



RESEARCH ARTICLE

Students' Perceptions of The National Science Olympiad (OSN) Coaching Program in The Earth Science Field at SMAN 5 Bandar Lampung

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ABSTRACT

The National Science Olympiad (OSN) in the Earth Science field is an interdisciplinary science competition that assesses students' understanding of earth and space phenomena. The broad and in-depth complexity of Earth Science materials requires the implementation of a structured coaching program at the school level. The implementation of this coaching program needs to be examined from the perspective of students as participants. This study aims to explore students' perceptions of the National Science Olympiad (OSN) Earth Science coaching program in term of cognitive, affective, and conative aspects. The research employed a qualitative descriptive method with data collected through observation, in-depth interviews, and documentation. The research was conducted at SMAN 5 Bandar Lampung. The results show that, in general, students have positive perceptions of the Earth Science OSN coaching program. From a cognitive perspective, students understand the components and processes of the coaching program. From an affective perspective, students perceive the program as providing meaningful, well-structured, and collaborative learning experiences, and as enhancing their understanding of Earth Science concepts. From a conative perspective, students demonstrate a relatively high level of commitment and involvement in the coaching activities, as well as motivation to pursue further studies related to the field of Earth Science. However, several challenges remain, including limited coaching intensity prior to the competition, unequal opportunities for field practice visits among participants, and monitoring and evaluation activities that have not yet been optimally implemented.

Keywords: Students' Perception; Coaching Program; National Science Olympiad; Earth Science



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1. INTRODUCTION

Education plays a crucial role in developing the potential of the nation's future generations, so that they can become an excellent generation ready to face the challenges of the global competitive era. The government pays considerable attention to education, as one indicator of a nation's progress is the quality of its education (Patandung and Panggua, 2022). Quality education does not only focus on the transfer of scientific knowledge from educators to students, but also emphasizes aspects of character building, strengthening moral values, and enhancing critical, creative, and analytical thinking skills. This is because learning itself is derived from processes of memory, cognition, and metacognition that influence students' understanding (Widodo and Utami, 2018).

One of the strategic steps taken by the government in efforts to improve the quality of education and students' competitiveness is through the implementation of the National Science Olympiad, often abbreviated as OSN. According to Erfan et al. (2019), the National Science Olympiad (OSN) serves as a platform for students at the elementary and secondary levels to compete academically in the field of science. The National Science Olympiad (OSN) features various competition branches. One unique and quite challenging OSN field for the senior high school/MA/equivalent level is Earth sciences. Unlike other OSN fields such as mathematics, chemistry, physics, and others that have their own subjects in school, Earth sciences are not taught as a specific subject at the senior high school/MA level (Idris et al., 2023). Consequently, students' understanding of Earth science concepts tends to be limited, even though the scope of its study is very broad and complex. Earth sciences are an interdisciplinary science that integrates various concepts from physics, chemistry, biology, geology, meteorology, oceanography, and even astronomy (Fang, 2021). This condition demands critical, analytical thinking skills, and the ability to integrate various scientific concepts in a unified manner. The complexity of Earth science material makes the OSN coaching program an urgent necessity for schools in preparing students to compete optimally.

SMAN 5 Bandar Lampung is one of the schools that also strives to conduct coaching for students who have scientific potential, including in the field of Earth sciences. This OSN Earth sciences coaching program has been systematically held since 2018. During its implementation, several achievements have been attained in various Earth Science competitions, as presented in Table 1.

Table 1. Student achievement in Earth Science Coaching at SMAN 5 Bandar Lampung

No.	Competition	Achivement	Organizer
1.	OSN-K (OSN-City Level) 2024	Bronze Medal	Balai Pengembangan Talenta Indonesia-Puspresnas
2.	OSN-P (OSN-Province Level) 2024	Top 7	Balai Pengembangan Talenta Indonesia-Puspresnas
3.	National Earth Science Olympiad – Teknik Geofisika Universitas Lampung 2024	1st place	Universitas Lampung
4.	Earth Science Olympiad - Hima TG Bhuwana Universitas Lampung 2024	2nd Place	Universitas Lampung
5.	Sriwijaya Earth Science Competition National 2021	3rd Place	Universitas Sriwijaya
6.	Earth Science Olympiad Lampung Provincial – Himpunan Mahasiswa Teknik Pertambangan Institut Teknologi Sumatera (ITERA) National Level 2021	1st place	ITERA
7.	Earth Science Olympiad Lampung Provincial – Himpunan Mahasiswa Teknik Pertambangan Institut Teknologi Sumatera (ITERA) National Level 2021	3rd Place	ITERA

Sources: Documentation of SMAN 5 Bandar Lampung (2024)

The achievements presented in Table 1 were obtained from various competitions organized by different institutions, including competitions held by student organizations at the university level. However, the most prestigious and nationally recognized competition among these is the OSN, which is officially organized by Puspresnas (the Indonesian Talent Development Center of the National Achievement Center). The OSN serves as the primary national benchmark for scientific achievement and the main pathway for students to advance to international-level competitions. The best achievement recorded in this official OSN channel was a bronze medal at the City-Level OSN in 2024, which enabled the student to advance to the provincial level. However, the results at this stage have not yet brought them to provincial-level championships or advancement to the national level. This indicates that although student potential in Earth Sciences is actually quite promising, when viewed from the measure of success in the most prestigious OSN event, these achievements have not reflected optimal results.

Based on preliminary research activities through interviews with the OSN Earth Sciences coach, who also serves as a geography teacher, the implementation of this coaching program has faced different conditions and challenges each year. In 2018, the program began with the formation of initial structure and plans. Entering 2019, the school started inviting alumni with relevant Earth Sciences backgrounds to provide guidance to coaching students. However, during the 2020-2021 period, the program faced obstacles due to the COVID-19 pandemic, which hindered face-to-face learning activities, forcing students to study independently and through online platforms. From 2022 to the present, the program has been re-implemented with the addition of collaboration with external tutor trainers or expert lecturers competent in Earth Sciences to enrich students' knowledge and understanding. This indicates that the program continues to experience developmental dynamics, yet throughout its implementation, there has been no in-depth evaluative study, particularly from the perspective of students who directly experience the benefits and impacts of this program.

Previous studies have examined student perceptions of science Olympiad participation. Greco and Orion (2018) investigated students' perceptions of the International Earth Science Olympiad, finding that while most students had positive views of their Olympiad experience and were able to learn about earth sciences and collaborate in teams, their interest in pursuing geoscience studies remained relatively low. Additionally, school and teacher involvement in preparation coaching was still very limited, so the program had not been fully integrated into the national education system. Sahin, Gulacar, and Stuessy (2015) found that participation in science olympiads positively influenced students' interest and perceptions of science subjects and helped improve 21st-century skills such as problem-solving, communication, and collaboration, while strengthening motivation to pursue STEM fields in higher education. Top, Sahin, and Almus (2015) identified that olympiad participation providing benefits including new experiences, increased confidence, expanded knowledge, social skills, and global awareness.

However, research specifically examining student perceptions of the coaching process in school itself including recruitment, scheduling, mentoring, facilities, and monitoring in the context of Earth Sciences OSN preparation in Indonesian senior high schools remains limited. While existing studies have explored the outcomes and benefits of olympiad participation, there is a gap in understanding how students perceive the structured coaching programs that prepare them for these competitions. This study addresses that gap by investigating students' perceptions of the entire coaching program implementation process.

Considering that Earth Sciences is not taught as a specific subject in schools, the OSN coaching program in this field is facilitated by geography teachers, making it a direct pedagogical responsibility of geography educators. This topic holds particular significance within geography education because Earth Sciences constitutes the fundamental basis of physical geography covering geology, meteorology, oceanography, and astronomy which are integral to the senior high school geography curriculum. As a result, this coaching program becomes the sole structured means for students to deepen their understanding of Earth Sciences, making the quality of its implementation a determining factor in students' readiness and success in competitions. This condition forms the basis for the importance of understanding how the implemented coaching program can optimally support student ability development, which in turn necessitates an in-depth study of the OSN Earth Sciences coaching program's sustainability, particularly from the viewpoint of students as activity participants.

2. LITERATURE REVIEW

This section presents the theoretical foundations and relevant empirical studies underpinning the investigation. The review covers key concepts including students' perception, National Science Olympiad Coaching Program Management, Earth Science in the OSN.

2.1 Students' Perception

Perception is a psychological process through which individuals interpret and respond to stimuli from their environment. Walgito (2019) defines perception as a process preceded by sensing, the reception of stimuli through the sensory organs which is then continued to the perceptual stage for interpretation. This process is not passive but involves cognitive activity, including the organization and interpretation of information based on an individual's experience, knowledge, and frame of reference (Prawira, 2014).

Walgito (2019) identifies three components of perception that form an individual's attitude structure toward an object or event. 1. Cognitive Component Relates to knowledge, understanding, and beliefs about the perceived object. This component encompasses how individuals receive, process, and organize information about their environment. 2. Affective Component: Concerns emotional responses, feelings, and evaluations toward the perceived object. This involves the individual's emotional engagement and value judgments. 3. Conative Component: Pertains to behavioral tendencies, motivations, and action orientations. This reflects how perception translates into actual behavior and commitment.

In educational contexts, student perception is a critical factor influencing how they receive, understand, and respond to learning experiences, including coaching programs. Students do not passively receive information but actively interpret and assign meaning to every experience based on their background knowledge and values (Hidayah et al., 2017). Perception can be categorized as positive or negative depending on its alignment with the perceived object (Irwanto, 2002). Positive perception leads to acceptance and support, while negative perception results in rejection or passivity.

2.2 National Science Olympiad Coaching Program Management

The National Science Olympiad (OSN) is an annual academic competition organized by the Center for Talent Development, National Achievement Center, under the Ministry of Education, Culture, Research, and Technology (Pusprenas, 2024). OSN aims to identify, develop, and prepare talented students to achieve at national and international levels (Erfan et al., 2019). For senior high school level, OSN covers nine fields: Mathematics, Physics, Chemistry, Informatics, Biology, Astronomy, Economics, Earth Science, and Geography (Pusprenas, 2024).

The OSN coaching program is a series of structured and continuous activities designed to prepare students for competition. Noval et al. (2025) identify four main stages in OSN coaching program management: (1) planning, which includes identifying student potential and scheduling; (2) organizing, which covers assigning coaches and collaborating with external tutors; (3) implementing, focused on developing academic abilities through specialized guidance and simulations; and (4) monitoring, involving routine supervision and evaluation to track student progress. Siregar (2020) adds that coaching success also depends on the availability of materials, question banks, coordination among stakeholders, and periodic program evaluation.

2.3 Earth Science in the OSN

Earth Science is one of the most unique and challenging OSN fields at the senior high school level. Unlike other OSN subjects such as mathematics, physics, or chemistry which have their own subjects in school, Earth Science is not taught as a separate subject in high school (Idris et al., 2023). Consequently, most students lack basic knowledge of Earth Science from formal schooling, requiring intensive coaching to master Earth Science concepts adequately.

Fang (2021) explains that Earth Science is an interdisciplinary science integrating concepts from physics, chemistry, biology, geology, meteorology, oceanography, and astronomy. The OSN Earth Science syllabus covers four main areas: Geology (Earth's structure and dynamics), Oceanography (water bodies and dynamics), Meteorology (atmosphere and weather-climate phenomena), and Astronomy (basic astronomy and planetary phenomena). This broad and complex scope demands that students possess critical thinking, analytical skills, and the ability to connect various scientific concepts in an integrated manner.

Previous studies have shown that olympiad participation positively impacts scientific concept mastery and 21st-century skill development. Greco and Orion (2018) found that students participating in the International Earth Science Olympiad had positive perceptions of their learning experience and teamwork. Şahin, Gülaçar, and Stuessy (2015) reported that science olympiad participation positively influenced students' interest in science subjects and enhanced problem-solving, communication, and collaboration skills. However, these studies also revealed that student interest in pursuing geoscience careers remained relatively low, and school and teacher involvement in coaching preparation was still limited.

This study aims to address these gaps by exploring students' perceptions of the OSN Earth Science coaching process at the school level. Based on the literature reviewed, this study adopts a conceptual framework that integrates Walgito (2019) perception model with Noval et al. (2025) program management framework. Student perceptions of the Earth Science OSN coaching program are examined across three dimensions: cognitive, affective, and conative and across four stages of program management: planning, organizing, implementing, and monitoring.

3. METHOD

3.1 Research Design

This study employs a descriptive method with a qualitative approach. Qualitative research is research based on naturalistic inquiry, the findings of which are not obtained through statistical calculation procedures (Basrowi & Suwandi, 2008). The qualitative method aims to understand phenomena in depth based on the views, experiences, and understanding of the research subjects. According to Sugiyono (2013), in qualitative research, the researcher acts as the key instrument, data collection is carried out through triangulation, the analysis is inductive, and the research results emphasize meaning over generalization. The approach used is phenomenology. According to Creswell (2013), phenomenology is a research strategy in which the researcher identifies the essence of human experience regarding a particular phenomenon. This approach was chosen because the research focuses on students' perceptions during their participation in the National Science Olympiad (OSN) coaching program in the Earth Science field.

3.2 Participants

The research was conducted at SMAN 5 Bandar Lampung, located on Jalan Soekarno-Hatta, Way Dadi Baru Village, Sukarama District, Bandar Lampung City, from July 2025. The research subjects consisted of eight students who participated in the OSN Earth Science coaching program. The sampling technique used was total sampling, where all members of the population were used as samples because the population size was relatively small (Sugiyono, 2013). This technique was applied to minimize the possibility of bias and to obtain comprehensive data from all participants who met the criteria.

3.3 Instruments

Data collection techniques included observation, semi-structured interviews, and documentation. Observation was conducted to obtain an overview of the location conditions, environment, and implementation of coaching activities. Semi-structured interviews were used to explore students' perceptions in depth, guided by an interview instrument developed based on three aspects of perception: cognitive, affective, and conative (Walgito, 2019). Documentation served as supplementary data obtained from observations and interviews.

3.4 Data Analysis

Data analysis followed the Miles and Huberman model (in Sugiyono, 2013), which consists of three stages: data reduction, data presentation, and conclusion drawing/verification. Data reduction was performed by summarizing and focusing on essential points according to the research objectives. The reduced data were then presented in narrative form to facilitate understanding of patterns and themes

that emerged. The final stage involved drawing preliminary conclusions, which were then verified through further data collection until credible conclusions were obtained.

Trustworthiness of the data was ensured through credibility testing using triangulation techniques. Triangulation was conducted by comparing data from interviews, observations, and documentation to ensure consistency and accuracy of information (Sugiyono, 2013). This process aimed to minimize bias and enhance the validity of research findings, ensuring that the results obtained could be scientifically accounted for.

4. RESULTS AND DISCUSSION

This study aims to explore students' perceptions of the National Science Olympiad (OSN) coaching program in the Earth Science field at SMAN 5 Bandar Lampung. Data were collected through in-depth interviews with eight students who participated in the program, as well as observations and documentation. The findings are organized according to the three components of perception: cognitive, affective, and conative (Walgito, 2019).

4.1 Cognitive Aspect of Students' Perception

The cognitive aspect reflects students' knowledge, understanding, and awareness of various components of the Earth Science OSN coaching program, including the recruitment process, coaching schedule, teacher roles, external collaboration, facilities, learning process, material difficulty, simulation activities, and monitoring and evaluation.

Table 2. Students' Cognitive Perceptions of the OSN Earth Science Coaching Program

Management Stage	Key Finding
Planning	Recruitment: Open registration for all students; selection for OSN; criteria requirements: consistency and discipline
	Schedule: 2 times/week; increased intensity before competitions
Organizing	Teacher role: Competent geography teacher as facilitator, motivator, and target setter
	External collaborator: alumni and ITERA lectures for astronomy, oceanography
	Facilities: Classrooms, library, books, Google Drive, projector, ITERA laboratory
Implementing	Learning methods: Discussion, practice questions, peer teaching, presentation, independent learning, periodic tryout, initial low understanding improved; ability connect to concepts to daily life; practical field experiences (unevenly distributed) .
	Material Difficulty: Geology & Meteorology easier; Astronomy most difficult
	Simulation: Official Puspresnas simulation; tryout for time management
Monitoring	Teacher-centered; limited school involvement

Source: Primary Data (2025)

1. Planning

In terms of the cognitive aspect, interview results indicate that most students recognized that the initial planning stage of the coaching program had been implemented in a structured and strategic manner. The findings on the planning stage of the OSN Earth Science coaching program at SMAN 5 Bandar Lampung are divided into two components: the recruitment process and the coaching schedule arrangement. Students understood that the planning stage of the OSN coaching program began with an open recruitment process for all students, either through self-registration submitted by students or through teacher recommendations based on academic achievement records and student activeness in geography classes relevant to Earth Science. This recruitment stage was then followed by a selection process aimed at choosing students as representatives in Earth Science competitions. Students also understood that the main criteria emphasized for coaching participants were not solely academic

intelligence, but rather consistency, discipline, seriousness, and commitment to following the entire coaching series. Furthermore, students explained that the coaching schedule was mutually agreed upon and implemented regularly at least twice a week, with a significant increase in intensity approaching competitions almost daily supported by school dispensations.

2. Organizing

The cognitive aspect of students at the organizing stage shows that students have a good understanding of how the OSN Earth Science coaching program is systematically arranged and executed. Students viewed the coach as a central actor who serves as teacher, facilitator, motivator, evaluator, and director of learning targets based on the OSN syllabus. The competence and experience of the coach are considered relevant to the earth science field. However, for complex calculation materials, coaching is reinforced through collaboration with alumni and university lecturers, specifically lectures from ITERA (Institute Technology of Sumatra). Organizing was also supported by the provision of facilities such as classrooms, library, teachers' room, printed and digital reading materials, projectors, and campus laboratory access. Financial support for coaching with lecturers and other technical needs indicated fairly systematic resource coordination. This demonstrates that cognitively, students are able to understand that the organizing stage in the OSN Earth Science coaching program has been designed with clear role division, optimal resource utilization, and collaborative teaching that supports the coaching process.

3. Implementing

At the implementing stage, the cognitive aspect shows that students have an understanding of their initial limited abilities in Earth Science. Students understood that the learning process in coaching took place through various methods, such as lectures, discussions, intensive practice questions, presentations, peer tutoring, independent learning, as well as periodic tryouts and simulations. Among these various methods, students considered practice questions as the main strategy in helping them understand concepts while preparing themselves for competition. Additionally, students also demonstrated understanding of the difficulty levels of the materials studied. Geology and Meteorology were understood as relatively easier because they are concrete and can be visualized, while Astronomy was perceived as more difficult because it is abstract and requires higher mathematical analytical skills. After participating in the coaching process, students understood that there was an improvement in material mastery, the ability to connect concepts with everyday phenomena, understanding of competition question patterns, as well as growing interest in further studies in Earth Science. Practical field experiences also strengthened understanding, although this was not evenly experienced by all participants. This shows that although students followed a relatively similar coaching process, the understanding formed in each student could differ. These differences were influenced by varying learning experiences, such as uneven involvement in field practicums, as well as students' initial abilities in understanding Earth Science materials. Thus, cognitively, students not only understood the coaching process in general, but also interpreted the learning experiences gained according to their respective conditions and experiences.

4. Monitoring

Based on interview results, students had a fairly clear understanding of the monitoring mechanisms in the OSN Earth Science coaching program, both in terms of form, implementation, and parties involved. Most students explained that monitoring in the OSN Earth Science coaching program was predominantly carried out by the coach. Students understood that monitoring was implemented through attendance tracking, involvement in coaching activities, and student activeness in following practice sessions. Furthermore, evaluation was also conducted through the provision of practice questions, periodic post-tests, and feedback on student learning outcomes. Through this process, students understood that evaluation served to identify weaknesses in material understanding, adjust learning strategies, and monitor their ability development during coaching. On the other hand, students also understood that the school's role in monitoring tended to be administrative and facilitative. School involvement was more visible in the form of support for program implementation, while technical monitoring was more extensively carried out by the coach through direct interaction with students. This caused students to

perceive monitoring more as part of the coaching process conducted by the coach rather than by the school.

4.2 Affective Aspect of Students' Perception

The affective aspect encompasses students' feelings, attitudes, and evaluations of various coaching program components.

Table 3. Students' Affective Perceptions of the OSN Earth Science Coaching Program

Management Stage	Key Finding
Planning	Recruitment process is open, transparent, and fair; selection via CBT strengthens objectivity; emphasis on diligence and consistency Schedule acceptable due but intensity considered insufficient for OSN material complexity
Organizing	Positive responses to coach: feel comfortable, motivated, and supported by the coach; satisfied with coaching facilities; some feel explanations for complex questions need improvement
Implementing	confident and optimistic after coaching; regular practice and support enhance self-efficacy; some anxiety regarding higher competition levels; readiness decreases at provincial level due to complex questions
Monitoring	Positive toward school support (facilities, dispensations, rewards); funding perceived as inconsistent; school monitoring and evaluation not conducted regularly; needs improvement in routine oversight and financial consistency

Source: Primary Data (2025).

1. Planning

At the planning stage, the affective aspect of students toward recruitment and the coaching schedule showed a positive tendency. The recruitment process was perceived as open, clear, and transparent because information was widely disseminated and provided equal opportunities for all interested students. Selection criteria did not only emphasize academic intelligence but also commitment and perseverance, while the use of the CBT (Computer Based Test) system in selection reinforced perceptions of fairness and objectivity. In terms of scheduling, students felt that the coaching schedule was not burdensome because it had been mutually agreed upon from the start, thus fostering a sense of responsibility. However, some students assessed that the coaching intensity was still insufficient compared to the high difficulty level of OSN, so additional meeting frequency was needed for more optimal preparation. Thus, the planning stage has proceeded well, although it still requires adjustments in terms of coaching time intensity.

2. Organizing

At the organizing stage, students demonstrated good affective perceptions. Students generally gave positive responses to the coach's role and the coaching methods applied. The coach was perceived as capable of creating a relaxed yet serious learning atmosphere, interactive, and discussion-based with a structured material system aligned with the OSN syllabus. The implementation of discipline, responsibility, and the coach's care both morally and materially also increased students' motivation and learning comfort. Nevertheless, some students assessed that the deepening of material provided by the teacher on high-complexity questions was not yet optimal and that coaching strategies still needed to be developed to be more competitive compared to other leading schools. Overall, organizing has been effective in building a conducive learning atmosphere, but still requires strengthening in advanced learning strategies.

3. Implementing

Affectively, most students demonstrated confidence and optimism in facing competitions after participating in the coaching program. Training experience, learning habituation, and support from the coach and school were the main factors increasing their self-confidence. The motivation to uphold the

school's good name also served as a strong driver of their readiness. However, there was also anxiety about the difficulty level of questions, especially at higher competition levels such as the provincial level. Some students felt their readiness decreased when facing questions with higher complexity. Overall, the implementation of coaching has been able to shape students' mental readiness and motivation quite well, although reinforcement of mental and academic aspects is still needed to face advanced-level competitions.

4. Monitoring

At the monitoring stage, students assessed school support for coaching as positive but not yet optimal. The school had provided facilities, activity dispensations, external tutor funding, and rewards as forms of appreciation that were able to increase student enthusiasm. However, funding support was perceived as inconsistent due to budget limitations and disbursement procedures that sometimes hindered urgent needs. Additionally, some students felt that school involvement in monitoring and evaluating coaching had not been conducted periodically. Accordingly, the monitoring function has supported program sustainability, but still needs improvement in terms of routine monitoring and consistency of financial support.

4.3 Conative Aspect of Students' Perception

The conative aspect reflects students' behavioral tendencies, motivations, and actions

Table 4. Students' Conative Perceptions of the OSN Earth Science Coaching Program

Management Stage	Key Finding
Planning	Student motivations for choosing Earth Science: 1. Internal influences: intrinsic interest in Earth Science phenomena, relevance to future studies (mining engineering, geology, etc) 2. External influences: teacher recommendations, previous olympiad experience
Organizing	Students attended coaching sessions consistently with high attendance consistency; school dispensations; sense of responsibility and
Implementing	Students actively engaged in discussions, asked questions, and practiced questions repeatedly. They utilized supplementary learning resources such as YouTube videos and reference books. They employed simplified formulas and strategies provided by coaches to solve complex problems. They participated actively in simulation activities and tryouts.
Monitoring	Students provided constructive suggestions for program improvement, including: increasing participant numbers through school strategies, extended coaching preparation time, improved facility management, sustainable external collaboration with university lecturers. They expressed hopes for better financial support and more regular school monitoring and evaluation.

Source: Primary Data (2025).

1. Planning

At the planning stage, the conative aspect of students is reflected in their reasons for choosing the Earth Science field as an initial motivation for joining the OSN coaching program. This motivation originates from both internal and external factors. Internally, students show interest in Earth Science, which studies the broad and complex phenomena of the Earth and outer space. Some students also consider its relevance to their future study plans, such as mining engineering or geology, thus viewing the coaching program as long-term academic preparation. Externally, the decision to choose Earth Science is influenced by prior competition experience, as well as invitations and recommendations from the coach. This diversity of motivation indicates that student involvement in the program is not merely about participating in activities but is based on interests, goals, and drives that form their initial commitment to the coaching program.

2. Organizing

At the organizing stage, the conative component is evident through the level of student participation and attendance in the coaching program. The majority of students demonstrate high commitment with regular and consistent attendance at every session. Absences generally occur only for urgent reasons such as illness or family matters, and are usually accompanied by rescheduling. Students also show a tendency to prioritize coaching over certain class agendas, especially due to academic dispensations from the school. A sense of responsibility toward the coach and personal commitment to discipline are driving factors behind this consistency. Overall, the high attendance intensity reflects students' seriousness and awareness in fulfilling their role as coaching participants.

3. Implementing

At the implementing stage, the conative aspect is reflected in students' strategies for overcoming learning difficulties. When faced with complex material, students actively ask questions and engage in discussions during coaching sessions. They also practice questions repeatedly, simplify solution steps, and utilize practical formulas provided by the coach. In addition to relying on guidance during official sessions, students demonstrate independent learning initiative by seeking additional references through books, visual media, and online learning videos such as YouTube. Enthusiasm is also evident when participating in coaching sessions with external tutors, especially in deepening material considered difficult, such as astronomy. This shows a combination of coach support and students' independent efforts as concrete actions in improving their competence.

4. Monitoring

At the monitoring stage, students' conative tendencies are visible through the suggestions and hopes they convey regarding the program's sustainability. Students propose strategies to attract more participants, increase periodic monitoring and evaluation from the school, and provide more prepared learning facilities. They also hope for increased funding support, additional coaching time intensity leading up to OSN, and continued collaboration with external tutors. Other hopes include an increasing number of students who pass and achieve in OSN events. Overall, these suggestions and aspirations indicate a positive conative tendency, as students not only strive to develop themselves but also demonstrate concern for improving the quality and sustainability of the coaching program as a whole. Thus, the conative aspect of students reflects motivation, responsibility, active participation, and concern for the program's sustainability. Students not only act as coaching participants but also as proactive individuals in supporting the success and continuous development of the program.

4.4 Discussion

This discussion section focuses on an in-depth examination of students' perceptions of the OSN Earth Science coaching program, reviewed based on the three perceptual aspects: cognitive, affective, and conative. These three aspects are interrelated in shaping how students understand, feel, and respond to the coaching program implemented at SMAN 5 Bandar Lampung.

1. Cognitive Aspect

First, in terms of the cognitive aspect, students have generally demonstrated a deep understanding of the coaching management indicators, namely planning, organizing, implementing, and monitoring. At the planning stage, students' understanding of the open recruitment system and structured schedule preparation indicates a cognitive process of clear knowledge and understanding of the program's mechanisms. Students not only understand recruitment as an administrative process but also interpret it as a mechanism for building commitment and discipline. Furthermore, the preparation of a structured and mutually agreed-upon schedule is also perceived as a factor that builds their readiness to participate in coaching activities. This finding aligns with Widya et al. (2024), who state that structured and continuous coaching can improve both material and psychological readiness of students in facing olympiad competitions.

At the organizing stage, students understand the role and competence of the coach as the main actor who not only functions as a teacher but also as a facilitator and motivator. This perception supports Siregar (2020) theory regarding the importance of educator competence alignment with the quality and performance of student learning outcomes. However, this study also found innovation in the form of collaboration with alumni and university lecturers relevant to Earth Science. This finding expands the coaching management concept according to Noval et al. (2025) by adding a strategic partnership aspect as a form of strengthening coaching quality. This collaboration also aligns with Manurung's view that the involvement of external mentors such as OSN alumni, practitioners, and university lecturers plays an important role in enriching learning materials and experiences, thereby strengthening students' cognitive mastery (Syafrizal et al., 2025).

At the implementing stage, students' cognitive aspect develops through the process of receiving and processing information obtained during the activities. This understanding is formed from initial knowledge that is generally still limited, then develops through learning experiences gained from various teaching methods during the activities, such as lectures, discussions, practice questions, and peer teaching. The application of these varied methods is considered by students to be very useful in creating a more active learning process, especially through the peer teaching approach, which enables them to exchange knowledge and strengthen conceptual understanding together. This aligns with the concept of peer teaching as a cooperative learning strategy that emphasizes collaboration among students by building mutual understanding between them (Febianti, 2014). Furthermore, differences in perception regarding understanding of Geology, Meteorology, and Astronomy materials also indicate that the cognitive process is influenced by learning experiences and the level of material complexity. Additionally, field practicum activities through visits to Earth Science institutions serve as real laboratories that strengthen conceptual understanding while developing observation, measurement, and geoscience data interpretation skills (Syafrizal et al., 2025), although this has not been evenly experienced by all students. Competition simulations also contribute to shaping students' cognitive and mental readiness, not only in material mastery but also in facing pressure and the actual competition system (Puspitasari et al., 2025). After undergoing the coaching program, students expressed cognitive improvement demonstrated through their ability to connect Earth Science concepts with everyday phenomena, and the experience of participating in competitions also sparked their academic interest to pursue further studies in fields related to Earth Science. Thus, overall, the coaching implementation plays an important role in gradually and meaningfully shaping students' cognitive understanding. Cognitively, this implementation stage is viewed by students as not only increasing competitive readiness but also forming scientific thinking patterns and long-term academic orientation.

At the monitoring stage, cognitively students demonstrate that they understand monitoring and evaluation as important parts of assessing ability development during OSN Earth Science coaching. This understanding is formed through direct experience, where students feel the coach's role more prominently in monitoring attendance, providing practice questions, and conducting evaluations through pre-tests and post-tests. Meanwhile, school involvement tends to be perceived as limited and administrative in nature, thus less directly felt by students. This condition indicates that cognitively students have recognized the monitoring function, but their understanding remains focused on the coach's role. This has not fully aligned with the ideal monitoring concept that involves collaboration between the principal, curriculum vice-principal, and coach in supporting coaching effectiveness (Noval et al., 2025).

2. Affective Aspect

Students' affective perceptions demonstrate positive emotional responses at each stage of the coaching program. In educational psychology, the affective aspect relates to students' feelings, emotions, and attitudes toward an object. Baharuddin (2020) explains that feelings are part of emotions, which are more complex in nature. In this context, students' positive responses such as feeling comfortable, motivated, and enthusiastic reflect the emotional engagement formed during the coaching process.

At the planning stage, students' affective perceptions of recruitment and scheduling are shown through positive evaluations of the recruitment system and coaching schedule, which are perceived as fair and transparent, thereby fostering trust and acceptance of the program. However, regarding scheduling, some students perceive that the intensity of coaching activities is not yet proportional to the complexity of OSN Earth Science materials. The density of school activities also becomes an obstacle for students in increasing coaching intensity. This time limitation raises concerns among students about facing competitions. This condition aligns with Hidayatika et al. (2020), who state that time constraints often make Earth Science olympiad training activities less proportional to the amount of material that must be learned. This finding indicates that, affectively, the planning stage has been able to build students' trust and acceptance of the coaching program. However, the limited intensity of coaching time still affects students' feelings, particularly in the form of anxiety about competition readiness, thus requiring time optimization to make students' affective perceptions more positive and stable.

At the organizing stage, students' affective perceptions show positive responses to the coach's role. Students feel comfortable and motivated because the coach is able to create an interactive, relaxed yet focused learning atmosphere. The coach's supportive, disciplined, and caring role toward student development also forms a pleasant emotional experience during coaching. Furthermore, the availability of facilities such as materials, practice questions, and other learning support makes students feel assisted in understanding Earth Science materials. However, some students perceive that the teacher's deeper explanations for complex questions still need optimization for students to fully understand. In line with this, Irfham and Wiyani (2020) state that teachers need to first analyze the types and locations of learning difficulties experienced by students. This condition indicates that learning experiences that have not fully met students' needs can affect the stability of their motivation.

At the implementing stage, students' affective perceptions show a sense of confidence and optimism in facing competitions after participating in the coaching program. Regular practice experience, habituation to working on questions, and support from the coach and school are the main factors shaping students' self-confidence. This competition readiness indicates the development of self-efficacy, as explained by Bandura (1997 in Nugraheni, 2018), who states that self-efficacy is an individual's belief in their ability to produce a certain planned performance. In this context, repeated learning experiences during coaching can enhance students' belief in their abilities. However, some students also show anxiety, especially when facing higher difficulty level questions at advanced competition levels. This condition indicates that students' emotional responses are not fixed but can change according to the level of challenges faced.

At the monitoring stage, students' affective perceptions relate to evaluations of monitoring, evaluation, and school support for the program's sustainability. Students show positive responses to periodic evaluations such as practice sessions and feedback from the coach that help them understand their ability development. Additionally, school support in the form of facility provision, rewards, and activity dispensations also enhances students' enthusiasm and motivation in participating in the coaching program. However, some students perceive that school monitoring has not been conducted regularly and that funding support remains inconsistent, thus affecting coaching optimization. This indicates that students' emotional experiences are influenced not only by the learning process but also by the extent to which the school plays a role in monitoring and supporting the program. Thus, the monitoring function has been running fairly well in providing motivational reinforcement, but it still needs improvement, particularly in the aspects of continuous monitoring and institutional support consistency.

3. Conative Aspect

The conative aspect is part of perception that relates to the tendency of behavior or actions of individuals in response to received stimuli (Walgito, 2019). Thus, the perception that is formed does not stop at understanding and feelings, but also encourages individuals to act concretely.

At the planning stage, students' conative tendency is evident from their initial motivation in choosing the Earth Science field, which is influenced by personal interest, relevance to study plans, and

environmental influences such as teacher recommendations. This indicates a combination of intrinsic and extrinsic drives. Uno (2023) states that intrinsic motivation originates from within the individual, such as interests, needs, and expectations, while extrinsic motivation arises due to external stimuli. In line with this, Herwati et al. (2023) affirm that intrinsic motivation plays a role in encouraging individuals to achieve specific goals. Thus, it can be seen that the conative aspect serves as the main driver in students' decision-making process to engage in the coaching program. The stronger the intrinsic drive supported by external factors, the greater the tendency for individuals to engage and participate actively in an activity.

At the organizing stage, the conative aspect is demonstrated through attendance consistency and active student participation in the coaching program. The high level of attendance reflects students' commitment and responsibility in fulfilling their role. The positive perception of the coaching program that has been previously formed encourages students to behave with discipline and prioritize coaching activities. Students' conation in this stage shows the need for achievement, as explained by Walgito (2019), that individuals with high achievement needs tend to work hard to achieve their goals.

At the implementing stage, students' conative tendency is evident from their active strategies in overcoming learning difficulties. Students do not only rely on the coach but also demonstrate independent learning initiative through various sources. Activities such as asking questions, discussing, and practicing independently reflect a conscious effort to improve their abilities. These efforts demonstrate initiative and independence as active responses to the positive perception of the program. This reinforces that positive perceptions of the coaching program will produce adaptive and productive actions in the learning process.

At the monitoring stage, the conative aspect is visible through students' suggestions and hopes for the coaching program. The aspirations expressed show concern and a desire to improve program quality continuously. The tendency of individuals to respond with criticism and suggestions is a form of active involvement with the perceived object. This confirms that the perception formed not only influences how students understand and feel about the coaching program but also encourages them to act concretely in supporting their own success and the overall sustainability of the coaching program.

Overall, the findings of this study align with previous research conducted by Greco and Orion (2018) titled "A Student Perception on International Earth Science Olympiad," which showed that student participation in Earth Science olympiad activities positively influences the improvement of scientific concept mastery and students' critical thinking skills. That study explained that involvement in the International Earth Science Olympiad (IESO) helps students understand the interconnections between Earth Science and global issues and fosters scientific awareness of the importance of geoscience in daily life. The results of this study also show that students have good cognitive understanding of all coaching stages and are able to connect Earth Science concepts with natural phenomena around them. However, differences in results appear in the aspect of further study interest. In that study, not all students showed a desire to continue studying geoscience because some participants considered olympiad activities more as enjoyable scientific learning experiences without necessarily making them a career direction. Meanwhile, in this study, some students actually showed interest in continuing their studies in the Earth Science field as an application of the interests and knowledge gained during the coaching program.

Furthermore, the results of this study also align with research conducted by Şahin, Gülaçar, and Stuessy (2015) titled "High School Students' Perceptions of the Effects of International Science Olympiad on Their STEM Career Aspirations and Twenty-First Century Skill Development." That study showed that the experience of participating in science olympiads can foster learning motivation, self-confidence, and encourage students' interest in continuing studies in relevant science fields. Students who participated in olympiad activities felt more motivated to deepen their scientific knowledge and had clearer academic orientation toward the science fields they were interested in. These findings support the results of this study, which also show that student participation in the OSN Earth Science coaching program not only increases knowledge and scientific thinking skills but also fosters conative drive in the form of enthusiasm for achievement and interest in continuing education in the Earth Science field.

These previous studies reinforce the findings of this study that Earth Science olympiad activities positively influence students' knowledge, attitudes, and behaviors in science learning. However, this study provides a new contribution by highlighting students' perceptions of the coaching process at the school level, which includes activity management, the coach's role, and school support as important factors in shaping students' interest and readiness for the Earth Science olympiad.

5. CONCLUSION

Based on the research findings regarding students' perceptions of the National Science Olympiad (OSN) Earth Science coaching program at SMAN 5 Bandar Lampung, the following conclusions can be drawn:

Cognitively, students demonstrated good understanding of the components and mechanisms of the OSN Earth Science coaching program. Students understood the participant recruitment process, coaching schedule and intensity, the role of the coach, facility availability, learning implementation, simulation activities, as well as the monitoring and evaluation system applied. The coaching program was perceived as capable of enhancing students' understanding of Earth Science concepts and developing scientific thinking skills. Nevertheless, students still faced challenges in understanding abstract and complex materials, such as Astronomy, and experienced limitations in practical field experiences that had not been evenly accessible to all participants.

Affectively, students assessed the OSN Earth Science coaching program as a meaningful, structured, and collaborative learning experience. This program not only improved students' academic knowledge but also fostered greater interest, enjoyment, and curiosity in the Earth Science field. Furthermore, the coaching helped build positive attitudes, including learning motivation, discipline, commitment, and mental readiness in facing competitions. However, at higher competition levels, particularly the provincial level, some students experienced a decline in self-confidence, indicating the need for psychological support and more intensive mental readiness reinforcement.

Conatively, students demonstrate strong commitment and engagement regular attendance, active participation, self-directed learning strategies, and constructive suggestions for program improvement. Their motivations reflect both intrinsic interest in Earth Science and extrinsic factors (teacher influence, career alignment), suggesting coaching programs serve multiple functions: academic preparation, interest cultivation, and career orientation.

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