

The Effect of Teaching Materials for Chemical Equilibrium Based on Spiritual Values on Student Learning Outcomes in the Guided Inquiry Learning Model

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Abstract: This research was motivated by the low learning outcomes and spiritual attitudes of students. This research aims to determine the effect of chemical equilibrium teaching materials based on spiritual values on student learning outcomes and students' spiritual attitudes in the guided inquiry learning model, as well as seeing the relationship between students' spiritual attitudes and student learning outcomes. This type of research uses research methods using a sample of 60 students. The data collection methods used were (1) interview observation, (2) student spiritual questionnaire, (3) test instruments. The results of the research show that chemical equilibrium teaching materials based on spiritual values in the guided inquiry learning model have an influence on students' learning outcomes and spiritual attitudes. The research results stated that there was a difference between classes that used high school textbooks on the subject of chemical equilibrium and classes that used chemical equilibrium teaching materials based on spiritual values, namely $\text{sig (2-tailed)} < 0.05$ or $0.007 < 0.05$. Furthermore, there is also the influence of chemical equilibrium teaching materials based on spiritual values on students' spiritual attitudes by looking at the difference between before and after being given treatment, where the sig value (2-tailed) > 0.05 or $0.000 < 0.05$ means that the chemical equilibrium teaching materials are based on Spiritual values that have been validated by expert validators can develop students' spiritual attitudes. Apart from that, there is also a relationship between students' spiritual attitudes and the learning outcomes of students who are taught using chemical equilibrium teaching materials based on spiritual values in the guided inquiry learning model where the sig value (2-tailed) < 0.05 or $0.024 < 0.05$.

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Introduction

Quality education in Indonesia is still being pursued by various parties including the government, the private sector, educational institutions, and the general public. People in Indonesia who understand the need to invest in education try to find the best school for their children. The quality of education has become a subject of discussion in recent decades. This is because the quality of education determines the quality of the graduates. Therefore, quality education is something that must be the center of attention for both the government and society (Alifah, 2021).

Article 3 of Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System explains that the role of national education is to develop competence and shape the character and civilization of a dignified nation in order to educate the nation's life, to become human beings who are devoted to God Almighty, noble, healthy, educated, capable, innovative, independent, and become democratic and responsible citizens. Article 31 (3) of the 1945 Constitution also states that national education aims to develop students' faith and devotion to God Almighty and good character. Based on the two legal foundations above, it can be concluded that education in Indonesia aims to produce human resources who have a high cognitive level and at the same time also have faith and devotion to God (Harahap & Darmana, 2020).

The spiritual aspect is an action that is able to face and solve problems related to value and meaning, namely those related to human life and the surrounding nature in relation to God. It can be said that spiritual intelligence is an ability in humans which is then developed through educational institutions and that potential must be trained and developed within the scope of education both seen from the curriculum, teachers, and the environment. Spiritual intelligence is very important for students because looking at the challenges of today's increasingly complicated times and can not only be passed by using intellectual skills (IQ) and emotional intelligence (EQ), but it is very necessary for spiritual intelligence (SQ). Learners who have spiritual intelligence will have integrity and always do God's commands. In this case, students who have spiritual intelligence will more easily understand the lessons at school and behave well (Rantesalu, 2020).

Based on the results of interviews with teachers, morning habituation activities to improve students' spiritual attitudes are carried out by reading holy books and praying before learning which is carried out for 15 minutes. The results of observations made at SMA Negeri 8 Medan show that the spiritual attitudes possessed by students are still relatively low such as a lack of sense of responsibility, lack of concern for the surrounding environment, and lack of discipline. The teacher's assessment aspect still focuses on the cognitive domain so that the teacher only assesses the affective domain through observation without using an assessment instrument. Based on the results of interviews with teachers, there are several student activities that have decreased or deteriorated character values such as, there are several students who skip school, do not do school assignments, and even cheat on tests or school exams. This has an impact on learning outcomes and students' spiritual attitudes. According to (Kuntoro & Wardani, 2020) it is necessary to conduct an assessment that can really measure the spiritual attitudes of students.

Religious science can be used as a counterweight to science, because if science is not balanced with religious science it will produce physical progress but dry in the spiritual aspect. This is because religious science goes hand in hand with science. Presenting spiritual aspects in chemistry will not reduce its scientific content, but will complement and strengthen each other which will be a means of achieving faith and piety (Okmarisa et al, 2016).

According to Darmana (2014) that implementing spiritual aspects in teaching materials will not reduce the quality of the scientific level of chemistry itself, it is even a very effective effort to be able to restore students' understanding that all real facts including scientific innovations that have been discovered are destinies that have been determined by God. With the integration of spiritual values in teaching materials can foster spiritual attitudes in students and be able to improve student learning outcomes (Okmarisa et al, 2016). Teaching materials allow teachers to deliver learning materials well to students. Therefore, teaching materials are systematically prepared by teachers and used in the learning process. The use of teaching

materials in the learning process can also produce changes in students, especially if the teaching materials are integrated with ESQ (Emotional Spiritual Qoutient) values. The existence of teaching materials integrated with ESQ values can overcome problems in the fading of students' social and spiritual values (Hervi & Ristiono, 2021).

Based on the results of interviews with class XI chemistry teachers at SMA Negeri 8 Medan, it was found that chemistry learning, especially chemical equilibrium material, still applies a conventional learning model with the lecture method, where the educator (teacher) provides an explanation of the material then divides the task and gives exercises in the form of questions. This results in students being less active in learning chemistry in the classroom, especially on chemical equilibrium material so that some students have not reached the KKM. This happens because chemical equilibrium material is difficult material and involves concepts that require the ability to define and formulate chemical equilibrium, calculate chemical equilibrium, and factors that affect chemical equilibrium. In addition, the learning that has been done by teachers in the classroom uses teaching materials that do not pay attention to the needs and characters of students. To be able to construct student knowledge properly, the task of a teacher is not only to convey material in class, but a teacher must be able to design effective learning, evaluate the learning that has been done, and make the necessary learning instruments. Learning experiences and process skills can be obtained by students by presenting a problem in everyday life.

Realizing this, there needs to be a change in learning by using a guided inquiry learning model developed with teaching materials that integrate spiritual values. The guided inquiry learning model is a learning activity that involves students' abilities based on critical and analytical thinking processes to solve problems that occur through observation and experimentation. The guided inquiry learning model is an effective learning model to increase student activity in the teaching and learning process (Jundu et al, 2020).

Research Methods

This study uses a type of quantitative research with research that uses quantitative data, namely data in the form of numbers or numbers to measure student learning outcomes. This study uses random sampling technique where there are 2 classes that become samples, namely class XI IPA 1 as an experimental class and class XI IPA 3 as a control class, each of which has 30 students. The experimental class will be treated with learning using spiritual value-based chemical equilibrium teaching materials with guided inquiry learning models in the form of modules while the control class will be treated using high school textbook teaching materials with guided inquiry learning models. The data collection methods used are (1) interview observation, (2) student spiritual questionnaire, (3) test instruments.

Research Results and Discussion

This research was conducted at SMA Negeri 8 Medan with the research sample, namely two classes that have been selected randomly (random sampling) are class XI MIA 1 as an experimental class and class XI MIA 3 as a control class. The implementation of this study used spiritual value-based chemical equilibrium teaching materials in the experimental class while the control class used high school student handbook teaching materials on the subject of chemical equilibrium. SMA Negeri 8 Medan has basically integrated several spiritual (religious) values such as the celebration of religious holidays, mandatory prayers before entering learning, greetings when passing teachers, mandatory zuhur prayers and other activities. However, these spiritual values have never been integrated in every subject matter

in learning, especially chemistry. Learning is still centered on the high school textbook given by the teacher.

In the study, the average pretest and posttest scores were obtained. The average pretest score in the experimental class was 36.67 while the average pretest score in the control class was 40.16. Furthermore, the average posttest value in the experimental class was 82.66 and the average posttest value in the control class was 75, which can be seen in table 1.

Table 1. Descriptive Statistical Data

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest Eksperimen	30	15	65	36.67	13.667
Postest Eksperimen	30	65	95	82,67	7.626
Pretest Kontrol	30	15	75	40,17	15.618
Postest Kontrol	30	45	95	75,00	12.798
Valid N (listwise)	30				

After the pretest value of posttest funds from each class both experimental and control classes which can be seen in table 1, it will then be tested using the Independent Sample Test test to see the learning outcomes of experimental and control class students. The experimental class was given treatment using spiritual value-based chemical equilibrium teaching materials and the control class was given a high school textbook on the subject of chemical equilibrium, and both classes were taught in the guided inquiry learning model. Research data on student learning outcomes that have been obtained can be summarized in Figure 1.

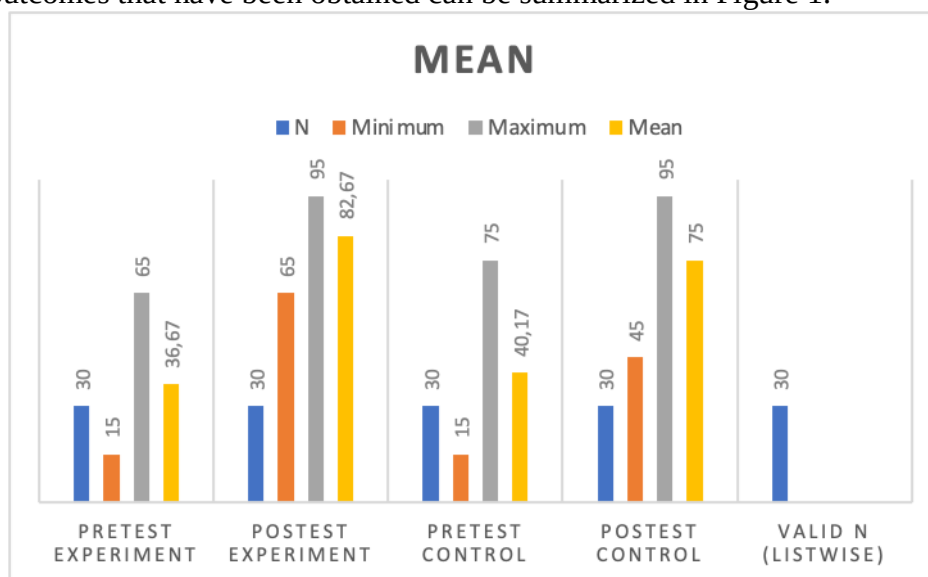


Figure 1. Comparison of Average Student Learning Outcomes of Experimental and Control Classes

From Figure 1, it can be seen that there is a difference in the average value of the experimental class and the control class, where the experimental class after being given treatment gives better results than the control class which can be seen from the acquisition of the average posttest value, namely in the experimental class of 82.67 and the control class of 75.00.

Furthermore, in the data on students' spiritual attitudes, before being given treatment in the experimental class, a questionnaire was first given as an initial test to determine the spiritual

attitudes of students before learning. Then after being given treatment, the questionnaire that has been prepared is given to students. This is done to see how the effect of chemical equilibrium teaching materials on students' spiritual attitudes by looking at the differences before and after treatment or in other words seen from the average value of pretest and posttest. The data on the results of spiritual attitude research obtained through questionnaires in the experimental class can be summarized in Figure 2.

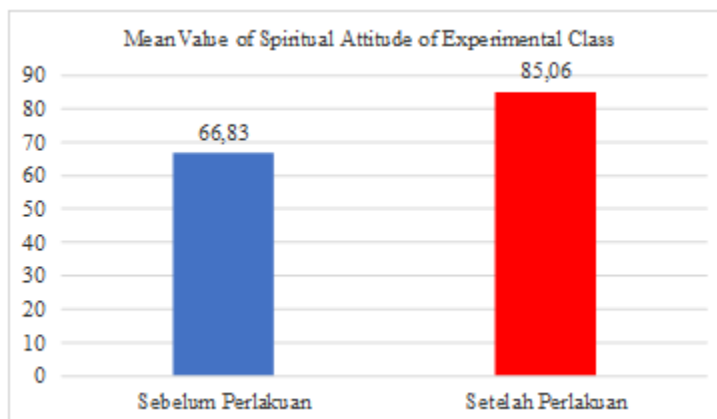


Figure 2. Comparison of Average Values of Spiritual Attitudes of Experimental Classes

From Figure 2, it can be seen that there is a difference in students' spiritual attitudes before and after being given treatment with teaching materials for chemical equilibrium based on spiritual values with a pretest value of 66.83 and an average posttest value of 85.06.

Based on the first hypothesis test that has been carried out using the IBM SPSS Statistics 25 for Windows program, the effect/difference of student learning outcomes taught using spiritual value-based chemical equilibrium teaching materials and those taught using high school textbooks on chemical equilibrium material obtained using the Independent Sample T-Test Test. Hypothesis testing as follows:

Ho: There is no effect of teaching materials for chemical equilibrium based on spiritual values in the guided inquiry learning model on student learning outcomes.

Ha: There is an effect of teaching materials for chemical equilibrium based on spiritual values in the guided inquiry learning model on student learning outcomes.

Ho : $\mu_1 = \mu_2$

Ha : $\mu_1 \neq \mu_2$

The data from the first hypothesis test can be seen in table 2.

Table 2. Independent Sample T-Test Test Results

Kelas	Rata-rata		df	t _{hitung}	t _{tabel}	Sig. (2-tailed)	Keterangan
	Pretest	Posttest					
Eksperimen	36,67	82,67	58	2,819	2,00172	0,007	Berbeda secara signifikan
Kontrol	40,16	75,00					

Based on table 2, the data obtained Sig. (2-tailed) on Equal variance not assumed is 0.07, which is smaller than the significance level ($0.007 < 0.05$), this shows that there is a significant difference between the experimental class and the control class. Or in other words,

there is an effect of spiritual value-based chemical equilibrium teaching materials on student learning outcomes so that H_0 is rejected and H_a is accepted.

This research can be information that spiritual value in learning can encourage students' spiritual attitudes to be better by fostering faith and devotion to God Almighty and realizing the majesty of God in creating the universe so that students can be more motivated in expanding their knowledge. This is in line with Darmana's opinion (in Sundari, 2020), which states that presenting the spiritual aspects of religion in chemistry / science will not reduce its scientific content but will complement and strengthen each other which will be a means of achieving faith and piety. Okmarisa et al., (2016) stated in their research that the application of teaching materials integrated with spiritual values can improve student learning outcomes, this is because the presence of religious elements in learning becomes a new color that fosters positive energy for students. One way to form students into people of faith and devotion is to present spiritual aspects or religious values into teaching materials.

In addition, the guided inquiry learning model in the learning process is able to make students more active and have a critical mindset in solving problems that occur. . This is in accordance with the opinion of Sarifah & Nurita (2023) saying that the guided inquiry learning model is a student-centered learning model where this model emphasizes students to think critically and analytically to seek and find their own answers to problems, this aims to make students' memories deeper in the material to be conveyed by the teacher. The guided inquiry learning model is a learning model that makes students actively participate in obtaining scientific knowledge by conducting investigations to get answers to existing problems. With the incorporation of spiritual value-based teaching materials on the subject of chemical equilibrium with the guided inquiry learning model, the learning process is more interesting.

Based on the second hypothesis test with the IBM SPSS Statistics 25 for Windows program, the difference in students' spiritual attitudes before and after being taught or in other words, there is an effect of teaching materials for chemical equilibrium based on spiritual values on students' spiritual attitudes on chemical equilibrium material obtained using the Paired Sample T-Test test, the hypothesis testing is as follows:

H_0 : There is no effect of teaching materials for chemical equilibrium based on spiritual values in the guided inquiry learning model on students' spiritual attitudes.

H_a : There is an effect of teaching materials for chemical equilibrium based on spiritual values in the guided inquiry learning model on students' spiritual attitudes.

$H_0 : \mu_1 = \mu_2$

$H_a : \mu_1 \neq \mu_2$

The data from the second hypothesis test can be seen in table 3 below.

Table 3. Test Result Paired Sample T-Test

Paired Sample T-Test						
		Paired Differences		T	Df	Sig. (2-tailed)
		95% Interval Difference	Confidance of the Upper			
Pair 1	Pretest Angket- Posttest Angket	-14,948		-11,350	29	0,000

Based on table 3 obtained data value Sig. (2-tailed) of 0.000 is smaller than the significance level ($0.000 < 0.05$), this shows that H_0 is rejected and H_a is accepted, which means

that there is an effect of teaching materials for chemical equilibrium based on spiritual values on students' spiritual attitudes.

Teaching materials for chemical equilibrium based on spiritual values that have been validated can have a positive influence on students. From the results of tabulated data on students' spiritual attitudes that have been given to students, it shows that learning using teaching materials for chemical equilibrium based on spiritual values gets a good response so that in its implementation it is balanced between the cognitive/knowledge aspect and the psychomotor/spiritual attitude aspect so that students can apply it in everyday life. This shows that the existence of teaching materials integrated with spiritual values makes educational institutions able to produce Indonesian people who have intellectual, emotional, social and spiritual intelligence (Irwansyah, 2020). This is in accordance with research conducted by (As-Syiba et al, 2023) which states that integrating spiritual value-based learning can strengthen the character attitudes of students so that they will have a balanced ability between IQ (Intelligence Quotient), EQ (Emotional Quotient) and also SQ (Spiritual Quotient). So that the spiritual values contained in teaching materials have a very positive and very good impact on the character of students.

This third hypothesis testing uses a correlation test. The analysis was carried out using the Pearson correlation test. This test is part of parametric statistics which aims to determine the level of relationship between variables expressed by the correlation coefficient (r). This test was carried out using the IBM SPSS Statistic 25 for Windows program. In testing the correlation between these two variables, it can be seen by looking at the correlation coefficient and the Sig value. (2-tailed). The basis for making correlation decisions is if the Sig value. (2-tailed) < 0.05 then H_0 is rejected, which means there is a significant relationship between variables. However, if the Sig value. (2-tailed) > 0.05 then H_0 is accepted, which means that there is no significant relationship between the variables in the study. Hypothesis testing is as follows:

H_0 : There is no relationship between students' spiritual attitudes on chemical equilibrium material and student learning outcomes.

H_a : There is a relationship between improving students' spiritual attitudes on chemical equilibrium material and student learning outcomes.

$H_0 : r = 0$

$H_a : r \neq 0$

The data from the third hypothesis test can be seen in table 4 below.

Table 4. Correlation Test Results

Correlation			
Sikap Spiritual	Pearson Correlation	Sikap Spiritual	Hasil Belajar
		1	-,412
			0,024
Hasil Belajar	Pearson Correlation	39	30
		-,412	1
		0,024	
	N	30	30

Based on table 4, the Sig. (2-tailed) is 0.024 which is smaller than the significance level ($0.024 < 0.05$), this shows that H_0 is rejected, which means that there is a significant relationship between the spiritual attitude variable and student learning outcomes. From the table above, it is also obtained that the Pearson Correlation value is 0.412 which is the interval value range of

0.40 - 0.60 or it can be interpreted that the correlation between variables is in the moderate category.

From the results of this study it can be concluded that students with good spiritual attitudes tend to have good learning outcomes and vice versa students with poor spiritual attitudes have poor learning outcomes. This is in line with research conducted by Zahara (2017) saying that student attitudes are an indicator in determining the success of students in following learning. Students' tendencies in following learning are very diverse, some are positive and some are negative. This tendency is clearly shown in the form of student attitudes during learning. Facts show that students' spiritual attitudes have meaning to student learning outcomes. (Komang, et al 2022) in his research stated that spiritual attitudes towards learning outcomes are used as an attitude of honesty, responsibility and tolerance where honesty and responsibility today are very minimal, this is the center of attention for educators so that these attitudes are embedded in each individual student. Therefore, it can be concluded that a good spiritual attitude can foster good learning outcomes as well. Therefore, it can be concluded that a good spiritual attitude can foster good learning outcomes as well.

Suggestion

1. There is an effect of teaching materials for chemical equilibrium based on spiritual values on student learning outcomes, namely, because the Sig. 2-tailed ($0.007 < \alpha$ (0.05)).
2. There is an effect of teaching materials for chemical equilibrium based on spiritual values on students' spiritual attitudes. The research results in the experimental class are Sig. (2-tailed) $< \alpha$ (significance level) or ($0.000 < 0.005$).
3. There is a relationship between students' spiritual attitude on chemical equilibrium material with student learning outcomes taught using spiritual value-based chemical equilibrium teaching materials because Sig. (2-tailed) $< \alpha$ the significance level or ($0.024 < 0.05$).

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