JURNAL PENGABDIAN KEPADA MASYARAKAT TABIKPUN
Vol. 6, No. 1, Maret 2025
e-ISSN: 2745-7699 p-ISSN: 2746-7759
https://tabikpun.fmipa.unila.ac.id/index.php/jpkm_tp
DOI: 10.23960/jpkmt.v6i1.192

Training for Understanding Mathematics Olympiad for Students and Teachers of SMAN 2 Kalianda

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A B S T R A C T

Kegiatan yang dirancang untuk meningkatkan penguasaan dan pemahaman materi olimpiade matematika di SMAN 2 Kalianda dilakukan untuk mendukung guru dan siswanya, sebab keberhasilan dalam olimpiade matematika memerlukan persiapan dan pembinaan yang baik. Ceramah, tanya jawab, dan simulasi adalah metode yang digunakan. Kegiatan ini tujuannya adalah agar guru dan siswa dapat memahami konsep-konsep materi olimpiade matematika di SMA, mendorong siswa untuk dapat aktif berpartisipasi dalam pelatihan, serta meningkatkan pemahaman siswa tentang materi olimpiade matematika. Kegiatan ini menghasilkan peningkatan pemahaman konsep matematika dan kemampuan guru untuk membimbing dan membina siswa untuk berkompetisi pada olimpiade matematika, seperti yang ditunjukkan oleh nilai siswa setelah menjalani post-test yang mengalami peningkatan yang signifikan.

Kata kunci: Matematika, Olimpiade, SMAN 2 Kalianda

A B S T R A C T

The activities designed to improve the mastery and understanding of mathematics olympiad materials at SMAN 2 Kalianda are conducted to support teachers and students, because success in mathematics olympiad requires good preparation and coaching. Lectures, Q&A sessions, and simulations are among the techniques employed. This program's objectives are to improve the high school learning environment, encourage students to actively engage in coaching, and assist them in comprehending the materials. As demonstrated by the significant rise in students' post-test scores, this exercise has improved teachers' comprehension and abilities to help students prepare for mathematical olympiads.

Keywords: *Mathematics, Olympiad, SMAN 2 Kalianda*

Submit:	Revised:	Accepted:	Available online:
06.11.2024	18.02.2025	05.03.2025	19.03.2025

INTRODUCTION

In 2002, the government through the Department of National Education, now known as the Ministry of National Education, organized the National Science Olympiad with one of the fields being mathematics (Pusat Prestasi Nasional, 2023).

The Math Olympiad has different characteristics in terms of the types of questions and assessment techniques from other math competitions. The questions given usually require special attention or expertise to solve, so math olympiad questions are rarely found in the classroom (Yuntawati & Sanapiah, 2020).

Mathematics olympiad questions include exploratory questions, reasoning, creativity, and concept understanding, with a fairly high difficulty level. Even for teachers at the senior high school level, these questions are a challenge in themselves (Ansori, Wamiliana, Amanto, & Chasanah, 2022).

Teachers often face difficulties in solving math olympiad questions due to lack of habit and lack of training in understanding math olympiad materials and solving math olympiad questions (Mauliddin, 2018). The materials of the math olympiad are not routine thus it is not easy for students to understand. Students experience some misconceptions, even about the common material, such as the quadratic equations (Sarlina, 2015). Not only students, but also some misconceptions occur when the teacher gives the topics in class (Yohanes, 2022).

Teachers and students at SMAN 2 Kalianda have obstacles in participating in math olympiad activities, namely the lack of routine training. This affects the insufficient abilities of both teachers and students in solving math olympiad questions. Therefore, assistance is needed to improve understanding and skills in solving math olympiad problems at SMAN 2 Kalianda.

This service team has previously carried out several similar activities. Ansori, Wamiliana, Amanto, & Chasanah (2022) conducted an activity with the title increasing the competence of Mathematics Teachers and understanding of SMPN 1 Baradatu students in Mastering Mathematics Olympiad Material with the results of coaching activities are able to improve the ability, and mastery of mathematics olympiad material for both teachers and students. Another similar training was held at SMAN 13 Bandar Lampung for teachers and students (Ansori, Wamiliana, Nurvazly, & Chasanah, 2023). The result of the coaching activities showed a similar result.

Several other activities that are also similar to this service activity are activities carried out by (Dewi, 2022) entitled fostering mathematics olympiads in the field of combinatorics at the high school level in Jati Agung, South Lampung. There was also an activity carried out by (Agustina, Sunandi, & Fransiska, 2018) entitled efforts to improve the mathematical abilities of SMA Negeri 8 Bengkulu City students in facing science olympiads. In addition, (Putri, et al., 2023) conducted an activity concerning training for the National Science Olympiad (OSN) for math students in High School in Samarinda.

PROBLEM IDENTIFICATION

Mathematics olympiad questions tend to have a high level of difficulty, even for senior high school students, making it a challenge for students and teachers to prepare themselves. Students and teachers at SMAN 2 Kalianda face various obstacles in the preparation needed to participate in math olympiad competitions, including a less in-depth understanding of the olympiad materials, limited mathematical exploration skills, and rudimentary problem-solving skills. These are factors that need to be considered in an attempt to increase the quality of students' preparation and teachers' assistance for the math olympiad.

Based on the problems found, the ideal conditions required are:

1. Development of Specialized Learning Modules: Create learning modules specifically designed for math olympiads, covering advanced topics and problem-solving methods not commonly found in the regular curriculum.
2. Teacher Training: Organize workshops and training for mathematics teachers to improve their ability to teach Olympic material and effective problem-solving strategies.

3. Olympic Preparation Class: Establish a special math olympiad class that allows students to study and practice intensively, focusing on problem-solving skills and mastery of advanced material.
4. Collaboration with Experts or Alumni: Engage alumni who have been successful in math olympiads or experts from universities to provide additional guidance and knowledge.
5. Competition Simulations: Regularly hold Olympic simulations to familiarize students with the format and difficulty level of real questions, as well as to hone their ability to manage time and pressure during exams.

Based on the situation analysis at SMAN 2 Kalianda, the problem faced by both teacher and student in facing the math olympiad is the insufficient coaching and skill development needed to solve the math olympiad problems. Therefore, assistance is needed for teachers and students at SMAN 2 Kalianda to improve their competence and understanding in mastering the material needed to solve the math olympiad problems.

IMPLEMENTATION METHOD

The math olympiad coaching training took place on June 10 and 11, 2024 at SMAN 2 Kalianda in person. Teachers and students attended this activity as coaching participants. The methods applied in this training include:

1. Lecture: The resource person used the lecture method to deliver material on mathematical concepts to the teachers with PowerPoint slides as a tool as well as a means to motivate students and introduce effective learning strategies.
2. Discussion: the discussion method was used by the resource person in interaction with teachers and students with the help of PowerPoint slides and modules containing Olympiad questions to improve teachers' knowledge and understanding of the mathematics Olympiad at the SMA/MA level comprehensively, so that they can master the mathematics Olympiad material well.
3. Independent practice tasks: trainees are given independent practice tasks provided in the module as part of this training method. This aims to improve the skills of teachers and students in the process of mastering math olympiad materials.

The steps in this service activity include:

1. The initial stage: At this stage, the service team held discussions related to the technical implementation of the activity. After that, the team conducted a location survey and asked permission from the Head of SMA Negeri 2 Kalianda to conduct coaching for 2 days.
2. Implementation stage: The implementation stage includes the implementation of service activities and preparation for evaluation. When implementing the activity, the service team shared tasks so that this activity ran smoothly. The following is the material presented, as listed in Table 1.

Table 1. Material Delivery

Participants	Presenters	Material
Teacher and student	Introduction to math olympiad: tips and strategies.	Wamiliana Muslim Ansori
Teacher	Delivery of high school math olympiad materials: algebra, number theory, combinatorics, geometry.	Muslim Ansori, Wamiliana, Siti L. Chasanah, Dina Eka N
Student	Coaching on algebra, number theory, combinatorics, and geometry.	Siti L. Chasanah, Dina Eka N

RESULTS AND DISCUSSION

In the initial stage, the team developed some of the materials used in this training, which included number theory, algebra, geometry, and combinatorics.

Figure 1. Training Modul

Figure 1 above is the modules that have been made by the service team. The modules contain materials and olympiad questions used during the training. The materials are based on the survey conducted so that they focus on the problems faced by teachers and students of SMAN 2 Kalianda. There are 4 modules that cover the entire Olympiad material. This module was made as a means to understand and increase the skills of students and teachers in solving math olympiad questions.

This training activity was attended by 19 students of SMAN 2 Kalianda consisting of X and XI classes. The training activity began with giving a pretest which was available in the module. The pretest was given with the aim that the service team could find out the initial ability of students to understand math olympiad questions.

Figure 2. Pretest For Students

Figure 2 shows the activities when students were given a pretest. When giving the pretest, students showed high enthusiasm, seen from all students who immediately worked on the questions given. The activity continued with the presentation of material by the service team using the lecture method and PowerPoint slides. After presenting the material, students carry out simulation activities. Simulation activities are given so that the service team knows how students' skills in solving math olympiad questions. After the simulation was carried out, it was found that the number theory and algebraic combinatorics questions were easier than the other material, while geometry was the most difficult problem, so the provision of material was emphasized more on geometry material, but the provision of other material was still carried out evenly.

Figure 3. Providing Material To Teachers

The activity of providing material to teachers in the form of guidelines and strategies for solving math olympiad problems can be seen in Figure 3. Providing this material to teachers is done so that teachers understand and are more skilled in solving math olympiad questions.

In addition to providing material, the team also provided independent practice tasks to teachers and students. The independent practice task given is a simulation containing math olympiad questions contained in the module. After the simulation was carried out to solve the

Olympic questions contained in the module, the team continued the activity with a discussion to discuss the questions given. From the simulations and discussions carried out, it was found that most teachers and students were not accustomed to working on Olympic questions, because Olympic questions were not questions that were routinely encountered at school.

Overall, the coaching activities went well as seen from the enthusiasm of the teachers in asking questions and the students who were eager to work on the Olympic questions. The questions given by the speakers were also responded well although not all questions were answered correctly.

To determine the level of success in this training activity, an evaluation was conducted. The evaluation was carried out by comparing the results of the pretest conducted at the beginning and posttest at the end of the coaching activity. The following is a comparison of student pretest and posttest results.

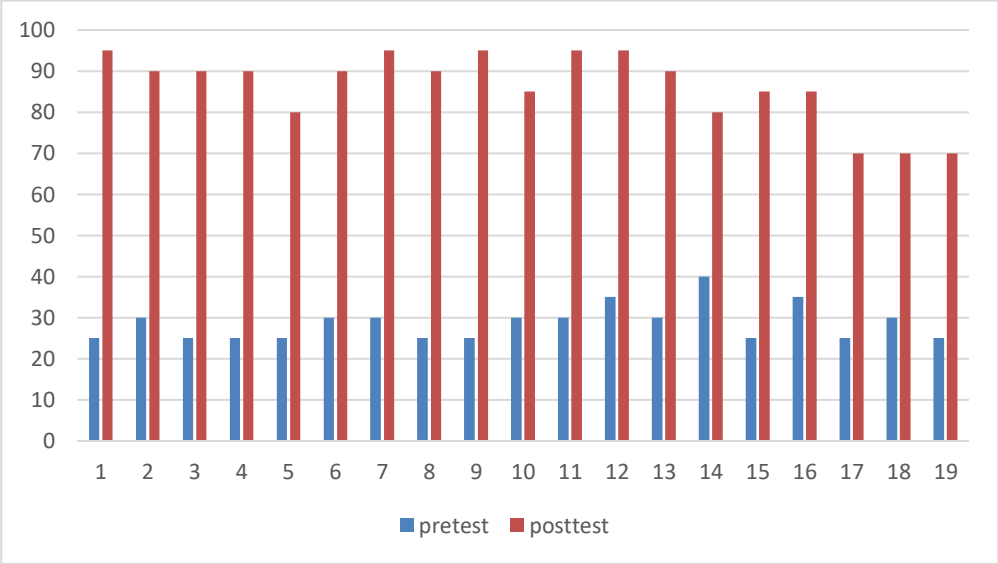

Figure 4. Pretest and Posttest grade

From Figure 4, it is known that the post-test results have increased after the training. The average student pretest score was 28.68 while the average student posttest score was 86.32. Based on this, there was an increase in the average score of 66.45%. The percentage increase in pretest and posttest scores can be seen in the figure below.

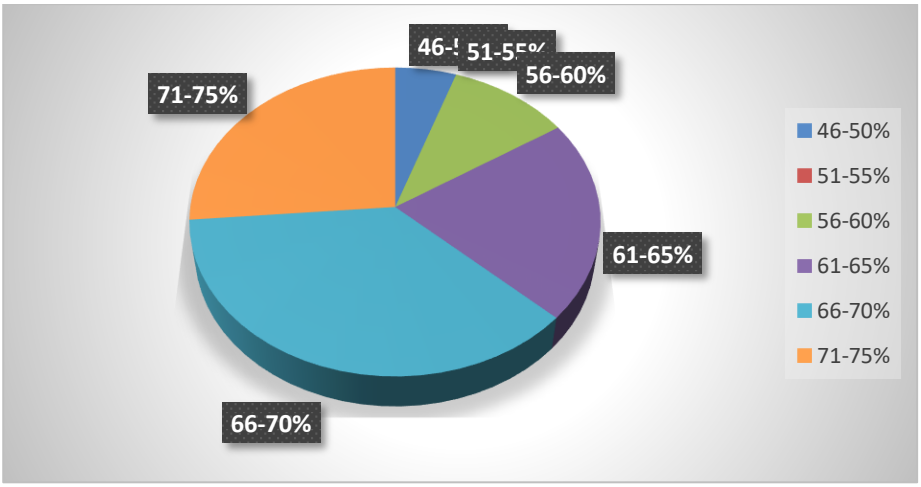

Figure 5. Percentage Increase in Students' Pretest and Posttest Scores

In Figure 5, it can be seen that students who gained an increase in pretest and posttest scores of 46-50% were 5%, students who gained an increase in pretest and posttest scores of 51-55% were 0%, students who gained an increase in pretest and posttest scores of 56-60% were 11%, students who gained an increase in pretest and posttest scores of 61-65% were 21%, students who gained an increase in pretest and posttest scores of 66-70% were 37%, and students who gained an increase in pretest and posttest scores of 71-75% were 26%. From these data, the average percentage increase in students' pretest and posttest scores was 66.45%. Therefore, it can be concluded that there was an increase between students' pre-test scores and post-test scores.

CONCLUSION

The service team has completed the event where the Math Olympiad training went well at SMAN 2 Kalianda. Teachers and students become more interested in and knowledgeable about the Math Olympiad due to the training exercises. The training activities improved the teachers' and students' ability to work on olympiad questions. Similar training activities can be carried out continuously and also applied to other high schools. Thus, it can improve students' ability to compete in regional, national, and international Olympiads.

ACKNOWLEDGEMENT

We wish to thank LPPM Universitas Lampung for funding community service activities with the PKM Unggulan scheme in 2024.

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