**International Journal of Academic Multidisciplinary Research (IJAMR)**
**ISSN: 2643-9670**
**Vol. 8 Issue 10 October - 2024, Pages: 149-154**

# The Effect of Literacy-Based POGIL Model on the Learning Outcomes of Student in History Subjects

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***Abstract:*** *This research aims to see whether there is a significant influence with the application of the literacy-based POGIL model on student learning outcomes. This research uses a quantitative approach with a quasi-experimental design type, then hypothesis testing is carried out using the ANCOVA test (analysis of covariance). The population in this study were all class XI students of SMAN 1 Talun for the 2023/2024 academic year. The samples in this research were students in classes XI 1, XI 2, XI 6 and XI 9. Data collection in this research used test and documentation techniques. The results of this research are that there is an influence of the literacy-based POGIL learning model on learning outcomes, showing the results of the ANCOVA test with a significance value of 0.000 <0.05 and a partial eta squared value of 0.222, including a large influence in the implementation of the model. The average score of the control class which was taught using the Cooperative Learning model was 83.356, while the experimental class which was taught using the literacy-based POGIL model had an average score of 86.852. Based on the results of the average score, it can be seen that the experimental class was superior to the control class. The conclusion that can be drawn from this research is that a significant influence was obtained from the application of the literacy-based POGIL model on student learning outcomes.*

**Keywords**: *POGIL Model, literacy, learning outcomes, history subjects*

## 1. INTRODUCTION

The implementation of the Merdeka Curriculum has been directed to be oriented towards 21st century skills and ensure learners gain critical thinking, creative, communication, collaboration skills and learn how to use life skills and apply them (Kemendikbud, 2022; Wrahatnolo & Muntolo, 2018). These skills are a form of the changing needs of the world of work and the times towards employees who must become flexible learners (National Research Council, 2013; Bybee, 2013; Johnson, Peters-Burton & Moore, 2016). So education is needed that is able to facilitate this in order to answer the challenges of the times (Kolikant, 2019). In the education system, educators have a central role in developing 21st century skills (Guo, 2014; Woon Chia & Goh, 2016). This requires educators to adapt to current learning conditions.

One of the important roles of educators in learning is to design the best possible learning so that learning objectives can be achieved. Educators must use their imagination to find creative ways of teaching (Drake & Reid, 2018). One of them is by updating the quality of learning through the application of learning models that are in accordance with the characteristics of 21st century learning and are able to encourage students to develop targeted skills (Wulandari, 2021). Pupuh and Sobry S (2010) also argue that the more appropriate the method or model used by the teacher in teaching, the more effective the achievement of learning objectives is expected. Therefore, according to Umamah et. al, (2021) educators must be able to demonstrate their ability to create an innovative learning environment. One of the important roles of educators in learning is to design the best possible learning so that learning objectives can be achieved. Educators must use their imagination to find creative ways of teaching (Drake & Reid, 2018). One of them is by updating the quality of learning through the application of learning models that are in accordance with the characteristics of 21st century learning and are able to encourage students to develop targeted skills (Wulandari, 2021). Pupuh and Sobry S (2010) also argue that the more appropriate the method or model used by the teacher in teaching, the more effective the achievement of learning objectives is expected. Therefore, according to Umamah et. al, (2021) educators must be able to demonstrate their ability to create an innovative learning environment.

Innovation in learning activities is important to meet the learning needs that are in accordance with the characteristics of students. This century's learners are Generation Z, a generation estimated to have been born in the 1990s and raised in the digital era of the 2000s (Rosen, 2010 in Sanalan & Taşlıbeyaz, 2020). This generation is accompanied by the development of advanced technology that makes access to information on their lives easier (Umamah, 2017). Unlike the previous generation, Gen Z prefers digital media over traditional media and always needs new and different information (Szmkowiak et.al, 2021). Gen Z tends to be versatile and broadly oriented, which makes them less able to pay continuous attention (Ding, et.al, 2017). Their tolerance is very low if they do not have digital resources, this is what makes them prefer learning through the internet compared to using paper-based materials (Rothman, 2016). Referring to the characteristics of Gen Z, integrating technology in learning needs to be done so that students are able to learn optimally.

Learning this century is designed to facilitate technology-based skills that include digital literacy skills. Learners are

required to have knowledge and skills based on mastery of technology through digital networks (Griffin et al., 2012; Gursoy, 2020; Samoylenko et al., 2022). The Minister of Education and Research (2022) also stated that digital literacy is an important part of the Merdeka Curriculum. The understanding of digital literacy was first proposed by Gilster (1997), namely the ability to use digital technology and information tools effectively and efficiently in various aspects such as academics, careers and daily life. Currently, digital literacy is needed for all aspects of human life, especially in the field of education (Saripudin, et.al, 2019). Therefore, digital literacy-based learning management is needed, especially in learning history (Sormin, et.al, 2019). Digital literacy in relation to history is the critical use of digital tools and resources to study the past (Hangen, 2015). In addition, digital literacy in history learning is also able to maximize students' critical and creative thinking skills and provide different patterns of thinking (Hidayanti, 2021). This shows the importance of managing history learning based on digital literacy.

History learning today is required to contribute to fostering historical awareness and strengthening the spirit and sense of patriotism. History learning also plays an important role in building the personality and mental attitude of students (Sormin, 2019). The objectives of learning history as stated in the Merdeka Curriculum include developing diachronic (chronology), synchronic, causality, imaginative, creative, critical, reflective, contextual, and multiperspective thinking skills (Kemendikbud, 2020). History learning is very important as a form of balancing the ability of attitudes, skills, and knowledge aspects (Safitri, Umamah, & Sumardi, 2019). Learning has a central role in shaping students' understanding of past events and influencing current and future conditions, therefore there is a need for innovation in the approaches used in learning history. One of the appropriate innovative and interactive approaches is the literacy-based Process Oriented Guided Inquiry Learning (POGIL) Model.

The POGIL model is a teaching strategy that tries to collaborate between guided inquiry and cooperative teaching, to bring learners to participate in teaching activities (Sen, 2015). The POGIL model is based on a learning cycle, which includes the steps of exploration, conceptual formation, and application (Barthlow, 2011). It reflects the historical thought process, where historians investigate and analyze to understand the historical context (Levistik & Barton, 2001). This approach also allows learners to cultivate critical thinking, problem-solving and teamwork skills (Moog & Spencer, 2008). Incorporating literacy in the POGIL model adds a new aspect to learning activities by focusing on the essentiality of reading, writing and critical thinking skills in understanding historical context (Wood et al, 2012).

In the context of studying history, literacy includes not only the ability to read historical texts but also the assessment and interpretation of historical sources, historical facts, and written and oral communication of understanding. This is important because historical literacy requires the ability to assess and interpret data from various angles (Seixas & Morton, 2013). Thus, the literacy-based POGIL paradigm can assist students in gaining a more critical and in-depth understanding of historical events. Previous research shows that the use of literacy-based POGIL model in learning can improve students' learning outcomes. Students who engage in POGIL learning show improvements in concept understanding, critical thinking skills and the ability to work together in teams (Farrell et al., 1999). In addition, the information and digital literacy integrated in the POGIL model enables students to search, evaluate and use historical information effectively, which is crucial in today's digital age (Gilbert, 2017).

The purpose of this study is to further explore the effect of literacy-based POGIL model on students' learning outcomes in history learning. This research is expected to contribute significantly to the effectiveness of history learning and help learners develop literacy skills that are essential for academic success and life.

## 2. RESEARCH METHODS

This research utilizes a quantitative approach with a quasi experimental design. The population in this study were all students of class XI of SMAN 1 Talun in the academic year 2023/2024 consisting of classes XI-1 to XI-12. The total number of students was 426 people. The determination of the experimental and control class samples in this study was carried out using a simple random sample, but before being selected by a simple random sample, the class was tested for homogeneity through the value of the last daily test conducted by grade XI students in history subjects.

Data collection in this study used documentation and test techniques. Documentation techniques by collecting data such as the number of students in grade XI who were taken 2 classes as experimental classes and 2 classes as control classes, the value of learning outcomes of the research population, the value of the learning outcomes of the XI class research sample. For the test technique in this study was carried out in order to obtain more satisfactory results in the achievement of learning outcomes in history subjects. The test used to measure learning outcomes is in the form of multiple choice questions with criteria for learning outcomes indicators of the cognitive domain aspects of analysis (C4/Analyze) and evaluation (C5/Evaluate).

Research instruments are tools applied in providing the number of values or scores in each research variable (Gay et al., 2012). The form of learning outcomes instrument in this study is a test. This test was conducted twice, before and after being treated in the experimental class and control class with the aim of knowing the initial ability and final ability of students on their learning outcomes. The learning outcomes test instrument is tested for validity and reliability to see the feasibility of an instrument to be tested.

The data analysis method in this study uses parametric data analysis with the help of SPSS 25 for Windows software. The data analysis used in this research is ANCOVA (analysis of variance). However, before conducting hypothesis testing using ANCOVA, the prerequisite analysis test is first carried out which includes regression homogeneity test, normality test and linearity test. The homogeneity test aims to ensure that the

**International Journal of Academic Multidisciplinary Research (IJAMR)**
**ISSN: 2643-9670**
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data from each of the two class samples have the same variance based on the daily test results. Homogeneity test criteria if sig > 0.05 then the data distribution is called homogeneous and if sig < 0.05 then the data distribution is called heterogeneous. While the normality test aims to determine whether the data is normally distributed or not. Normality testing uses the Kolmogorov-Smirnov test with the help of SPSS 25 for Windows software. With a significant level of α = 5% (0.05), if the significance 0.05 then the distribution can be said to be normal. Furthermore, the linearity test aims to ascertain whether there is a significant linear relationship between two variables. This test examines the bond between the covariate and the dependent variable, to determine whether the impact is directly proportional or inversely proportional. The basis for decision making is when the significance level value 0.05 then it does not have a linear relationship. Then to test the hypothesis using ANCOVA (Analysis of Covariance) with the help of SPSS 25 for Windows software. ANCOVA is used to test whether there is a significant difference between the means of groups that are not related to each other with pre-test scores as covariates. This test aims to see the effect of the literacy-based POGIL model on student learning outcomes. The decision is made based on the significance value, if more than 0.05, the null hypothesis is accepted, and if less than 0.05, the null hypothesis is rejected.

**Table 1** Schematic of pretest posttest nonequivalent control group design

| Class | Pre-test | Treatment | Post-test |
|---|---|---|---|
| Experiment | $O_1$ | $X_1$ | $O_2$ |
| Control | $O_3$ | $X_2$ | $O_4$ |

O1 and O3: Pretest is given to the experimental group and the control group to measure the learning outcomes of the students.

X1: The Process Oriented Guided Inquiry Learning model treatment is applied to the experimental class.

X2: The Cooperative learning model treatment is applied to the control class.

O2 and O4: Posttest is given to the experimental group and the control group to measure the learning outcomes of the students after the treatment.

## 3. Results And Discussion

### 3.1 Results

In this research, the data collected is quantitative data that discusses student learning outcomes before and after being treated using Process Oriented Guided Inquiry Learning (POGIL). The following presents the data collected in this research.

#### 1. Instrument Test Results

##### a. Validity test

**Table 2** Validity Test of Learning Outcomes Questionnaire Instrument

| Validity Test | | | | | Validity Test | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Question No. | $r_{count}$ | $r_{table}$ | Sig | Description | Question No. | $r_{count}$ | $r_{table}$ | Sig | Description |
| 1 | 0,594 | 0,329 | 0,000 | Valid | 16 | 0,373 | 0,329 | 0,024 | Valid |
| 2 | 0,491 | 0,329 | 0,002 | Valid | 17 | 0,428 | 0,329 | 0,009 | Valid |
| 3 | 0,67 | 0,329 | 0,000 | Valid | 18 | 0,42 | 0,329 | 0,011 | Valid |
| 4 | 0,37 | 0,329 | 0,027 | Valid | 19 | 0,393 | 0,329 | 0,018 | Valid |
| 5 | 0,542 | 0,329 | 0,001 | Valid | 20 | 0,47 | 0,329 | 0,004 | Valid |
| 6 | 0,362 | 0,329 | 0,030 | Valid | 21 | 0,6 | 0,329 | 0,000 | Valid |
| 7 | 0,465 | 0,329 | 0,004 | Valid | 22 | 0,33 | 0,329 | 0,046 | Valid |
| 8 | 0,53 | 0,329 | 0,001 | Valid | 23 | 0,375 | 0,329 | 0,024 | Valid |
| 9 | 0,526 | 0,329 | 0,001 | Valid | 24 | 0,433 | 0,329 | 0,008 | Valid |
| 10 | 0,395 | 0,329 | 0,017 | Valid | 25 | 0,368 | 0,329 | 0,027 | Valid |
| 11 | 0,483 | 0,329 | 0,003 | Valid | 26 | 0,35 | 0,329 | 0,038 | Valid |
| 12 | 0,358 | 0,329 | 0,032 | Valid | 27 | 0,38 | 0,329 | 0,023 | Valid |
| 13 | 0,47 | 0,329 | 0,004 | Valid | 28 | 0,473 | 0,329 | 0,004 | Valid |
| 14 | 0,471 | 0,329 | 0,004 | Valid | 29 | 0,414 | 0,329 | 0,012 | Valid |
| 15 | 0,349 | 0,329 | 0,037 | Valid | 30 | 0,403 | 0,329 | 0,015 | Valid |

(source: Primary data processed)

Based on table 2 above, shows the results of assessing the validity of the Process Oriented Guided Inquiry Learning Model on student learning outcomes may be declared to be valid at Corrected item-total correlation> 0.329. The findings of this validity test show that the questionnaire statements in this research are valid.

##### b. Reliability Test

**Table 3** Reliability Test Results of Research Instruments

| Research Variables | N | Cronbach's alpha | Description |
|---|---|---|---|
| Creative Thinking Skill | 36 | 0,855 | Very High Reliability |

(source: Primary data processed)

Based on the reliability test of the learning outcomes questionnaire instrument using the Cronbach's Alpha technique, a value of 0.855 was obtained, which falls within the category of $0.80 < r11 \leq 1.00$ (very high reliability). Therefore, it can be concluded that the Learning Outcomes instrument has good consistency.

#### 2. Prerequisite Test

##### a. Normality Test

**Table 4** Normality Test Results of Learning Outcomes

| Class | | *Kolmogrov-Smirnov* | | |
|---|---|---|---|---|
| | | **Statistic** | **Df** | **Sig.** |
| **Creative Thinking Skill** | Experiment *Pretest* | 0,102 | 72 | 0,060 |
| | Experiment *Posttest* | 0,103 | 72 | 0,054 |
| | Control *Pretest* | 0,102 | 72 | 0,063 |
| | Control *Posttest* | 0,100 | 72 | 0,069 |

**International Journal of Academic Multidisciplinary Research (IJAMR)**
**ISSN: 2643-9670**
**Vol. 8 Issue 10 October - 2024, Pages: 149-154**

(source: Primary data processed)

Based on the decision-making criteria that the significance value is above 0.05, the data is said to be normally distributed. It can be seen in table 1 that the significance value of the learning outcomes students in the control and experimental classes shows a significance value above 0.05, meaning that both pretest and posttest data are normally distributed.

### b. Regression Homogeneity Test

**Table 5** Regression Homogeneity Test Results of Learning Outcomes

| Source | F | Df | df2 | F | Sig. |
|---|---|---|---|---|---|
| Class*Pretest | 1,006 | 1 | 142 | 0,385 | 0,536 |

(source: Primary data processed)

Base on table 5, it shows the results of the *Creative Thinking Skill* regression homogeneity test Based on the data presented in with a significance value of (0.600> 0.05). So it can be concluded that the value of the results of the learning outcomes regression homogeneity test is greater than the significance level of 0.05, so the assumption of the regression homogeneity test is met.

### c. Liniearity Test

**Table 6** Liniearity Test of Learning Outcomes

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Class* Pretest | 4877,427 | 1 | 4877,427 | 445,027 | .000 |

(source: Primary data processed)

Based on the data presented in Table 6, the significance value for learning outcomes is 0.000. Since the significance value is less than 0.05, it can be concluded that the assumption of linearity is met. Therefore, the results of the linearity test provide a strong justification for considering the pretest variable as a covariate.

### 3. Hypothesis Test

Hypothesis testing is carried out to answer the formulation of research problems. In this study, pretest and posttest data from experimental and control classes will be tested using ANCOVA (Analysis of covariance) assisted by the SPSS 25 for windows software program. Hypothesis testing in this study is a significant effect in Learning Outcomes taught using the Literacy-Based Process Oriented Guided Inquiry Learning (POGIL) model in the experimental class and the Cooperative Learning model in the control class of students in history subjects.

As for decision making:

a. If the significance value is more than 0.05 (> 0.05) then H0 is accepted and Ha is rejected

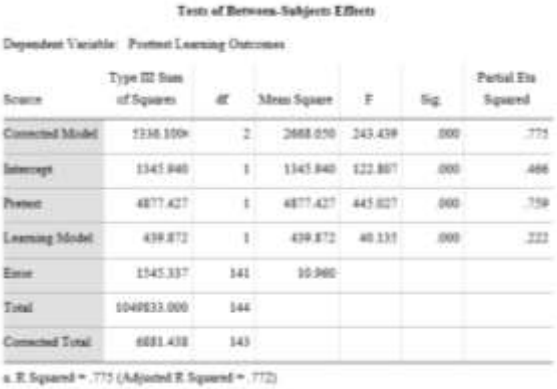
b. If the significance value is less than 0.05 (<0.05) then H0 is rejected and Ha is accepted

**Table 7** Results of Test of Between Subject Effect Learning Outcomes

(source: Primary data processed)

Table 7 presents the results of the ANCOVA test to determine the effect of the learning model on students' learning outcomes. The results in the "corrected model" column show a significance value of 0.000 (0.000 < 0.05), indicating that both the pretest and the learning model have a simultaneous influence on students' learning outcomes. Furthermore, the results in the "learning model" column show a significance value of 0.000 (0.000 < 0.05), meaning that H0 is rejected and Ha is accepted. The conclusion is that there is a significant effect of the implementation of the literacy-based Process Oriented Guided Inquiry Learning (POGIL) model on students' learning outcomes in history lessons.

The magnitude of the learning model's effect on


Tests of Between-Subjects Effects

Dependent Variable: Posttest Learning Outcomes

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 5338.100a | 2 | 2669.050 | 243.439 | .000 | .775 |
| Intercept | 1345.840 | 1 | 1345.840 | 122.807 | .000 | .466 |
| Pretest | 4877.427 | 1 | 4877.427 | 445.027 | .000 | .759 |
| Learning Model | 439.872 | 1 | 439.872 | 40.135 | .000 | .222 |
| Error | 1545.337 | 141 | 10.960 | | | |
| Total | 1049833.000 | 144 | | | | |
| Corrected Total | 6883.438 | 143 | | | | |

a. R Squared = .775 (Adjusted R Squared = .772)

students' learning outcomes can be seen in the "partial eta squared" column, which shows a value of 0.222, categorized as a medium effect. Additionally, the output table shows a coefficient of determination ($R^2$) of 0.775, meaning that the independent variable (POGIL model) accounts for 77.5% of the influence on the dependent variable (learning outcomes), while the remaining 22.5% is influenced by other factors outside the independent variable (POGIL model).

The criteria for the magnitude of the influence can be seen with the *Effect Size Criteria* table presented below.

**Table 7** . Effect Size Criteria

| Effect Size | Category |
|---|---|
| 0,1 | Small Effect |

| | |
|---|---|
| 0,3 | Medium Effect |
| 0,5 | Large Effect |

(source: *Cohen: 1998*)

The test to examine the effect of the literacy-based POGIL model on learning outcomes can be seen in the estimates of marginal means output presented below.

**Tabel 8** Estimates Marginal Means

**Estimates**

| Dependent Variable: Postest | | | | |
|---|---|---|---|---|
| | | | 95% Confidence Interval | |
| Media Pembelajaran | Mean | Std. Error | Lower Bound | Upper Bound |
| Experiment Class | 86,852[a] | ,390 | 86,081 | 87,623 |
| Control Class | 83,356[a] | ,390 | 82,585 | 84,128 |

a. Covariates appearing in the model are evaluated at the following values: Pretest = 73,31.

(source: Primary data processed)

Based on Table 8, the estimates of marginal means show that the control class, which used the Cooperative Learning model, has a mean value of 83.356. The experimental class, which applied the Process Oriented Guided Inquiry Learning (POGIL) model, has a mean value of 86.852. Therefore, it can be concluded that the POGIL model has a greater impact on students' learning outcomes compared to the Cooperative Learning model.

### 3.2 Discussion

The analysis using ANCOVA showed that the POGIL model has an impact on students' learning outcomes. This is supported by several previous studies, which stated that the Process-Oriented Guided Inquiry Learning model can improve students' learning outcomes and learning activities compared to conventional teaching methods (Rambe et al., 2020). The Guided Inquiry Learning-based approach also offers potential as a pedagogy to facilitate richer Learner-Content interaction and is indicated as a strong positive predictor of student achievement, with its influence also positively associated with students' interest (Al Mamun et al., 2022; Kang & Keinonen, 2018). Treagust et al. (2020), in their research, established that active student participation in learning leads to an increase in students' perceptions of their achievement. In POGIL, students are continuously engaged with animations, simulations, and group or class discussions, which can provide lasting and effective learning (Williamson et al., 2012). By focusing learning on student-led groups, POGIL builds a foundation of constructivism (knowledge created by students) and social constructivism (knowledge created in a social context) (Mitchell & Hiatt, 2010). According to social constructivism theory, learners will better understand a concept by actively participating in the learning process. Piaget also stated that the role of the educator as a facilitator encourages students to engage as critical thinkers in learning (McLeod, 2015; Piaget, 2012). The POGIL model integrates these principles into its pedagogy (Roller & Zori, 2017).

Research conducted by Joshi & Lau (2023) showed that POGIL positively impacts optimizing students' learning outcomes. Another study by Roller & Zori (2017) also demonstrated that POGIL can improve students' final grades or learning outcomes. In addition to fostering academic achievement in exams or learning, the POGIL model provides an interactive classroom environment and helps nurture higher-order thinking skills (Brown, 2010; Douglas & Chiu, 2012; Hein, GE & Lee, 2010; Soltis et al., 2015). Similar research conducted by Şen et al. (2015) stated that POGIL can maximize students' self-regulated learning skills, inquiry skills, metacognitive abilities, and critical thinking skills. POGIL also promotes student collaboration with teams, better understanding, greater retention, enhanced self-confidence, more positive attitudes toward the subject, course, instructor, and other important process skills for their development as independent learners (Moog, Creegan, Hanson, Spencer, & Straumanis, 2006).

The POGIL model, as a learning approach, also shows a positive contribution to students' learning outcomes (Trigwell & Prosser, 1991). Learning approaches are divided into two categories: deep and surface approaches. A deep approach occurs when students seek meaning in their learning to understand the material, while a surface approach is applied when students use memorization techniques to reproduce information for exams (Marton & Säljö, 1976). Embedded within POGIL is the underlying assumption that students will discuss critical questions and construct new knowledge throughout the course, encouraging them to adopt a deep learning approach. Trigwell & Prosser (1991) stated that promoting a deep learning approach leads to superior learning outcomes in academic activities. Student achievement and learning can be determined by the level of their cognitive engagement with learning activities. This is explained by Chi and Wylie (2014) in their ICAP framework (interactive-constructive-active-passive). Student behaviors related to interactive learning involve activating, integrating, and summarizing, which each align with the POGIL learning cycle. Various studies have shown that POGIL positively impacts students' cognitive performance in final exams, particularly among those with below-average grades (Lewis & Lewis, 2005). POGIL also influences competence beliefs, which in turn have a positive impact on student performance (Vincent-Ruz et al., 2020).

## 4. CONCLUSION

Based on the results of the research, it can be concluded that the literacy-based POGIL model has an impact on students' learning outcomes in history lessons. According to the ANCOVA test, a significance value of 0.000 (0.000 < 0.05) was obtained, meaning that H0 is rejected and Ha is accepted, indicating a significant effect. The magnitude of the learning model's impact on students' learning outcomes can be seen in the "partial eta squared" column, which shows a value of 0.212, categorized as a large effect. The estimates marginal means table shows that the mean score for the control class, which was taught using the Cooperative Learning model, is

84.259. Additionally, the output table shows a coefficient of determination ($R^2$) of 0.775, meaning that the effect of the independent variable (POGIL model) on the dependent variable (learning outcomes) is 77.5%, while the remaining 22.5% is influenced by other factors outside the independent variable. This indicates an improvement in students' learning outcomes after being taught using the literacy-based POGIL model. Therefore, it can be concluded that the implementation of the literacy-based POGIL model has a significant effect on improving students' learning outcomes.

## 5. ACKNOWLEDGMENT

The author expresses gratitude to SMA Negeri 1 Talun school for granting permission to conduct the study, as well as to the students of XI 1, XI 2, XI 6 and XI 9 classes who actively participated in the research. The author also extends appreciation to all those who provided assistance and support during the research process.

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