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Empowering Academic Excellence: Pre-National Science Olympiad Training for Elementary and Junior High School Students

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ABSTRACT

This community service activity aimed to enhance students' academic competency and preparedness for the National Science Olympiad (OSN) 2023 in Mathematics and Natural Sciences at elementary and junior high school levels. The program, organized by the Physics Department of Universitas Islam Negeri Walisongo Semarang in collaboration with the Association of Madrasah Science Enthusiasts (Perkumpulan Pegiat Sains Madrasah), was conducted online via Zoom Meeting. The training covered eight comprehensive sessions including Kinematics and Mechanics, Forces, Rotational Dynamics, Oscillations and Waves, Electricity and Magnetism, Solar System, Optics, and Temperature and Heat, along with two simulation sessions. Despite challenges such as network connectivity issues and varying participant readiness levels, the program successfully provided intensive coaching to OSN participants and their supervising teachers from elementary (SD/MI) and junior high school (SMP/MTs) levels. This initiative demonstrates the importance of systematic academic preparation and highlights the role of higher education institutions in supporting K-12 education excellence through collaborative mentoring programs.

Keywords:
National Science Olympiad; Academic preparation; Online training; Science education; Community service.

Introduction

Quality education development requires strategic initiatives that foster student creativity and excellence through academic competitions in science and technology fields (Ministry of Education and Culture, 2022). The National Science Olympiad (OSN) represents one of Indonesia's most prestigious educational competitions, serving as a strategic platform for students to enhance cognitive abilities, problem-solving skills, creativity, and sportsmanship (Puspendik, 2023). This competition encompasses science olympiad events for students at elementary, junior high, and senior high school levels across Indonesia.

Science olympiad competitions provide crucial opportunities for students to develop advanced analytical thinking and scientific reasoning skills (Sulistyorini & Supartono, 2007). However, the success of these competitions cannot be achieved through event organization alone without adequate support and facilitation from educational institutions. Student motivation and enthusiasm must be cultivated, and their efforts must be properly directed to achieve the intended outcomes of olympiad participation (Wibowo & Suhandi, 2013). Therefore, mentoring and guidance for science olympiad preparation are essential responsibilities of educational institutions, ensuring students have clear direction and purpose in their olympiad participation.

The implementation of science olympiad mentoring for teachers at elementary (SD/MI), junior high (SMP/MTs), and senior high school (SMA/MA) levels is expected to provide comprehensive understanding of science olympiad competitions and prepare educators to face these challenging academic contests. Through proper mentoring provided by teachers, student achievement quality in olympiad competitions can be significantly enhanced (Anggraeni & Kustijono, 2013). Teacher guidance and training for science olympiad preparation help students understand and solve problems effectively while preparing them mentally to tackle more challenging olympiad questions compared to regular classroom assessments.

Community service programs focusing on science olympiad preparation represent vital initiatives to ensure students receive adequate support to compete effectively in these prestigious competitions. Such programs contribute to developing generations with strong capabilities and genuine interest in science fields (Sari et al., 2020). Mentoring activities help teachers understand and implement science olympiad guidance optimally through expert consultation, experienced science educator mentorship, and interactive discussions about scientific concepts and methodologies.

Comprehensive science olympiad mentoring for teachers across educational levels helps prepare students for competitive academic challenges. Proper preparation significantly increases opportunities for achieving excellent results (Handayanto & Wilujeng, 2018). When olympiad mentoring teachers understand their roles and functions thoroughly, they can provide invaluable support to students facing olympiad competitions. Intensive and continuous mentoring and guidance conducted by teachers will cultivate enthusiasm and motivation for students to learn and compete effectively (Nurjannah et al., 2019).

Methods

This community service project followed a structured approach consisting of three main stages: preparation, implementation, and evaluation.

Stage I: Preparation
The preparation phase involved comprehensive planning and coordination activities. The Physics Department team, in collaboration with the Association of Madrasah Science Enthusiasts (Perkumpulan Pegiat Sains Madrasah/PPSM), developed detailed training materials covering essential physics topics for OSN preparation. Administrative preparations included creating promotional materials, establishing Zoom Meeting links, and coordinating with all stakeholders. The team also prepared evaluation formats and established clear communication channels with participants and instructors.

Stage II: Implementation
The training program was conducted online via Zoom Meeting. The comprehensive curriculum included eight core sessions: (1) Kinematics and Mechanics, (2) Forces, (3) Rotational Dynamics, (4) Oscillations and Waves, (5) Electricity and Magnetism, (6) Solar System, (7) Optics, and (8) Temperature and Heat. Additionally, two simulation sessions were conducted to provide practical experience with olympiad-style problems. Each session featured expert presentations, problem-solving strategies, interactive discussions, and question-and-answer segments.

Stage III: Evaluation
The evaluation phase included comprehensive assessment of program effectiveness through participant feedback, instructor evaluations, and identification of challenges encountered during implementation. This evaluation process was crucial for determining the success of the community service activity and providing recommendations for future improvements.

Results and Discussions

The Pre-National Science Olympiad Training program successfully engaged participants from elementary (SD/MI) and junior high school (SMP/MTs) levels, along with their supervising teachers. The program was implemented according to the planned schedule, with expert instructors from the Physics Department delivering comprehensive content across all targeted subject areas.

Figure 1 shows an online-based olympiad learning activity conducted via Zoom. The training sessions were conducted by qualified instructors including Istikomah, M.Sc., who provided specialized expertise in their respective physics domains. The curriculum was designed to address key areas typically covered in National Science Olympiad competitions, ensuring participants received comprehensive preparation for the actual competition.

Participant engagement remained consistently high throughout the program duration, with active participation in discussions and problem-solving activities. The online delivery format allowed

broader accessibility for participants from various geographical locations, overcoming traditional barriers to accessing quality olympiad preparation resources (Rahmawati et al., 2021). This approach aligns with current trends in educational technology integration and distance learning methodologies (Dhawan, 2020).

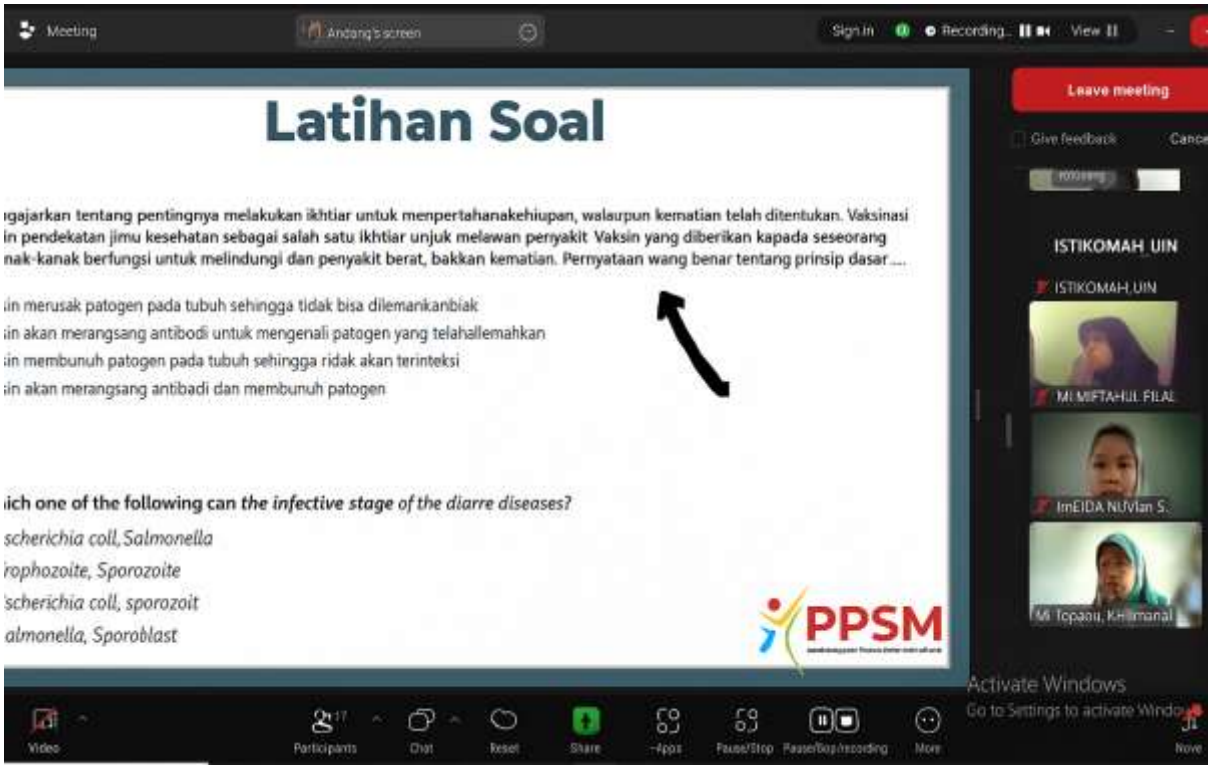

Figure 1. An online-based Olympiad learning activity conducted via Zoom

The simulation sessions proved particularly valuable, providing participants with realistic olympiad problem-solving experiences. These practical applications helped bridge the gap between theoretical knowledge and competitive problem-solving skills required for olympiad success (Setiawan & Susilo, 2022). Similar community service initiatives have demonstrated the positive impact of structured academic preparation programs on student performance in national competitions (Astuti et al., 2021).

Despite the program's overall success, several challenges were identified during implementation. Network connectivity issues occasionally disrupted sessions, reflecting common challenges in online education delivery in Indonesia (Nugroho & Mutmainah, 2021). Additionally, varying levels of participant preparedness and capability differences required adaptive instructional approaches to accommodate diverse learning needs.

The program's funding through PPSM demonstrated the collaborative nature of this initiative and the commitment to supporting academic excellence at the grassroots level. This investment in human capital development represents a strategic approach to enhancing Indonesia's competitiveness in international science competitions (Wardani & Suyanto, 2019).

Conclusion

The Pre-National Science Olympiad Training program for Elementary and Junior High School Students successfully achieved its primary objectives of preparing students and teachers for OSN 2023 competitions. The comprehensive eight-session curriculum, delivered through online platforms, provided accessible and quality preparation resources for participants across diverse geographical locations. Despite challenges related to network connectivity and varying participant readiness levels, the program demonstrated the effectiveness of collaborative mentoring between higher education institutions and K-12 education stakeholders.

The positive participant response and engagement levels indicate strong community readiness for systematic academic preparation programs. These findings emphasize the importance of continued investment in teacher development and student preparation initiatives, particularly in science education. Future implementations should address technical infrastructure challenges while maintaining the program's comprehensive curriculum approach and collaborative delivery model.

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