains limited and requires contextual, field-based learning support.

The physical environment of MAN 3 Kampar actually provides great potential for contextual learning through its green open spaces, but these facilities had not been utilized as learning media prior to the implementation of the Geo-Exploration Outdoors program. Observation results also highlighted the absence of technology-based teaching aids—no LCD projectors or tablets were used during lessons, and internet access was restricted to the teacher's office area.

Following the introduction of teacher training and the development of digital e-modules integrated with green open space exploration, significant changes were observed. The integration of Google Earth, QR-based quizzes, and local field mapping activities increased student engagement to 95% by the third learning cycle. Students began to demonstrate improved geospatial understanding, as evidenced by their ability to identify environmental components and spatial interactions within the school surroundings. This transformation shows that contextual, digitally supported learning not only increases motivation and conceptual understanding but also aligns with the Ministry of Education's digital transformation agenda under the Merdeka Curriculum framework.

The long-term impact of implementing this method is an increase in students' geospatial literacy, which is important for real-life situations, such as understanding spatial planning and local environmental issues. The school also benefits by establishing an image as an innovative and technology-friendly madrasah,

supporting the vision of becoming a competitive educational institution. For teachers, this method strengthens accountability in managing school assets (RTH) and competence in learning innovation. Student involvement in collaborative activities also strengthens the values of harmony and loyalty to the national education mission.

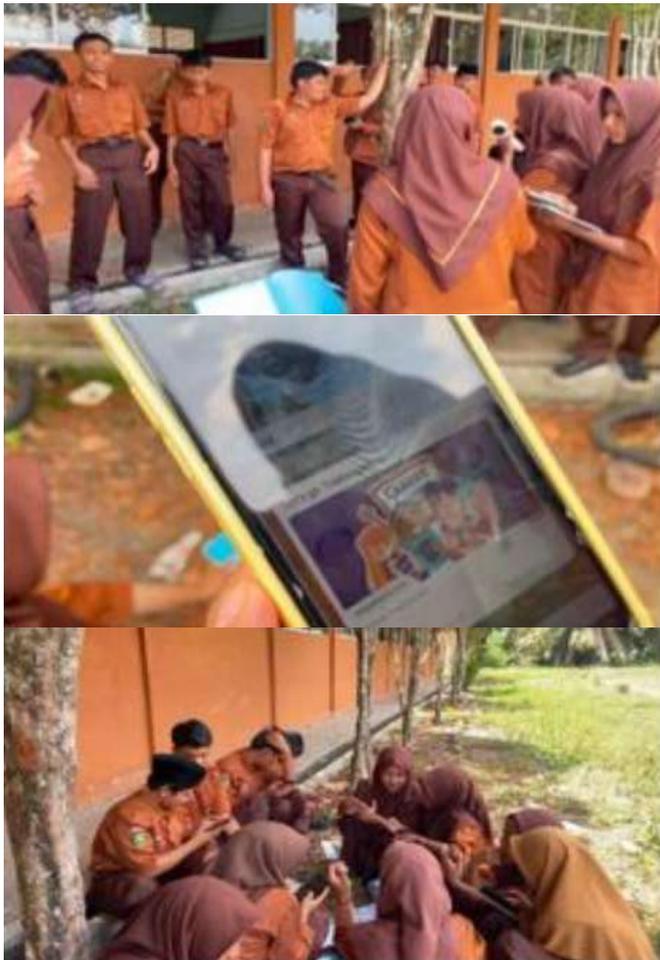


Figure 5. Reflection process

Further discussion shows that the green open space-based exploration approach not only improves learning outcomes but also changes students' perceptions of geography. Previously, many students viewed geography as a rote subject, but through this approach, they see the relevance of geographic concepts to their surroundings, such as analyzing seasonal flooding in Kampar or the impact of land conversion for oil palm plantations. This aligns with findings, which state that environment-based learning creates an active and meaningful learning environment.

Despite the positive results, this study has limitations, such as its limited scope to a single class and its short implementation duration. Sustainability requires regular teacher training, the provision of more adequate technological infrastructure, and the

systematic integration of this approach into the school curriculum. Recommendations for further research include the development of AR applications specifically for geography learning and the extension of this method to other subjects, such as biology or environmental science, to support a cross-disciplinary approach.

Overall, utilizing green open space with digital-based exploration methods has proven effective in improving students' understanding of geography concepts, motivation, and environmental awareness. This approach not only addresses the challenges of 21st-century learning but also strengthens the role of teachers as innovative and accountable civil servants. With the support of school management and sustainable resource development, this method has the potential to become a leading learning model at MAN 3 Kampar, supporting the transformation towards an adaptive and highly competitive madrasah.

Conclusion

The use of Green Open Space (RTH) as a geography learning medium with a digital-based exploration method at MAN 3 Kampar has proven effective in improving the understanding of geography concepts of grade X students. Classroom Action Research (PTK) conducted in three cycles in August 2025 showed a significant increase in geospatial literacy, student engagement, and environmental awareness, with an average cognitive score of 88.27 and an affective-skills score of 78.23. The integration of digital technology, such as Google Earth, Google Maps, and QR code-based quizzes, made learning more interactive, contextual, and relevant to everyday life, in line with the Merdeka Curriculum and the values (Service-Oriented, Accountable, Competent, Harmonious, Loyal, Adaptive, Collaborative). The implementation of the exploration method in the green open space enabled students to actively observe geographic phenomena, such as soil types, vegetation, and spatial patterns in the school environment, thus changing the perception that geography is only a theoretical subject. This activity also increased learning motivation, with 92% of students stating that learning was more enjoyable through questionnaire responses. Collaboration with mentors and peer teachers strengthened harmonious and collaborative values, while the use of technology reflected the competence and adaptability of teachers as civil servants. Documentation, such as videos and publications on the school's social media, also helped enhance MAN 3 Kampar's image as an innovative educational institution. However, implementation faced obstacles such as limited equipment (compass, GPS), unpredictable weather, and noise in the green open space area. These obstacles were overcome by utilizing

smartphone apps, adjusting schedules, and choosing quieter locations, demonstrating a proactive and adaptive approach. Fishbone analysis identified root causes, such as limited teacher skills and conventional methods, which were successfully minimized through in-house training and the development of interactive e-modules. This approach also supports the digital transformation of education, in line with national policy. The success of this research is reflected in the achievement of the Minimum Completion Criteria (KKTP) of 71, along with notable improvements in students' observation skills, collaboration, and analytical thinking. The green open space-based learning approach not only enhances cognitive outcomes but also nurtures students' environmental awareness and critical reasoning toward local geographic issues, such as seasonal flooding and land-use changes. Furthermore, this learning process encourages students to actively construct knowledge through direct exploration, discussion, and digital-based data interpretation, making geography learning more meaningful and relevant to real-world contexts. The results demonstrate that outdoor and technology-integrated learning effectively supports the achievement of learning objectives in geography, particularly in developing geospatial literacy, critical thinking, and problem-solving skills aligned with the Merdeka Curriculum. Overall, the green open space-based exploration method with digital technology offers a concrete solution to address the lack of interactive media in geography learning. For sustainability, regular teacher training, the provision of technological infrastructure, and the integration of this approach into the school curriculum are recommended. With the support of school management, this method has the potential to become a superior learning model, strengthening the role of MAN 3 Kampar as an adaptive, innovative, and highly competitive madrasah, while also supporting the national education mission oriented towards the Pancasila Student Profile.

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Author Contributions

Conceptualization, methodology, software, formal analysis, investigation, resources, data curation, writing—original draft preparation, A.H.; writing—review and editing, validation, visualization, supervision, D.H. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

This research was conducted without any conflict of interest that could affect the objectivity of the results. The researcher, as a geography teacher at MAN 3 Kampar, has no financial, personal, or professional relationships with external parties that could influence the design, implementation, or reporting of the research. All activities, including the development of teaching modules, the use of digital technology, and the utilization of Green Open Spaces (RTH), were conducted using internal school resources and free applications, thus not involving sponsors or third parties that could introduce bias. This research is purely aimed at improving the quality of geography learning and supporting the national education mission, in line with the values.

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