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THE EFFECT OF THERMOCHEMISTRY LEARNING BASED ON TAWHED TO CONCEPTUAL AND TAWHED UNDERSTANDING OF SENIOR HIGH SCHOOL STUDENTS

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Abstract - Moral crisis in Indonesia have been faced in all sectors. Improving quality of education process is one of some ways which believed as solution. The new school curriculum 2013 was launched to respond the crisis. This curriculum emphasize more on spiritual aspect as it is stated in the goals of national education. The research was conducted to support the implementation of the new school curriculum, especially focused on internalization of tawhed values, mainly in thermochemistry learning.The objective of this research is to known the effect of thermochemistry learning based on tawhed to conceptual and tawhed understanding of senior high school students**.** The quasi experimental method was used, involved tree islamic senior high schools in Medan. The data of conceptual understanding is collected by multiple choice test, whereas the tawhed understanding by essay test. The result shown that :(1) the average score of the students understanding of conceptual was 25,3 before and 77,4 after learning, there were diffrent as significant (t-test with $\alpha = 0,05$), and the average of N-Gain value is 0,7 (midle categories). (2) the average score of the students understanding of tawhed was 62 (sufficient categories), It measured only after learning.

Keywords : **Learning, internalization, tauhid, thermochemistry**

1. INTRODUCTION

The launching of new curriculum 2013 as a positive respon toward the goal of the national education. The core of the national education goals as stated in UUD 1945 is to become a man that has *iman* and *taqwa* to Allah, noble character, healthy, knowledgeable, skilled, creative, independent, and becomes a democratic and accountable citizens. Where as the chemistry course of senior high school aims to form positive attitude towards chemistry and realized the regularities of nature and glorify of Allah. A positive attitude towards chemistry and be aware of the nature order can be achieved as a result of the investigation, which brought to an awareness or belief that nature has certain laws (sunatullah) and there are regulator, creator and owner. The glorification of Allah *Yang Maha Esa* is expected to appear simultaneously with the admiration to his creatures that beautiful, regularly so making it easier to studied.

Allah Tuhan yang Maha Esa, Esa in his creation, ownership, establishment and maintenance of the nature. Allah had confers this nature as well as the means and the ability for people to learn and master, all for the benefit of mankind. This glorify would be helpful if continued with meng-Esakan in worship that manifested in the form do his command and leave prohibitions (taqwa) which will be reflected as a noble character. So how great the relationship between iman and taqwa to Allah Yang Maha Esa with a noble character. Noble character can be considered a "fruit" of iman and taqwa to Allah.

Chemistry as well as other sciences are studied in schools all of which are scientific. Chemistry is developed through observation and reasoning. Chemistry learning in school with only emphasize to scientific aspect will not to become a tool for students to have the noble character, especially if it hopes to form students that iman dan taqwa as stated in the national education goals. Inserting religious values on scientific science is a very good way. This method can provide a comprehensive understanding of the scientific and spiritual view (Darmana, 2012). The combination of science and religion is a combination of the right concept to understand the nature (Marssonet, 2012). Similarly, religion and science collaboration will make a major contribution to achieving a peaceful and sustainable society as well as ensuring the safety of the environment (Reich, 2012; Walach, 2005).

Has a lot of studies that seek to bring nearer among science lesson with religious values (Djudin, 2012, 2011; Hartono, 2010; Rohman, 2010; Rohmawati 2010; Saputro 2008; Kusnadi, 2000; Romadlon, 2000; Riduansyah, 2000) , This study, as previous research that develops of chemistry

teaching materials based on tawhed values. Materials of teaching developed are expected to be a means of embedding the values of tawhed in students. This research will be carried out tests on the effects of the teaching materials to the understanding conseptual of chemistry and the chemistry-tawhed.

2. METHODS

Quasi-experimental research conducted in the city of Medan from July to November 2015, involving three schools (two Islamic senior high schools, one school of MAN) as a research subject. Each school was taken one randomized experimental class (SMA Al ulum = 36 students; Ulu-Nuha 19 students; and MAN 37 students). Data of chemistry conceptual understanding collected by a multiple-choice test instrument as many as 18 items. Whereas the data of tawhed understanding collected by a essay test instrument as many as 10 item. Both instruments have validated through expert judgment (content validity) and empirical testing (construk validity). The scope of teaching materials based on tawhed values Include thermochemistry concepts /law that inserted by tawhed values. Inserting tawhed values done in two ways. The first way is done by integrating the concept/law of thermochemistry with translate of Quran verses that considered corresponding. The second way is done by revealing the moral wisdom and moral lesson of the concept / law of thermochemistry based on tawhed view. The data of Conceptual understanding were analyzed using SPSS through pretest and posttest t- test (ά = 0.05) and with a normalized Gain analysis (N-G). Criteria to declare the significant difference between pretest and posttest value based on the value of "p" is smaller than the value of ά (0.05). While the N-G criteria are improvement categories: low (0 <N-G <0.3); medium (0.3 <NG ≤ 0.7) and high (0.7 <NG <1), while the data of tawhed understanding only categorizing the posttest score with criteria (60-69 category enough; 70-79 medium category; 80 - 100 high category).

3. RESULTS AND DISCUSSION

3.1. The Effect of thermochemistry learning based on tawhed to conceptual understanding

The effect of thermochemistry learning based on tawhed to conceptual understanding based on two criteria. The first criterion is based on the significance of differences in the results of the pretest and posttest scores of thermochemistry (t -test). Whereas the second criterion is based on the value of the gain is normalized (N-G). The following will be presented the results and discussion based on these two criteria.

Obtaining the results of the pretest and posttest mean of conceptual understanding are presented in Table .1

Tabel 1. The result of prettest and posttest mean of conceptual understanding

Name of school	Pretest mean score	Postest mean score	t-test (ά =0,05)	N-G
Ulu-Nuha	26,6	67	.000 (signifikan)	0,6 (medium)
Al-Ulum	13,3	84,1	.000 (signifikan)	0,8(high)
MAN	35,9	81	.000 (signifikan)	0,7(medium)
	25,3	77,4	.000 (signifikan)	0,7(medium)

From table 1 the obtaining of the pretest mean score of conceptual understanding for the third class and the overall are low (25.3). While the mean of postest score in overall is medium category (77.4). The result of t- test showed that there is significant difference between the score of pretest and posttest mean for each school as well as a whole.

The low of pretest score, it can be said that the students have not learned the thermochemistry material. Mastery of thermochemistry only be obtained by learning. Although basically there are some thermochemistry concept (the concept of energy conservation laws) that have been introduced to students in science subjects in junior high school, but it was not enough to contribute to the pretest score. Posttest score in both school (Al-Ulum and MAN) is high, whereas in SMA Ulu-Nuha in the medium category, the mean of postest score for the whole in the medium category (77.4)

The result of t-test show that there is different significantly for each school as well as the overall. These results implies that thermochemical learning based on tawhed significantly can improve students' conceptual abilities. The results of the analysis of the gain for each school obtained the N-G mean score in the medium category (Ulu-Nuha and MAN) and high (Al-Ulum) and the

overall obtained in the medium category (N-G = 0.7). These results implies that thermochemistry learning based on tawhed can improve learning outcomes in the medium category.

These findings are almost same with several previous studies where research combining religious values, or the values of local wisdom in learning a particular subject matter shown to improve the mastery of these materials. These research are studies on the integration of the value of tawhed in learning of geography that can improve the ability of geography material and tawhed (Kusnadi, 2000). Research of integration of religious values at food chemistry learning, obtained results that improve the chemistry knowledge and religious (Romadlon, 2000). The research of IMTAQ integration in learning biology, where learning outcomes of students' understanding of biology and prohibitions of Allah increases (Riduansyah, 2000). Similarly, studies that basically integrates the values of the local culture to the content of certain subjects, the results showed an increase in the ability of the content of these subjects (Basuki, 2011; Achyani, 2010; Triwiyono, 2010). It also indicates that learning to bring the values of tawhed or spiritual values that others do not have a negative impact on the mastery of the material. This reinforces the assumption that understanding the scientific concept of spiritual perspective will not substantially reduce the levels of the scientific concept of scholarship (Darmana, 2012; Djahiri, 1996).

The science that scientifik is a knowledge in the one side which question of what happened and how the occurrence of a view of internal substance itself, while on the other side there is the knowledge about the "meaning and wisdom" which is basically more useful and meaningful to human welfare of spiritual and physical. Studies on "the meaning and wisdom" with a view of the outside factors, the nature of the cause of why something happened? for what happened? is a study that actually after hundreds of years popularized by Aristotle that basically he requires that on scientific studies should be concern to reason of efficient, formal, material and final. (Americana, 1974 ; Kartanegara, 2005)

3.2. Effect of thermochemical learning based on the understanding of monotheism monotheism

The ability of tawhed understanding is the ability to understand of chemistry topic based on the tawhed prespective. From the three schools were used as research subjects obtained mean score is 62 (max 100). This score included the category of enough. The score of mean for each school Ulu-Nuha, Al-Ulum, and MAN was 61; 62; and 63. For more details are presented in Table 1 below:

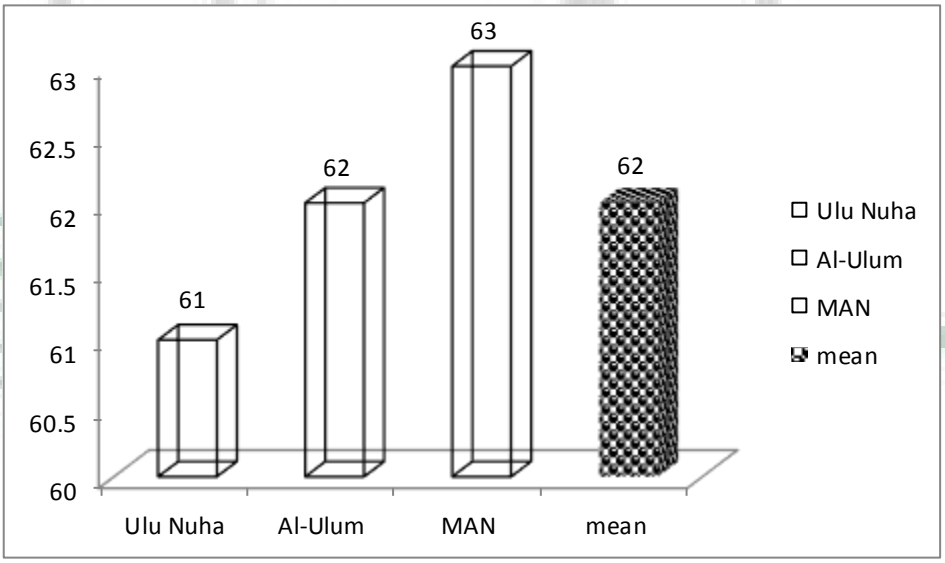

Figure 1 The mean score of tawhed understanding

The mean score of tawhed understanding which is almost the same in each school showed that the background of each school is relatively the same. Third schools of research subject are school of islamic. The curriculum whic implemented is two curriculum. It is curriculum the Ministry of National Education and Ministry of Religion. Obtaining the highest mean is 63, coming from the students of the MAN school (Public Mandrasah Aliyah under the guidance of Religion Department),

while the other two schools are private high schools which organizes the curriculum of National Education(Department of education and culture) and Religion Departmen.

Understanding of tawhed through chemistry materials is very important, it is based on the grounds that the understanding of tawhed through chemistry materials further contribute to the achievement of the first core competencies (KI-1) curriculum, 2013. The mean score of tawhed understanding that is still not satisfactory caused by several factors, including: the factors of students, teachers, and learning resources. Factors of student who has no experience in answering the questions of chemistry-tawhid, for them it is the first time. Although they have learned of religion (because of Islamic schools) but studied religion separate from studying chemistry. Although their school are favorite school that organized two curriculum (departement of National Education and Religion), but the implementation is not done "two in one" , only performed simultaneously or in frequency of relatively little incidentally has been done by teachers (Darmana, 2013; 2013a).

For students, this is a new thing so the time allocation of the curriculum is not sufficient (approximately 3 weeks) thus providing an experience that is too short. The students receive new information about the chemistry-tawhid has not until to a deep understanding of what else to respond and assess (Djahiri, 1996).

The Factor of teacher, although as a teacher in islamic schools but their background is the same as other teachers. They are graduates of the Public Higher Education that does not provide the ability of religion, especially religion through chemicstry materials or other materials. The teachers also do not receive coaching / or upgrading is formal but only socialization by researcher in a relatively short time. In the chemistry-religion / chemistry-tawhid / chemistry-values learning, the level of believe or quality of the teacher-student relationship may affect how large the positive values (religion / tawhed) can be absorbed or understood by students. Students are the least tendency to position the teacher as role model which will affect the level of their understanding and application. The chemistry teacher is not capable of being the ideal figure. This is consistent with the theory that one way to get a value internalization done through example and exemplary (Elmubarok 2009; Murdiono 2010; Ulwan in Maulana, 2012).

Other factors that influence is the lack of books that can be used as a reference source. Reference books as a source of learning about the chemistry-religion as well as a reference in the form of experts are still very rare or do not exist. This is an obstacle for students and teachers to increase their knowledge.

If the views of obtaining the highest and lowest score and percentage of students who scored ≥ 60 for each class are presented in Table 2 below:

Table 2 highest and lowest scores, the number of students who obtain a score ≥ 60

Score/ school	Ulu-Nuha	Al-Ulum	MAN
lowest	5,3	2,0	3,5
highest	7,0	8,0	8,25
≥ 60	64%	85%	97%

Although the mean score is reached 62, but there are students who achieve score more than 80 (MAN and Al-Ulum). This result gives enough confidence that there will be students of other students who have a high understanding of the chemistry-religion. Therefore, if this is done on the concept of the overall chemistry also in other subjects (other than chemistry) and do continuously then it is possible the mean score that reflects the ability of students to understand the chemistry of religions will increase. Likewise, if seen from the percentage of students who scored ≥ 60 were the majority, even in MAN almost 100% (97%).

4. CONCLUSIONS

1. The average score of the conceptual understanding was 25.3 pretest (low categories), and 77.6 postest (medium categories). There was significant differences between the pertest and postest score. The thermochemistry learning based on tawhed can improve students' conceptual understanding in the category of moderate (N-gain medium).
2. The thermochemistry learning based on tawhed can help students understand the tawhed with the average score of 62 (sufficient categories).

Suggestions

1. To minimize misunderstanding/mistake in the chemistry-tawhed learning so the teacher of chemistry should be improve communication more intense with religious teachers
2. Tauhid is the "value" of importance in the religion of Islam, therefore, can continue to study further by taking other, more universal values specific and set out on a new curriculum in 2013, for example, the values of honesty, hard work, and discipline (KI-2)

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