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Correlation Between Learning Outcomes and Spiritual Attitudes Through the Implementation of Chemistry Teaching Materials Based on Spiritual Value Using the Process-Oriented Guided Inquiry Learning (POGIL) Model on Hydrocarbon Topics for Class XI

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Abstract: Correlation Between Learning Outcomes and Spiritual Attitudes Through the Implementation of Chemistry Teaching Materials Based on Spiritual Value Using the Process-Oriented Guided Inquiry Learning (POGIL) Model on Hydrocarbon Topics for Class XI. The purpose of this study was to determine the relationship between learning outcomes and students' spiritual attitudes through the implementation of spiritual value-based chemistry teaching materials with the POGIL model on Hydrocarbon material in class XI Matlanfor SMA Negeri 1 Percut Sei Tuan. This type of research is correlational research. The data collected were in the form of learning outcome test instruments and non-test spiritual attitude questionnaires. The results of the study were that there was a significant positive relationship between students' spiritual attitudes and increased learning outcomes after using integrated chemistry teaching materials with spiritual values in class XI Matlanfor with a Sig. (2-tailed) value of 0.003 ≤ α (0.05) obtained a person correlation value of 0.243 indicating that students' spiritual attitudes contributed 24.3% to the learning outcomes of class XI Matlanfor students of SMA Negeri 1 Percut Sei Tuan.

Keywords: Learning Outcomes, Spiritual Atttudes, POGIL, Spiritual Value

Abstrak: Korelasi Antara Hasil Belajar dan Sikap Spiritual Melalui Penerapan Bahan Ajar Kimia Berbasis Nilai Spiritual Menggunakan Model Process-Oriented Guided Inquiry Learning (POGIL) pada Materi Hidrokarbon Kelas XI. *Tujuan dari penelitian ini untuk mengetahui hubungan antara hasil belajar dan sikap spiritual siswa melalui implementasi bahan ajar kimia berbasis niali spiritual dengan model POGIL pada materi Hidrokarbon di kelas XI Matlanfor SMA Negeri 1 Percut Sei Tuan. Jenis penelitian ini adalah correlational research. data yang dikumpulkan berupa instrumen test hasil belajar dan non test angket sikap spiritual. Hasil penelitian yaitu terdapat hubungan positif yang signifikan antara sikap spiritual siswa dengan peningkatan hasil belajar setelah menggunakan bahan ajar kimia terintegrasi nilai spiritual dengan nilai Sig. (2-tailed) sebesar 0,003 ≤ α (0,05) didapatkan nilai person correlation sebesar*

0,243 menunjukkan bahwa sikap spiritual siswa berkontribusi sebesar 24,3% terhadap hasil belajar siswa kelas XI Matlanfor SMA Negeri 1 Percut Sei Tuan.

Kata kunci: *Hasil Belajar, Sikap Spiritual, POGIL, Nilai Spiritual*

- **INTRODUCTION**

Education plays a very important role in life. Through education, students can be honed and formed according to their skills. The success of education is measured by the achievement of the expected goals. One of the main goals of education is to shape students' mindsets and instill noble moral values in them. To achieve these goals, a process is needed, namely the teaching and learning process (Sitinjak & Pulungan, 2019). Education must emphasize students' mastery of life skills to be more responsive to changes and developments in the era. Students need to think critically in connecting knowledge to real life, master technology and information, and be able to communicate and collaborate with others. One of the important life skills to be developed in the 21st century is scientific literacy (Anggraeni & Rahmawan, 2024).

Science in the 21st century has experienced developments in line with the demands of the times. In an era of global competition, it is important to implement learning that provides a means for students to hone their abilities and skills in preparation for facing challenges in life at the global level. The skills needed in this century are known as the 4Cs, which include high-level thinking skills (Azizah et al., 2023). Today the primary need is for deep cognitive skills in understanding the context of life related to problems, events, or incidents. With the rapid changes around us, the ability to acquire, assess, and use knowledge in depth is the main key to facing the challenges of the 21st century (Rahayu et al., 2022).

Education today is experiencing a fundamental shift in its philosophy, direction, and purpose in the new knowledge age of the 21st century. The incredible acceleration in the advancement of knowledge is driven by the application of digital media and technology. Learning now requires authentic design that encourages student collaboration in creating solutions to learning challenges, solving problems, and finding answers through information resources available anywhere and anytime (Etistika Yuni Wijaya et al., 2016). Major challenges are still faced in the implementation of education in Indonesia. Although the government has revised the curriculum several times in the last decade, the learning process is often still too focused on mastering science, ignoring social, moral, and spiritual aspects (Mujala et al., 2022). This shows that, in the midst of efforts to prepare a superior generation in the 21st century, there is still much room for improvement in realizing holistic education, covering intellectual, emotional, moral and spiritual aspects. (Iberahim et al., 2017).

The existence of cases of moral decadence shows a lack of correlation between intellectual and spiritual development, as well as between cognitive abilities and faith, piety and noble character, which is thought to be caused by the separation between religion and science (Darmana et al., 2013). Officially, Indonesia has had and set educational goals that can develop cognitive and spiritual aspects. These goals are not only aspirations but also mandates contained in the 1945 Constitution. Article 31 paragraph 3 of the 1945 Constitution explains that national education aims to increase faith and devotion to God Almighty and form a noble character to enlighten the life of the nation. Something similar is contained in UUSPN no. 20 of 2003 article 3, where national education aims to develop the potential of students to become individuals who

believe, are devoted to God Almighty, have noble character, are healthy, knowledgeable, competent, creative, independent, and become democratic and responsible citizens. Spiritual attitudes are often neglected in the learning process, causing students' potential not to be utilized optimally. This results in character values often being neglected in the educational environment. Greater attention is needed to the development of students' spiritual and character aspects so that education can provide a more holistic and sustainable impact on future generations (Darmana A, 2016).

Chemistry is one of the important subjects taught to students because it can improve thinking skills and stimulate creative thinking patterns. Effective chemistry learning is one that is able to provide meaningful understanding of the scientific process to students. To achieve this, teachers need to apply two important things in the learning process, namely linking chemical concepts to everyday life and encouraging students to build their own understanding of the material that has been studied (Cahyaningsih et al., 2021). However, many students have difficulty in understanding chemistry lessons. This difficulty is caused by the abstract and complex nature of chemical concepts that require deep understanding. Many students also dislike chemistry because it is considered difficult and boring. Some of the difficulties experienced by students in learning chemistry include a lack of understanding of how to learn, difficulty connecting concepts, and requiring logical, mathematical, and language skills, so that students often face learning difficulties in the chemistry learning process (Priliyanti et al., 2021). Thus, it is important to have adequate learning resources so that the learning process in the classroom can achieve the desired basic competencies. These resources include teachers, textbooks, and facilities and infrastructure. However, in practice, problems often occur, especially in terms of textbooks. The role of teachers has also changed, from being the only source of learning to being more of a facilitator. Therefore, the existence of teaching materials or guidebooks is needed as a solution to overcome the limitations of students' absorption and the limitations of teachers' abilities in managing the learning process in the classroom (Wulantina, 2020).

Many learning materials carry the values of beauty and order which ultimately lead to respect for the creator. If we can dive deeper into the meaning behind these chemical events, then we will find many religious values that are important for students as provisions in their lives. Integrating spiritual values into learning materials will not reduce the level of scientific knowledge itself. On the contrary, it is the right step because it restores the unity between sharia and nature. By applying religious values in chemistry learning, especially in hydrocarbons, it is hoped that it can have a positive impact in instilling values of faith in students and integrating them with science and technology, so that it can form positive attitudes in students in everyday life. Aligning the spiritual dimension of religion in the field of chemistry/science will not reduce its scientific validity, but will complement and strengthen each other, becoming a means to achieve faith and piety (Okmarisa et al., 2016). Integration of spiritual values in chemistry learning can be done by arranging teaching materials in such a way that spiritual values are contained in them (Saputro, 2011)

In addition to the spiritual aspect, the selection of an interesting learning model also affects success in the learning process. One of the learning models that can improve learning outcomes is the POGIL learning model. The POGIL (Process Oriented Guided Inquiry Learning) learning model is a learning model that is based on the constructivist concept and emphasizes the active participation of students in the learning process through interaction in groups to overcome challenges or problems given (Farda et al.,

2017). POGIL activities focus on core concepts and scientific processes to stimulate deep understanding of learning materials while enhancing higher-order thinking skills. POGIL has great potential in helping students learn science without forming alternative conceptions. In addition, this method helps students in linking understanding of chemical phenomena from macroscopic and microscopic perspectives with symbolic representations (Villagonzalo, 2014). The POGIL learning model guides students through exploration to help them develop their own understanding (guided inquiry) with the educator acting as a facilitator (Nugraheni et al., 2014). POGIL is used to expand information and knowledge and help improve student understanding. In the learning process, student involvement is very important so that they can develop their own thinking through the application of learning cycles in guided inquiry activities (Septiani & Sugiarto, 2017)

Based on research conducted by Memah, R. A., Gugule, S., and Gumolung, D. in (2020) on the effect of the Process Oriented Guided Inquiry Learning (POGIL) learning model on student learning outcomes in acid-base titration material. Based on the posttest and pretest results obtained in this study, there was a significant increase in student learning outcomes after implementing the POGIL learning model. The average posttest score of students in the experimental class was 81.80, higher than the average posttest score of students in the control class of 71.53. This shows that the application of the POGIL model has a positive effect on improving student learning outcomes in acid-base titration material. Thus, it can be concluded that the POGIL learning model is effective in improving student understanding and learning outcomes (Anita et al., 2020). Based on the background explained above, the researcher will conduct research on the Correlation Between Learning Outcomes and Spiritual Attitudes Through the Implementation of Chemistry Teaching Materials Based on Spiritual Value Using the Process-Oriented Guided Inquiry Learning (POGIL) Model on Hydrocarbon Topics for Class XI.

▪ METHOD

This research was conducted at SMA Negeri 1 Percut Sei Tuan located at Jalan Irian Barat Desa Sampali No. 37, Medan Estate, Kec. Percut Sei Tuan, Deli Serdang Regency, North Sumatra. This research will be conducted in the odd semester of the 2024/2025 academic year. The subjects of this study were grade XI students at SMA Negeri 1 Percut Sei Tuan in the 2024/2025 academic year. The product trial was conducted on 35 students of grade XI Matlanraf. The type of research used was correlation research (Maharani et al., 2024). Correlation research is a type of research that aims to determine the relationship or association between two variables. Sampling using purposive sampling technique, namely directly selecting XI Matlanraf as an experimental class with a total of 35 students. The data collection technique used was qualitative data. Data collection techniques are methods that can be used by researchers to collect data needed in research. Test instruments are tools to measure student learning outcomes. Before the questions are tested on students, the questions are first tested to determine the extent to which the instrument has met the requirements in terms of level of difficulty, discriminatory power, validity, and reliability.

Research Design

The design in this study is a quasi-experimental research which involves testing the effects of treatment or intervention on experimental individuals, but without randomization or random division of groups.

Research Instrumens

The research instruments used by the researcher were hydrocarbon learning outcome tests and non-test spiritual questionnaire instruments. The learning outcome test was first validated by an expert validator and tested on class XII Matlanraf and the spiritual attitude questionnaire was validated by two lecturers before being given to students. The learning outcome test was conducted twice, namely pre-test and post-test.

▪ RESULT AND DISCUSSION

RESULT

Research Instrument Analysis

There are two types of instruments that are tested on students, namely the Hydrocarbon learning outcome test instrument and the non-test spiritual attitude questionnaire instrument. The hydrocarbon learning outcome test instrument consists of 40 multiple-choice questions, the non-test spiritual attitude questionnaire instrument consists of 45 statements before being validated. After being validated, the hydrocarbon learning outcome test instrument was tested on class XII Matlanraf students of SMA Negeri 1 Percut Sei Tuan. The purpose of the trial was to determine the validity, reliability, discriminatory power, and level of difficulty.

Test Validity

Validity is a measure to show the levels of validity or validity of an instrument. This validity test is carried out with two tests, namely the content validity test and the empirical validity test. The content validity test will be carried out by chemistry lecturers from FMIPA UNIMED, while the empirical validity test will be carried out in class XII Matlanraf SMA Negeri 1 Percut Sei Tuan. In this study, the number of respondents (N) was 35 students with a significance level of $\alpha = 0.05$ which produced a rtable value of 0.334. The results of the trial showed that out of 40 questions, there were 28 valid questions and 12 invalid questions. Of the 28 valid questions, 20 questions were selected based on considerations of difficulty level and discriminatory power.

Test Reliability

Reliability refers to the consistency of a measuring instrument, so that the results obtained are always consistent. Reliability testing in this study was conducted using Microsoft Excel with the Kuder and Richardson (KR-20) method. Based on the calculation, the r11 value was obtained as 0.84 with a significance level of $\alpha = 0.05$ and rtable of 0.334, so that the test instrument was declared reliable and had high reliability.

Difficulty Level

Difficulty level analysis is used to determine whether a question is easy, medium, or difficult. A good question is a question that is neither too easy nor too difficult. Based on the results of the difficulty level test on 40 questions, 6 questions have a medium level of difficulty, 30 questions are in the easy category and 4 questions are in the difficult category.

Discriminatory power

Discriminatory power is the ability of a question to differentiate between students with high and low abilities. Based on the analysis results, out of 40 questions tested, 35 questions met the criteria for discriminatory power, while 5 questions did not meet the criteria (Appendix 21). With all the requirements of the test instrument having been met, this test instrument can be used as a data collection tool in research. The number of questions used is 20 questions, namely numbers 3, 4, 5, 6, 8, 10, 12, 16, 17, 18, 20, 21, 22, 23, 25, 27, 30, 32, 38, 39.

Data Analysis and Research Results

The research data were obtained from the learning outcome test and measurement of students' spiritual attitudes on Hydrocarbon material. Before the learning began, a pre-test was conducted in the experimental class with learning outcome test instruments and a spiritual attitude questionnaire. After that, learning was carried out using integrated chemistry teaching materials with spiritual values with the POGIL model. The post-test was given using the same test instrument as the pre-test and a spiritual attitude questionnaire to evaluate students' learning outcomes and spiritual attitudes**.**

Table 1. Average learning outcomes and spiritual attitudes of students

Descriptive Statistics

	Mean	Std. Deviation	N
Spiritual Attitude	88.4571	7.39074	35
Learning Outcomes	87.1429	6.09794	35

From the results of student scores, it can be seen that the average value of student learning outcomes is 87.1429 with a standard deviation of 6.09794. While the average value of students' spiritual attitudes is 88.4571 with a standard deviation of 7.39074 (Std. Deviation). with the number of each sample (N) of 35. If it is associated between spiritual attitudes and learning outcomes, then the relationship between the two variables is classified into person correlation and simple linear regression between spiritual attitudes and hydrocarbon learning outcomes.

Hypothesis Test

After the research data is obtained, a hypothesis test is carried out using SPSS 21 For Windows which aims to determine whether the hypothesis in this study is accepted or rejected and to obtain more relevant data. In this study, to determine the relationship between students' spiritual attitudes and student learning outcomes, a Pearson Correlation test and a significant simple linear regression test were carried out between the spiritual attitude variable (X) and hydrocarbon learning outcomes (Y). Based on the test results, the output obtained is as attached to the linearity data presented in Table 2.

Table 2. Correlation between spiritual attitudes and learning outcomes

Correlations

		Spiritual Attitude	Learning Outcomes
Spiritual Attitude	Pearson Correlation	1	.493**
	Sig. (2-tailed)		.003
	N	35	35

	Pearson Correlation	.493**	1
Learning Outcomes	Sig. (2-tailed)	.003	
	N	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

Based on the table 2, the correlation coefficient value (r) is 0.493 which indicates a positive relationship and a moderate level of strength, so it can be said that the higher the spiritual attitude of students, the higher the learning outcomes that students will obtain. The significance value (Sig. (2-tailed)) is 0.003. Based on the hypothesis test criteria, if the significance value ≤ α (0.05), then Ha is accepted and Ho is rejected, meaning that there is a significant positive relationship between students' spiritual attitudes and increased learning outcomes after using integrated chemistry teaching materials with spiritual values.

Tabel 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.493[a]	.243	.220	5.38453

a. Predictors: (Constant), Sikap Spiritual

In addition, based on the table of simple linear regression test results, the coefficient of determination (R Squared) value of 0.243 shows that students' spiritual attitudes contribute 24.3% to student learning outcomes. Meanwhile, as much as 75.7% of learning outcomes are influenced by other factors.

- **DISCUSSION**

This research was conducted at SMA Negeri 1 Percut Sei Tuan with a population of all students of class XI IPA consisting of 6 classes in the 2024/2025 academic year. The research sample was selected using a purposive sampling technique, namely class XI Matlanfor as an experimental class using spiritual value-based chemistry teaching materials through the Process Oriented Guided Inquiry Learning (POGIL) model and learning video media on hydrocarbon material.

This study was conducted to observe the relationship between spiritual attitudes and learning outcomes in the experimental class. Learning outcomes were measured through a post-test while students' spiritual attitudes were measured through a spiritual attitude questionnaire sheet, then the correlation or relationship between spiritual attitudes and student learning outcomes would be calculated.

The measuring instrument in this study was a test instrument, namely multiple choice questions with five alternative answer choices (a, b, c, d, e) and a non-test, namely a spiritual attitude questionnaire using a Likert scale totaling 15 statement items. Achievement of learning outcomes was measured using data from the pre-test and post-test with an increase in learning outcomes determined based on the difference between the pre-test and post-test scores. Meanwhile, spiritual attitudes were assessed through a questionnaire on students' spiritual attitudes.

Spiritual Attitude

From the results of the spiritual attitude questionnaire that was filled out by 35 class XI Matlanfor students of SMA Negeri 1 Percut Sei Tuan, a graph was obtained showing the students' spiritual attitude scores as follows:

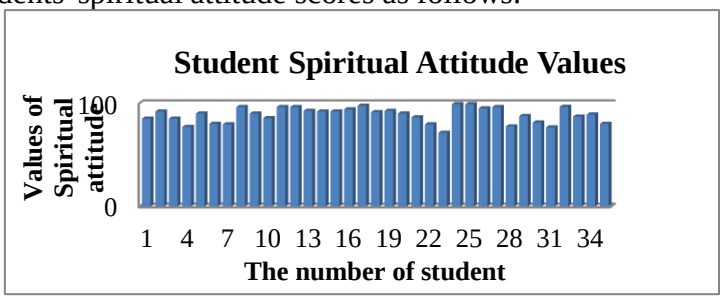

Figure 1. Graph of students' spiritual attitude values

Based on the data obtained, the average value of students' spiritual attitudes is 88.4571. From Figure 1 it can be seen that the lowest value for students' analytical ability is 71.25, while the highest value for analytical ability is 99.

Learning Outcomes

From the hydrocarbon learning outcome test on 35 class XI Matlanfor students of SMA Negeri 1 Percut Sei Tuan, a graph was obtained showing the students' learning outcome scores as follows:

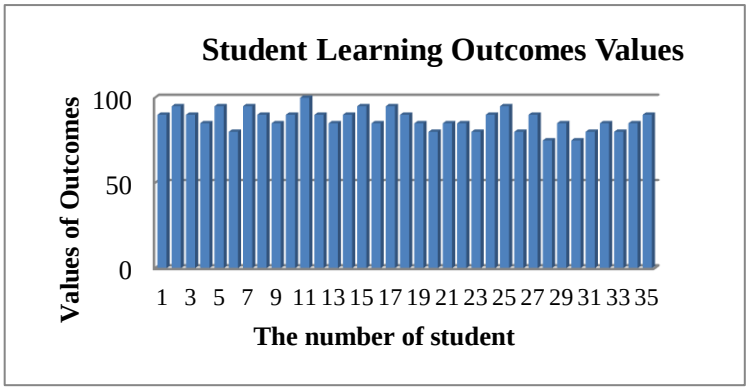

Figure 2. Graph of student learning outcomes

From the research results, the average result of students' hydrocarbon learning was 87.14. The lowest score was 75, while 1 student obtained the highest score in hydrocarbon learning results, namely 100.

Analysis of the relationship between students' spiritual attitudes and student learning outcomes was conducted using the Pearson Correlation test with a significance level of <α (0.05). The test results showed a significance value (Sig. (2-tailed)) of 0.003, a significance value of ≤ α (0.05) then Ha was accepted and Ho was rejected, meaning that there was a significant positive relationship between students' spiritual attitudes and increased learning outcomes after using integrated chemistry teaching materials with spiritual values on the subject of hydrocarbons and petroleum. The correlation coefficient value (r) was 0.493, indicating a positive relationship and a moderate level of strength, so it can be said that the higher the students' spiritual attitudes, the higher the learning outcomes that students will obtain. In addition, the determination

coefficient value (R Squared) of 0.243 showed that students' spiritual attitudes contributed 24.3% to students' learning outcomes. Meanwhile, as much as 75.7% of learning outcomes were influenced by other factors. The other factors in question are internal factors and external factors. Internal factors such as learning motivation, intelligence, physical condition, and student personality can affect learning outcomes. On the other hand, external factors such as family support, social environment, and access to learning resources play an important role in student learning. All of these factors, both internal and external, contribute to the achievement of student learning outcomes, beyond the influence of spiritual attitudes. In line with research conducted by Heppy Okmarisa, Ayi Darmana, and Retno Dwi Suyatni (2016), there is a relationship between students' spiritual attitudes and learning outcomes. The study shows that students' spiritual values contribute to improving learning outcomes. The results of the analysis using SPSS show that the Sig. (2-tailed) value is less than 0.05 (0.002 <0.05). The correlation coefficient obtained is R = 0.508, which indicates that the relationship is in the rather low category. However, this relationship still shows that students who have better spiritual attitudes tend to have better learning outcomes. So based on the research that has been conducted at SMA Negeri 1 Percut Sei Tuan, it can be concluded that chemistry teaching materials based on spiritual values have an effect on students' learning outcomes and spiritual attitudes on the subject of hydrocarbons and petroleum.

▪ CONCLUSION

Based on the results of the research that has been conducted, it is concluded that there is a significant positive relationship between students' spiritual attitudes and increased learning outcomes after using integrated chemistry teaching materials with spiritual values in class XI Matlanfor with a value of Sig. (2-tailed) $0.003 \leq \alpha$ (0.05) obtained a person correlation value of 0.243.

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