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The Application of The Pogil Model to Improve the Activity and Learning Outcomes of IPA Class V Students UPT SDN Tondrong Saddang

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Abstrak

Penelitian ini bertujuan untuk mengevaluasi penerapan Model POGIL (Process Oriented Guided Inquiry Learning) dalam meningkatkan aktivitas dan hasil belajar IPA siswa kelas V di UPT SDN Tondrong Saddang. Penelitian ini menggunakan metode Penelitian Tindakan Kelas (PTK) yang terdiri dari dua siklus. Setiap siklus mencakup tahap perencanaan, pelaksanaan, observasi, dan refleksi. Hasil penelitian menunjukkan adanya peningkatan signifikan dalam aktivitas siswa, hasil belajar, dan motivasi belajar setelah penerapan Model POGIL. Pada Siklus I, rata-rata aktivitas siswa mencapai 55%, dengan hasil tes formatif rata-rata 72,5 dan skor motivasi siswa sebesar 3,2. Setelah dilakukan perbaikan dalam Siklus II, terjadi peningkatan dalam semua aspek. Aktivitas siswa meningkat menjadi 75%, hasil tes formatif mencapai rata-rata 85,0, dan motivasi siswa meningkat menjadi 4,5. Peningkatan ini menunjukkan bahwa Model POGIL efektif dalam mendorong siswa untuk lebih aktif dalam pembelajaran, meningkatkan pemahaman konseptual, serta memperkuat keterampilan berpikir kritis dan kolaborasi. Selain itu, Model POGIL juga berhasil meningkatkan motivasi siswa, yang berkontribusi positif terhadap hasil belajar mereka. Penelitian ini merekomendasikan penerapan Model POGIL dalam pembelajaran IPA dan mata pelajaran lainnya untuk meningkatkan kualitas pendidikan secara keseluruhan, serta mengembangkan keterampilan berpikir kritis yang lebih baik di kalangan siswa.

Kata Kunci: Model POGIL, Hasil Belajar

Abstrack

This study aims to evaluate the implementation of the POGIL (Process Oriented Guided Inquiry Learning) model in improving the activity and learning outcomes of science students in the fifth grade at UPT SDN Tondrong Saddang. The research employed Classroom Action Research (CAR) with two cycles, each consisting of planning, implementation, observation, and reflection stages. The results indicate a significant improvement in student activity, learning outcomes, and motivation after the application of the POGIL model. In Cycle I, the average student activity was 55%, with formative test results averaging 72.5, and student motivation scoring 3.2. After improvements in Cycle II, all aspects showed growth. Student activity increased to 75%, formative test scores averaged 85.0, and student motivation rose to 4.5. This improvement demonstrates that the POGIL model effectively encourages students to be more engaged in learning, enhances conceptual understanding, and strengthens critical thinking and collaboration skills. Additionally, the POGIL model successfully boosted student motivation, positively contributing to their learning outcomes. This research recommends the application of the POGIL model in science education and other subjects to improve the overall quality of education and further develop students' critical thinking better among students.

***Keywords**: Process Oriented Guided Inquiry Learning, Learning Outcomes*

Intruduction

Education at the primary level has a very crucial role in forming the basis of students' knowledge and skills. One of the important subjects in the basic education curriculum is Natural Sciences (IPA). Science not only provides knowledge about the surrounding world but also equips students with critical thinking and problem-solving skills. However, in practice, science teaching often faces various challenges, especially in improving student learning activities and outcomes.

Student activity in learning is very influential in achieving optimal learning outcomes. Activities that actively involve students can increase their engagement and, in turn, affect their learning outcomes. In the context of science learning, approaches that involve experiments, discussions and practical activities can deepen students' understanding of scientific concepts. This shows that an active and interactive learning approach is needed to improve the quality of science learning.

However, many teachers face difficulties in making science learning interesting and interactive. Students' lack of interest in science is often caused by teaching methods that are less varied or do not involve students actively. As a result, student learning outcomes in this subject are less than optimal. In this situation, it is important to find learning methods that can overcome these challenges and improve student engagement and learning outcomes.

One of the learning methods that can be a solution is the POGIL (Process Oriented Guided Inquiry Learning) Model. This model focuses on developing students' scientific process skills through inquiry-based activities. The POGIL model emphasizes question-based learning and active exploration and collaboration between students. With this approach, students not only receive information but also actively seek and develop their own understanding.

The POGIL model consists of several key components, including exploration activities, guided questions, and group discussions. Exploratory activities are designed to arouse students' curiosity and lead them to investigate scientific concepts. Guided questions serve to help students direct their thinking and find relevant answers. Group discussions allow students to share their thoughts and learn from the perspectives of their peers.

The application of the POGIL Model can provide various benefits, including increased critical thinking skills, problem solving, and collaboration between students. This model can also improve student learning activities and learning outcomes in science subjects. By actively involving students in the learning process, the POGIL Model has the potential to improve students' understanding of science materials as well as important scientific skills.

Previous research has shown that the POGIL Model is effective in improving student engagement and learning outcomes across a range of subjects. These studies have identified the benefits of this model in the context of science learning and how it can be applied at the primary school level. However, there is still a need for further research into the application of the POGIL Model in the primary school setting, particularly in grade V.

The context of this research is UPT SDN Tondrong Saddang, an elementary school that requires efforts to improve student learning activities and outcomes in science subjects. This school was chosen because of the need felt by the school to improve the quality of science learning and student learning outcomes. By applying the POGIL Model, it is hoped that a more effective way can be found to improve student engagement and learning outcomes.

The main objective of this study is to evaluate the effectiveness of the POGIL Model in improving students' science learning activities and outcomes in class V UPT SDN Tondrong Saddang. This study aims to provide insights

into how this model can be effectively applied in an elementary school setting and provide recommendations for classroom learning practices.

This research methodology will use a quantitative approach with a classroom action research design. Data will be collected through observation of student activities, learning outcomes tests, and interviews with teachers and students. Data analysis will be conducted to assess the impact of implementing the POGIL Model on student activity and learning outcomes in class V.

It is expected that this research can make a significant contribution to the development of science learning methods in elementary schools. The findings of this study are expected to be used to improve classroom learning practices and provide recommendations for teachers and education policy makers.

This research is important because it can help teachers in applying more effective and interactive learning methods. By improving students' learning activities and outcomes, it is expected that students will better understand science concepts and have better scientific skills. This can also have a positive impact on the overall quality of education.

However, this study also has limitations, such as limited time and available resources. The results of this study may not be generalizable to all other primary school contexts. Therefore, it is important to consider the local context and specific needs when implementing the POGIL Model.

The operational definition in this study includes learning activities that involve student participation in discussions, experiments, and task completion. Learning outcomes are measured through learning outcome tests that include understanding of science concepts and scientific skills obtained during the learning process.

The literature review will include previous studies on the POGIL Model and its application in science learning. It will include the learning theories underlying this model as well as relevant research results. This review is expected to provide a theoretical and practical basis for this research.

The implementation plan for the POGIL Model in grade V will include the development of learning materials, teacher training and curriculum adjustments. These strategies are designed to ensure that the implementation of this model runs smoothly and effectively, and can provide maximum benefits for students.

Evaluation of the implementation of the POGIL Model will be conducted through assessment of student activity, analysis of learning outcomes, and feedback from teachers and students. These assessments aim to determine the extent to which the model affects student activity and learning outcomes and to identify areas for improvement.

Overall, the application of the POGIL Model in science learning in class V UPT SDN Tondrong Saddang has the potential to improve student learning activities and outcomes. By actively involving students in the learning process, it is expected that they will better understand science concepts and develop scientific skills that are important for their future.

Method

This study adopted a Classroom Action Research (PTK) approach with a cycle-based design to assess the effectiveness of the POGIL Model in improving science learning activities and outcomes of fifth grade students at UPT SDN Tondrong Saddang. This model is designed to provide opportunities for researchers to implement interventions directly in the classroom, as well as observe and evaluate their impact in real-time through repeated cycles. PTK allows researchers to make modifications and improvements based on the evaluation results of each cycle, thus providing an opportunity to improve the quality of learning in a sustainable manner.

In this study, each cycle consisted of four main stages: planning, implementation, observation, and reflection. In Cycle I, the first step was planning, where the researcher developed a lesson plan using the POGIL

Model. This plan included the development of teaching materials, activity guides, and assessment instruments that would be used to evaluate student learning outcomes. In this stage, the researcher also designed observation sheets to monitor students' activities, as well as questionnaires to collect feedback from students and teachers.

After the plan is developed, the next stage is implementation, where the POGIL Model is applied in the learning process in the classroom. The applied POGIL model involves exploration activities, guided questions, and group discussions. Exploration activities are designed to encourage students to discover science concepts through direct experience. Guided questions assist students in directing their thinking to understand the material in depth, while group discussions provide opportunities for students to share knowledge and deepen their understanding through social interaction.

During the implementation, researchers conducted observations to collect data on student activities and the learning process. Observation sheets were used to record student engagement, participation in experiments, as well as collaboration in groups. In addition, formative tests were used to measure students' understanding of the material taught, and questionnaires were administered to obtain feedback on their learning experience. The data collected from these observations and assessments were then analyzed in the reflection stage.

In the reflection stage, researchers analyzed observation and test data to evaluate the effectiveness of the POGIL Model. The results of this analysis were used to identify the strengths and weaknesses of the model implementation, as well as to plan the necessary improvements. Based on the reflection results from Cycle I, researchers then prepared Cycle II by making improvements to the lesson plan, including updating the teaching materials and learning strategies to be applied.

Cycle II began with improved planning, in which the researcher adjusted the teaching materials, activities, and assessment instruments based on the results of the reflection from Cycle I. The improvements were aimed at increasing the effectiveness of the POGIL Model and overcoming the problems found in the previous cycle. These improvements aimed to increase the effectiveness of the POGIL Model and overcome the problems found in the previous cycle. After planning, the implementation of Cycle II was carried out by implementing the improved plan. Researchers continued to use the POGIL Model, but with adjustments that were expected to improve student learning activities and outcomes.

During the implementation of Cycle II, the researcher again conducted observations to collect data regarding students' activities and their learning outcomes. This data includes observation sheets that record student engagement, formative tests that measure student understanding, and questionnaires that provide feedback on learning. The data collected was used to evaluate whether the improvements made had a positive impact on students' activities and learning outcomes.

In the final stage, which is the reflection of Cycle II, researchers analyzed the data obtained to determine the effectiveness of the POGIL Model after improvement. The researcher evaluated whether there was a significant improvement in students' learning activities and outcomes compared to Cycle I. The conclusions from this analysis were used to make recommendations on better learning practices in the future. The conclusions from this analysis were used to make recommendations on better learning practices in the future.

To measure student activity, researchers used observation sheets with parameters of involvement in discussion, participation in experiments, and collaboration in groups. Activity scores are calculated using the formula:

$$\text{Skor Aktivitas} = \frac{\text{Jumlah Skor Aktivitas}}{\text{Jumlah Kriteria Aktivitas}} \times 100$$

Student learning outcomes were measured through formative and summative tests. The learning outcome score is calculated with the formula:

$$\text{Nilai Akhir} = \frac{\text{Jumlah Skor yang Diperoleh}}{\text{Jumlah Skor Maksimal}} \times 100$$

Student motivation was measured using a questionnaire with a Likert scale, and motivation scores were calculated using the formula:

$$\text{Skor Motivasi} = \frac{\text{Jumlah Skor Kuesioner}}{\text{Jumlah Item Kuesioner}}$$

For data analysis, researchers used statistical tests, such as the t-test, to compare test results between Cycle I and Cycle II. The percentage increase in activity and learning outcomes was calculated using the formula:

$$\text{Persentase Peningkatan} = \frac{\text{Hasil Siklus II} - \text{Hasil Siklus I}}{\text{Hasil Siklus I}} \times 100$$

Result and Discussion

This study aims to evaluate the application of the POGIL (Process Oriented Guided Inquiry Learning) Model in improving the activities and learning outcomes of fifth grade science students at UPT SDN Tondrong Saddang. This research was conducted in two cycles, where each cycle consisted of planning, implementation, observation, and reflection. The following are the results and discussion of the two cycles that have been implemented.

Cycle I

1. Planning

In Cycle I, planning was done by preparing lesson plans using the POGIL Model, including inquiry-based learning activities and group division. This plan includes the preparation of activity guides, student worksheets (LKS), and learning media relevant to science materials.

2. Implementation

Implementation of Cycle I involves:

Material Delivery: Teaching is conducted with a focus on the inquiry method, where students are divided into groups to conduct experiments and discussions. Student Activity: Student activity was measured based on engagement in discussions, participation in experiments, and collaboration in groups. Evaluation: Formative tests are conducted at the end of the cycle to assess students' understanding of the material.

3. Observation

Observations were made to measure students' activities and their involvement in the learning process. The following are the results of student activity scores during Cycle I**:**

Table 1. Student Activity Score in Cycle I

Activity Aspect	**Score (%)**
Discussion Engagement	60%
Experiment Participation	55%
Group Collaboration	50%
Average Activity Score	**55%**

4. Formative Test Results

The formative test showed the following results:

Table 2. Formative Test Results in Cycle I

Formative Test Score (Average)	**Value**
Cycle I	72.5

5. Questionnaire Feedback

Feedback from students at the end of Cycle I showed an average motivation score:

Table 3. Student Motivation Score in Cycle I

Motivation Score (Average)	**Value**
Cycle I	3.2

Cycle II

1, planning For Cycle II, the planning was improved based on feedback from Cycle I. The following elements were added:
Activity Improvement: Increased time for group discussions and modified student worksheets to make them more challenging. Use of Media: Addition of learning media such as teaching aids and technology to support learning activities.

2. Implementation, Cycle II implementation includes: Material Delivery: Implementation of the POGIL Model with adjustments to more interactive activities. Student Activity: Increased student participation and engagement in experiments and discussions. Evaluation: Formative tests are repeated with a format that focuses more on concept application.

3. Observation, The results of observations in Cycle II showed an increase in student activity as follows:

Table 5. Student Activity Score in Cycle II

Activity Aspect	**Score (%)**
Discussion Engagement	80%
Experiment Participation	75%
Group Collaboration	70%
Average Activity Score	**75%**

4. Formative Test Results The formative test results in Cycle II showed a significant improvement:

Table 6. Formative Test Results in Cycle II

Formative Test Score (Average)	Value
Cycle II	85.0

5. Questionnaire Feedback

Students' motivation scores after the improvement in Cycle II are as follows:

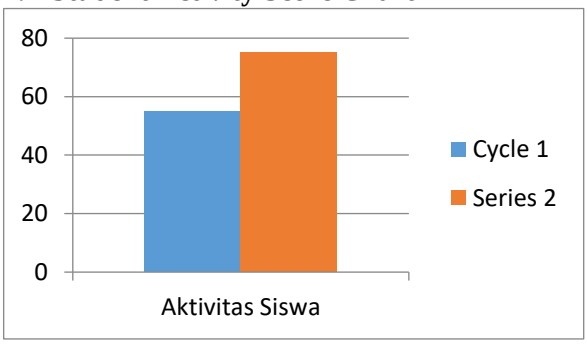
Table 7. Student Motivation Score in Cycle II

Motivation Score (Average)	Value
Cycle II	4.5

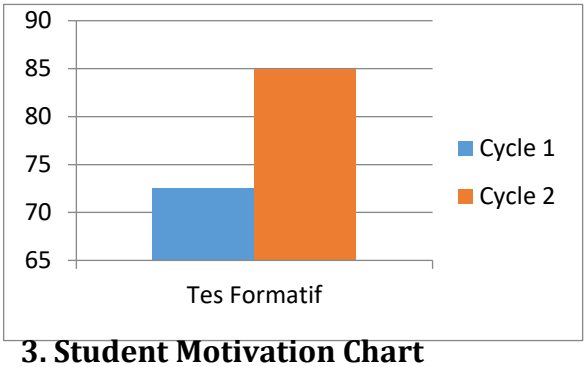
Comparison Chart

To provide a visual picture of the research results, here is a comparison chart of activity scores, formative test results, and student motivation between Cycle I and Cycle II:

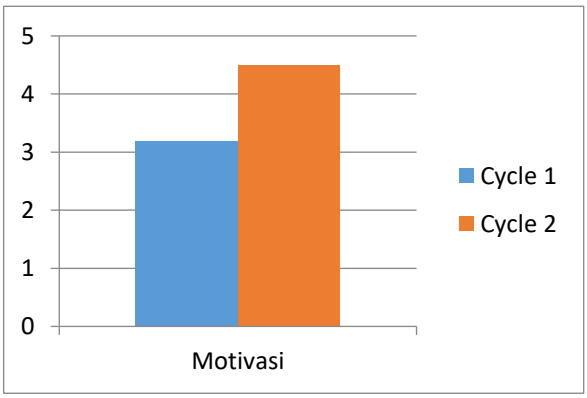
1. Student Activity Score Chart



2. Formative Test Results Chart



3. Student Motivation Chart



Student Activity in Learning The significant increase in student activity scores indicates that the application of the POGIL (Process Oriented Guided Inquiry Learning) Model can effectively increase student engagement. In Cycle I, the average student activity only reached 55%, but this figure increased to 75% in Cycle II. This indicates that this inquiry-based and collaborative learning model is able to move students to be more active in the learning process.

Involvement in Discussion One of the most prominent aspects of improving student activity is involvement in group discussions. In Cycle II, students were more involved in constructive discussions compared to Cycle I. They dared to ask questions, express opinions, and respond to their friends' arguments. They dared to ask questions, express opinions, and respond to their friends' arguments. This intensive discussion activity showed an improvement in communication skills among students.

Participation in Experiments In addition to discussions, participation in experimental activities also increased. In Cycle I, some students tended to be passive in participating in the experiment, but with the modification of a more challenging Student Worksheet (LKS) in Cycle II, their participation increased significantly. The application of the POGIL Model involving inquiry-based experiments motivates students to be more involved.

The role of worksheets in increasing student activity The use of worksheets that are designed to be more challenging and direct students to think critically plays an important role in increasing their involvement. In Cycle I, the worksheets tended to be less challenging so that students were not too encouraged to participate. However, after modifications were made, the worksheet in Cycle II provided a better stimulus in encouraging student activity.

The increase in the average score of the formative test from 72.5 in Cycle I to 85.0 in Cycle II shows that the application of the POGIL Model is effective in improving students' understanding of science material. This increase indicates that students not only understand basic concepts, but are also able to apply them in more complex situations.

Better Conceptual Understanding The increase in formative test scores not only reflects an improved understanding of the material, but also shows an increase in students' ability to apply their knowledge in problems that require deeper thinking. This suggests that inquiry-based learning can help students develop a more comprehensive understanding of science concepts.

Inquiry Approach Support The inquiry approach in the POGIL Model provides students with the opportunity to develop analytical thinking and problem solving skills. By conducting independent exploration and group discussions, students can explore various concepts in more depth, which ultimately has an impact on improving formative test results.

Student Motivation in Learning Student **motivation** also increased significantly after the implementation of the POGIL Model. In Cycle I, student motivation was measured with an average score of 3.2, but this figure increased to 4.5 in Cycle II. This increase indicates that students feel more involved and enthusiastic in participating in learning.

Interactivity and Student Engagement The increase in student motivation can be attributed to the interactive and problem-based characteristics of the POGIL Model. Students are given challenges that are relevant to their daily lives, so they feel more interested and motivated to complete the tasks given.

The Relationship between Motivation and Learning Outcomes High motivation plays a role in improving student learning outcomes. When students feel motivated, they tend to put more effort into understanding the material and actively participating in learning. This can be

seen from the significant increase in formative test results in Cycle II.

Students' Critical Thinking Skills The POGIL model also proved effective in developing students' critical thinking skills. In Cycle II, students' analysis, evaluation, and synthesis skills improved significantly compared to Cycle I. This shows that the POGIL Model successfully provided the right stimulus to train students' critical thinking skills. This shows that the POGIL Model successfully provides the right stimulus to train critical thinking skills.

Application of Collaboration-Based Approach, One of the factors that support the improvement of critical thinking skills is collaboration between students. In the POGIL Model, students work in groups to solve problems and explore new concepts. This process encourages them to think more deeply and consider multiple perspectives.

Development of Problem Solving Skills, With the inquiry approach, students are invited to engage in complex problem solving. This not only trains their critical thinking skills, but also helps them develop the ability to analyze problems and seek solutions systematically.

Teacher's Role as Facilitator In the POGIL Model, the teacher's role shifts from a teacher to a facilitator. The teacher helps direct students in finding their own answers through the inquiry process. This helps students become more independent in learning and develop confidence in completing tasks.

Implications for Learning The application of the POGIL model not only impacts on learning outcomes, but also on student engagement and motivation. This model succeeds in creating a dynamic and challenging learning environment, so that students are more interested in learning and participating in learning.

Recommendations for Application in Other Classes The POGIL model is highly recommended for application in other classes and in different subjects. With its inquiry-based approach and collaboration, this model can help improve students' engagement and their learning outcomes in various learning contexts.

Further Development Further research could explore the application of the POGIL Model in different learning contexts. For example, how this model can be applied in more abstract subjects such as math, or how it affects non-academic skills such as social skills.

Long-term Impact on Critical Thinking Skills The application of the POGIL Model can also be further explored in research that examines the long-term impact on students' critical thinking skills. Longitudinal research can reveal the extent to which these skills persist and develop over time.

Application in Science Learning in Other Schools It is hoped that with the adoption of the POGIL Model, the quality of science learning in other schools can also improve. Students will gain a deeper understanding of the material and critical thinking skills needed to face future challenges.

The POGIL model is proven effective in improving students' activities, learning outcomes, motivation, and critical thinking skills. With an interactive and inquiry-based approach, this model provides a more meaningful learning experience for students and can be widely applied to improve the quality of education.

Conclusion

This study aims to evaluate the application of the POGIL (Process Oriented Guided Inquiry Learning) Model in improving the activities and learning outcomes of fifth grade science students at UPT SDN Tondrong Saddang. Based on the results of two cycles, it is evident that the POGIL Model is effective in increasing overall student engagement.

In Cycle I, planning involved developing an inquiry-based activity guide that was used to guide students in the learning process. Students were organized into groups to conduct experiments and discussions.

Student activity during Cycle I showed quite low engagement with an average activity score of only 55%. This was due to the lack of challenges in the Student Worksheet (LKS) and limited time for group discussions.

The formative test scores in Cycle I showed adequate results, with an average of 72.5. This indicates that most students understood the basic material, but were not yet able to apply it optimally in more complex situations.

Student motivation in Cycle I was at an average score of 3.2, reflecting moderate enthusiasm in following the learning process. In Cycle II, improvements were made to the planning aspect, especially by providing more discussion time and modifying the worksheet to make it more challenging. Learning media was also improved to support students' understanding.

Cycle II results showed a significant increase in student activity, with the average activity score reaching 75%. Students became more active in discussions, participating in experiments, and working together in groups.

Group discussion became the most prominent aspect in Cycle II, with much better student engagement compared to Cycle I. Students more often asked questions, expressed opinions, and responded to each other's arguments.

Increased participation in experimental activities was also evident in Cycle II. The modification of the LKS that was more challenging succeeded in encouraging students to be more involved in the experiment.

The use of a more challenging worksheet in Cycle II played a major role in increasing student engagement. This worksheet helped them think more critically and explore the material.

Formative test scores in Cycle II increased to an average of 85.0, indicating a better understanding of science concepts, as well as the ability of students to apply them in more complex problems.

The improvement in formative test results also indicates students' better conceptual understanding, where they are able to think analytically and solve problems more effectively.

Student motivation in Cycle II also increased significantly, with the average score reaching 4.5. This indicates that students felt more engaged and enthusiastic about the learning approach used.

The interactivity in the inquiry-based POGIL Model makes students feel challenged and more motivated to actively participate in learning, thus contributing to increased motivation.

This increase in motivation plays a role in improving learning outcomes, because more motivated students tend to put more effort into understanding the material and actively participating in learning.

The POGIL model is also effective in developing students' critical thinking skills. They are invited to analyze, evaluate, and synthesize information during the learning process.

The collaboration applied in the POGIL Model encourages students to consider multiple perspectives, so that they can think more deeply and critically in solving problems.

The Process Oriented Guided Inquiry Learning (POGIL) model has been proven effective in improving various aspects of student learning, including learning activities, learning outcomes, motivation, and critical thinking skills. In research conducted in class V, the application of this model showed significant results, where students were more actively involved in the learning process and were able to achieve better results compared to traditional learning models.

The success of POGIL in improving students' learning activities lies in its student-centered approach. Students are directly involved in the learning process through activities designed to encourage them to think critically and solve problems collaboratively. This makes students more active and responsible for their learning, which in turn improves their understanding of the material taught.

In addition to learning activities, student motivation also increased significantly. The POGIL model encourages students to find solutions through exploration and group discussion, which provides a more interesting and meaningful learning experience. Students

feel more motivated because they are not only passively receiving information, but also actively participating in the learning process. Thus, students become more enthusiastic and engaged in learning activities.

Not only motivation, student learning outcomes also improved significantly. Students taught with the POGIL model showed an increase in mastery of science concepts compared to students taught using conventional methods. This approach helps students understand the material in a more in-depth and applicable manner, thus improving the quality of their learning outcomes.

The POGIL model also has a positive impact on students' critical thinking skills. Through this approach, students are trained to analyze, evaluate and synthesize information independently. They learn to ask questions, solve problems and work together in groups to achieve learning objectives. These developed critical thinking skills are essential to face the challenges of higher level learning.

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