



## **THE EFFECT OF QUANTUM TEACHING MODEL BASED LITERACY TOWARD STUDENT CRITICAL THINKING SKILL**

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### **ABSTRACT**

This study is aimed to see the effect of quantum teaching model based on literacy toward student's ability in critical thinking focused on flat side building in SMP Plus Darul Ilmi Murni. The method of this study is quantitative research by using quasi experimental research. The total number of sample is 19 students for each classes, they are experimental and control class. Based on the data and analysis, it shows that there is significant differences between T-Count and T-table. The analysis of the data resulted that T-test is 4,226 and T-Table is 5 % (1,689). From the percentage, it can be seen that  $t_{count} > t_{table}$ , it is  $4,226 > 1,689$ , thus  $H_0$  is rejected and  $H_a$  is accepted. Therefore, the hypothesis can conclude that there is a significant effect of quantum teaching based literacy toward student's ability in critical thinking focused on flat side building in SMP Plus Darul Ilmi Murni

**Key word:** *Quantum Teaching* based literacy, critical thinking ability

## INTRODUCTION

At the national level, evaluation of learning in Indonesian schools is carried out by using the standard of National Examination (UN). In 2016, The questions of Mathematics have a higher quality than previous years. It is caused of these questions have higher reasoning power "(Ulfa, Lubab, & Arrifadah, 2017). This is also one of the changing that occurred in the 2013 curriculum. In Indonesia, there is affirmation and expectation in learning; getting used to train students to have higher-order thinking skills or critical thinking.

Furthermore, at the international level, there is a study called an instrument. It is a test of global competencies. By using of this test, we can see students' readiness to compete in the global world. The name of the study is PISA (Program for International Student Assessment). Hayat and Yusuf stated that "PISA aims to examine periodically about the ability of 15 year old students in reading (reading literacy), mathematics (mathematics literacy), and science (scientific literacy). PISA assessment tests the children's ability to use their skills and knowledge in facing real life challenges "(Hayat & Yusuf, 2010). In Lutfianto and Sari, it is explained that "the last assessment in 2015, Indonesia was still in the lower rank when it is compared to countries in ASEAN that followed the PISA assessment such as Thailand, Vietnam and Singapore. In the field of mathematics, Indonesia is ranked 63 out of 70 PISA participants "(Lutfianto & Sari, 2017). This happens because of Indonesia uses late entrance regulations or starts elementary school education at the age of 7 (Fathani, 2016).

Based on the evaluation of the education study, it was stated that Indonesian students had not optimally reached the target in learning mathematic. Though, they had increased points. There is a factor to make Indonesia student got low score in international competency. Indonesia students admitted that mathematics is a difficult course. They argued that they can't understand and make them lack of interest and motivation in learning mathematic.

The low ability of students in mathematical literacy is also grounded by the lack critical thinking and their awareness to admit that literacy as the need to develop their intellectual developing. Mathematical literacy is a reading and writing activity that requires an effort to think critically in order to get influence and change within the individual. Thus, it is needed mathematic which has a role in organizing human thinking. By using of this, the result can be obtained from the process as the problem solving

According to Wardhani and Rumiati, the low PISA results were caused by one of the factors; Indonesian students were generally less in exercise to answer or finish the questions. They seem do not recognize the characteristics of question from TIMS and PISA. Generally, mathematical syllabus is structured to display rubric assessment which is less related to the life context and does not facilitate students in expressing their opinion and arguin]g. This situation is not in line with the characteristics of the questions in TIMSS and PISA, in which the substance is contextual, requiring reasoning, argumentation and creativity in problem solving (Wardhani & Rumiati, 2011)

Dealing to this, Shadiq argued that "mathematics learning will not run well if the questions are not supportive. According to him, we must follow what the objectives of the question are to determine how the learning process is going to be. TIMSS and PISA questions should be used as a reference for the preparation to have contextual questions "(Sadiq, 2014). According to Fisher and Scriven, critical thinking is "skilled interpretation and evaluation toward observation and communication, information and argumentation" (Fisher, 2009). Then Wade argued that it is "the ability and willingness to make judgments on a number of statements, objective decisions based on sound considerations and supporting facts, not based on emotions and anecdotes" (Wade, 2008). The definition of critical thinking according to Ennis is "reflective thinking that is reasoned and focused on determining what to believe or do" (Hendriana & Soemarmo, 2014)

Then. Ennis stated that the ability to think critically in mathematics is "the ability to think in solving of mathematical problems which involve mathematical knowledge, mathematical reasoning, and mathematical proof" (Lestari & Yudhanegara, 2015). From several definitions of experts, it can be concluded that mathematical critical thinking is an individual effort to stay active in using brain work functions about information through cognitive strategies and understanding of the information as a result of the analysis that has been done.

Based on the description above, it can be concluded that y mathematical critical thinking skills in this study is an individual effort to stay active in using the brain's work function in thinking about information through cognitive strategies and understanding the information as a result of the analysis that has been carried out. It is aimed to obtain the results and appropriate data through assessment by using of indicators of mathematical critical thinking skills. They are providing simple explanations, building basic skills, concluding, making further explanations / clarifications, and developing strategies and tactics.

Based on the observations regarding the percentage of completeness of the UKD-1 score of the year 2017/2018, it can be concluded that the student has not been able to achieve the expected KKM score of 80, so it requires special handling from the field teacher to overcome this. Then based on the observation data obtained, regarding the responses of the experimental class to mathematics learning, it can be seen that from the results of the highest percentage, namely 57.90% (11 students) stated that he had a good response to mathematics learning depend on mathematics teacher who educated him.

In the next process, the researcher made observations to determine students' mathematical critical thinking skills. Based on observations at SMP Plus Darul Ilmi Murni, it shown that some students have been able to answer the test questions . However, the problem found was that the students were not able to answer the literacy-based questions correctly. The one reason is the students have not required the indicators of mathematical critical thinking skills and the material indicators of the flat side. Therefore, researcher intends to examine critical thinking skills through the influence of literacy-based Quantum Teaching learning models because they are important in improving the quality of education.

This argument is in line with Julita's thinking "the learning process will be effective if students actively build their knowledge by thinking critically about the topics they are learning and not only as passive recipients of information, then learning will be more meaningful" (Julita, 2014).

DePorter has successfully carried out his doctoral research and came up with the result that Quantum teaching organizes the best of the best into a multisensory, multi-intelligence, and brain-compatible package, it will boost the teacher's ability to inspire and the ability of students to compete. This methodology is built on eighteen years of experience and research on 25,000 students and the synergy of opinions from hundreds of teachers (DePorter, Reardon, & Singer-Nouri, 2010).

This learning model was developed to make students and teachers more easily in teaching learning mathematics. Through this model, it is expected that it can affect the mathematical critical thinking skills of students in mathematical literacy. This is also in line with Erik Santoso's research on elementary students. Erik found the result that "there is a positive effect of using the quantum teaching learning model on the ability to think critically in mathematics" (Santoso, 2016).

The scope of the material in this study is geometry and measurements of flat-sided form. Based on the description and facts above, this study aims to determine and prove

the effect of literacy-based Quantum Teaching learning models on critical thinking skills in learning Flat Side Building toward students' critical thinking skills in learning. This study is useful for the learning process in developing of student character. Researchers also expect that there is a contribution from all parts in implementing of this research.

## **METHOD OF RESEARCH**

This research used a quantitative study using a quasi-experimental research. The population is taken at Islamic-based junior high school in Deli Serdang, The researchers chose the population to all student in class VIII at SMP Plus Darul Ilmi Murni. It is consisted of 2 (two) classes with a total of 38 students. The sample in this study used a saturated sampling technique. Sugiyono stated that "saturated sampling is a sampling technique when all members of the population are used as samples" (Sugiyono, 2010). The classes used as the sample in this study were class VIII A with 19 students and VIII B with 19 students. Class VIII B as an experimental class learn by using Quantum Teaching based literacy and class VIII A as a control class learn by using the cooperative learning model.

There were two instruments used during the study; the treatment instrument and measuring instrument. The treatment instruments are RPP (Learning Implementation Plan) and LAS (Student Activity Sheet) as well as learning media as materials used in learning. The measuring instrument is in the form of an essay test with a total of five items which include a test indicator of mathematical critical thinking skills and are related to real life, which is integrated with Islamic teachings.

The data analysis of this study consists of descriptive analysis and inferential analysis. Descriptive analysis was carried out by presenting the data through the histogram frequency distribution table, mean and standard deviation. Meanwhile, inferential analysis is used in statistical hypothesis testing and processed with data analysis techniques which include calculating the average score, standard deviation, , normality test using the Lilliefors technique, homogeneity test using the Bartlet test, and statistical hypothesis t test. By using of this, we can see significant influence between the mathematical critical thinking skills from both of class groups and answer research hypothesis.

## FINDINGS AND DISCUSSION

### A. Data Description

#### 1. The description of Score in Pretest Between experiment and control class

Based on the pretest, it shown that 19 students in experimental class got avarage score in 27,684 with the highest score of 46, while the lowest score was 14. Meanwhile, from 19 students in the control class, they obtained average score of 32.368 with the highest score of 45 while the lowest score was 15

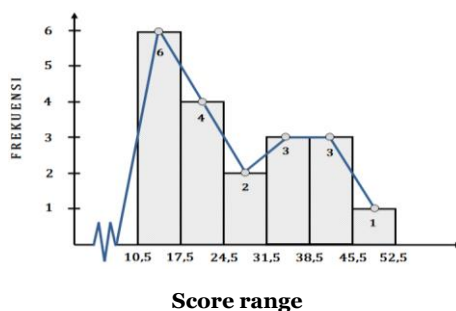
##### a. Pretest Score in Experimental Class

The results of the pretest scores shown that student’s mathematical critical thinking skills are listed in attachment of 20 and the frequency of distribution data in attachment 22 with a description of the arithmetic mean score of 27.684 Variance = 107,784; Standard Deviation (SD) = 10.382; maximum score = 46; minimum score = 14 and range of score (range) = 32.

**Table 1 Data Frequency Distribution in Pretest from Experimental Class**

Klp	Score Range	Freq (Fi)	Ppercentages Cum	(%)	% Cum
1	10,5 – 17,5	6	6	31,58	31,58
2	17,5 – 24,5	4	10	21,05	52,63
3	24,5 – 31,5	2	12	10,53	63,16
4	31,5 – 38,5	3	15	15,79	78,95
5	38,5 – 45,5	3	18	15,79	94,74
6	45,5 – 52,5	1	19	5,26	100,00
<b>total</b>		<b>19</b>		<b>100,00</b>	

Based on the score above, the following histogram will clarify in detail.



**Figure 1 Data Histogram of Pretest in Experimental Class**

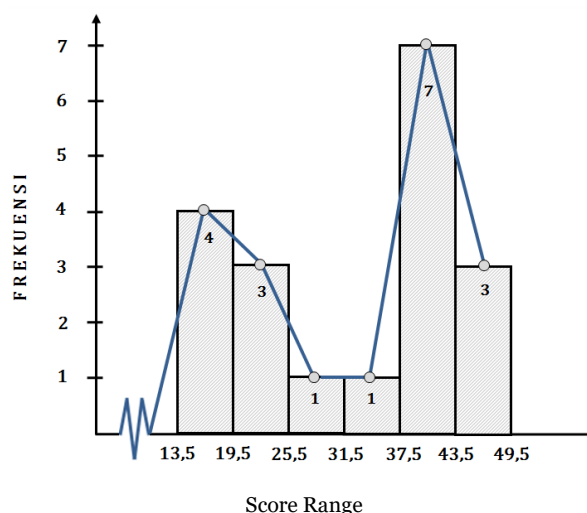
**b. Pretest Score in Control Class**

The results of the pretest scores shown that student’s mathematical critical thinking skills are listed in attachment 21, the frequency of distribution data in attachment 23 with a description of the arithmetic mean score of 32.368 Variance = 127,135; Standard Deviation (SD) = 11.275; maximum score = 45; the minimum score = 15 and the range of score (range) = 30.

**Table 2 Data Frequency Distribution in Pretest from Control Class**

Klp	Score Range	Freq (Fi)	Percentage	(%)	% Cum
1	13,5 – 19,5	4	4	21,05	21,05
2	19,5 – 25,5	3	7	15,79	36,84
3	25,5 – 31,5	1	8	5,26	42,11
4	31,5 – 37,5	1	9	5,26	47,37
5	37,5 – 43,5	7	16	36,84	84,21
6	43,5 – 49,5	3	19	15,79	100,00
<b>Total</b>		<b>19</b>		<b>100,00</b>	

Based on the score above, the following histogram will clarify in detail.



**Figure 2 Data Histogram in Pretest from Control Class**

**2. Description Score of Posttest between experimental Class and Control Class**

Based on the post-test in the experimental class with the literacy-based Quantum Teaching model shown that from 19 students obtained an average score of 82.474 with the highest score of 94 and the lowest score was 68. Meanwhile, for the control class with cooperative learning resulted that 19 students obtained an average score of 73.053 with the highest score of 85 while lowest score 62.

**a. Posttest Score in Experimental Class**

The results of the posttest scores concluded that student’s mathematical critical thinking skills are listed in attachment 20, the frequency of distribution data in attachment 22 with a description of the arithmetic mean score of 82.474; Variance = 51,263; Standard Deviation (SD) = 7,160; maximum score = 94; the minimum score= 68 and score range (Range) = 32.

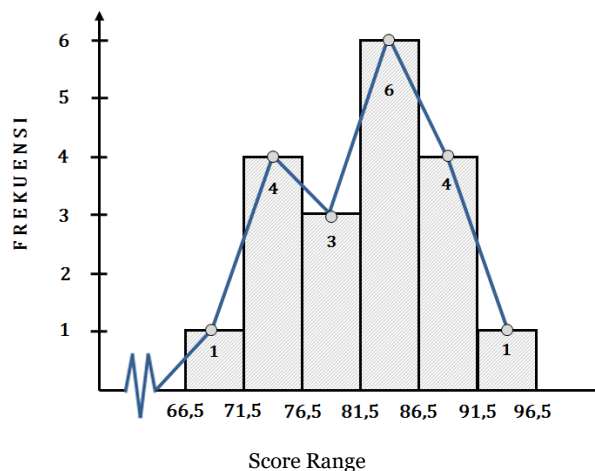
**Table 3 Data Distribution Frequency of Posttest in Experimental Class**

Klp	Score range	Freq (Fi)	Percentage Cumulatif	(%)	Percentage Cumulatif
1	66,5 – 71,5	1	1	5.26	5.26
2	71,5 – 76,5	4	5	21.05	26.32
3	76,5 – 81,5	3	8	15.79	42.11
4	81,5 – 86,5	6	14	31.58	73.68



5	86,5 – 91,5	4	18	21.05	94.74
6	91,5 – 96,5	1	19	5.26	100.00
<b>Total</b>		<b>19</b>		<b>100,00</b>	

The following is histogram from the group data.



**Figure 3 Data Histogram of Posttest in Experimental Class**

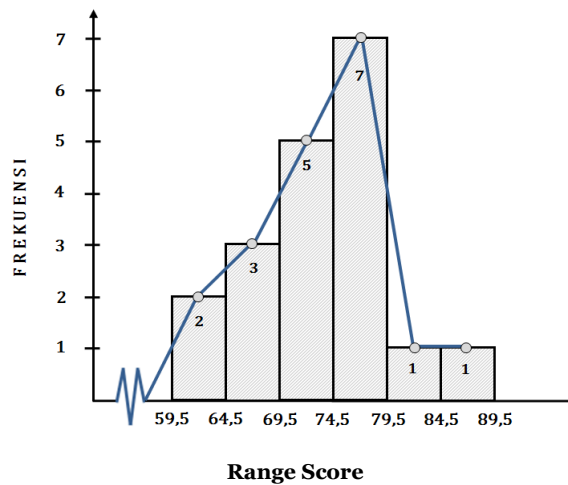
**b. Posttest Score in Control Class**

The results of the posttest scores on students' mathematical critical thinking abilities are listed in attachment 21, the frequency distribution data in attachment 23 with a description of the arithmetic mean score of 73.053; Variance = 43,164; Standard Deviation (SD) = 6,570; maximum score = 85; the minimum score = 62 and the range of score (range) = 23.

**Table 4 Data Distribution Frequency of Posttest in Control Class**

<b>Klp</b>	<b>Range Score</b>	<b>Freq (Fi)</b>	<b>Percentage Cumulatif</b>	<b>(%)</b>	<b>Percentage Cumulatif</b>
1	59,5 – 64,5	2	2	10.53	10.53
2	64,5 – 69,5	3	5	15.79	26.32
3	69,5 – 74,5	5	10	26.32	52.63
4	74,5 – 79,5	7	17	36.84	89.47
5	79,5 – 84,5	1	18	5.26	94.74
6	84,5 – 89,5	1	19	5.26	100.00
<b>total</b>		<b>19</b>		<b>100,00</b>	

Deal to the score in the table above, the following histogram will clarify the group of the data



**Figure 4 Data Histogram of Posttest in Control Class**

### 3. An Analysis of Students' Mathematical Critical Thinking Ability

#### a. First Question

The first item discusses flat-sided form (cubes, blocks, prisms, and pyramids) to sharp students' basic skills in this material regarding the form of flat-sided space nets. The indicators of this item consist of indicators of critical thinking skills and indicators on flat-sided form

1. Perhatikan gambar jaring-jaring bangun ruang berikut ini.

Jaring-Jaring Prisma

Jaring-Jaring Balok

Jaring-Jaring Limas Segi-6

Jaring-Jaring Kubus

- Cobalah periksa apakah gambar dan nama jaring-jaring bangun ruang tersebut telah benar dan sesuai gambar? Jika telah benar berilah tanda cekdis dan jika salah berilah tanda silang pada kolom yang berada disebelahnya.
- Tulislah nama yang benar sesuai pada kolom jawaban yang terdapat di bawah masing-masing gambar.
- Pilihlah 2 buah bangun ruang yang kamu senangi dan gambarkan jaring-jaringnya selain dari gambar jaring-jaring yang tertera pada soal.
- Jumlah jaring-jaring balok dan kubus berturut-turut yaitu 54 buah dan 11 buah. Sementara jumlah jaring-jaring prisma dan limas terdapat klasifikasi berdasarkan bentuk alasnya. Apakah pernyataan tersebut benar?
- Mengapa terdapat perbedaan jumlah jaring-jaring balok dan kubus? Jika pernyataan soal bagian "d" benar berikanlah alasan ananda.

**figure 5 First Question**

The following are the results of the answer from the one of students in the experimental class students, code name ASB who got a score of 18 and the control class student with the code name SAU got a score of 15

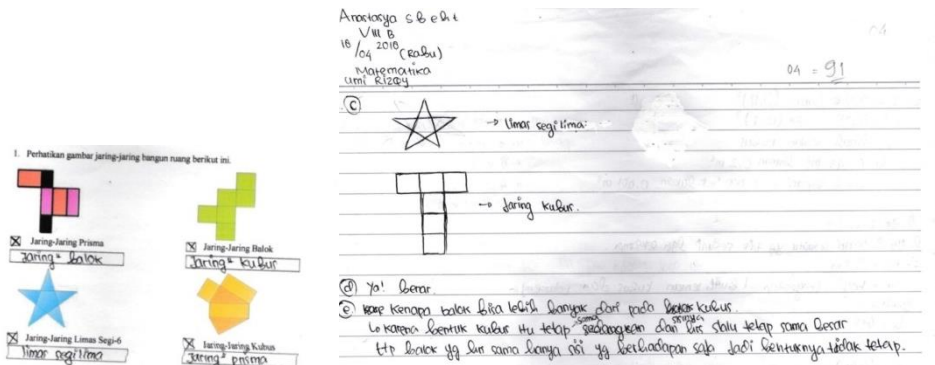


Figure 6 Result Answer of First Question in Experimental Class

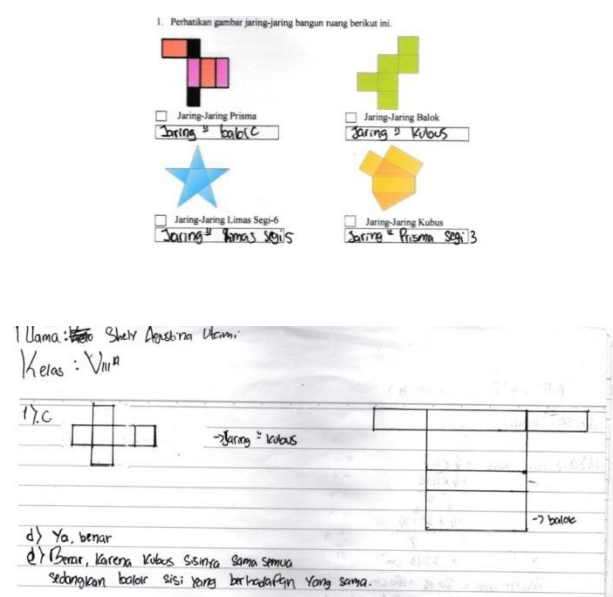


Figure 7 Result Answer of First Question in Control Class

Based on the analysis on the first item, it can be concluded that students in the experimental class got better critical thinking skills scores (seen from student code ABS) than in control class such as student’s code “SAU”. However, there is an exception, it is the problem on question 1c.

**b. Second Question**

The second item of question discusses cuboids. The indicators in this question consist of indicators of critical thinking skills which are linked to indicators on the material of flat-sided form. This question is an integration between mathematical Islam, regarding to the dimensions of the Ka'bah space to hone students' critical thinking skills based on the results of the literacy they have done on the question.

Perhatikan gambar berikut ini.



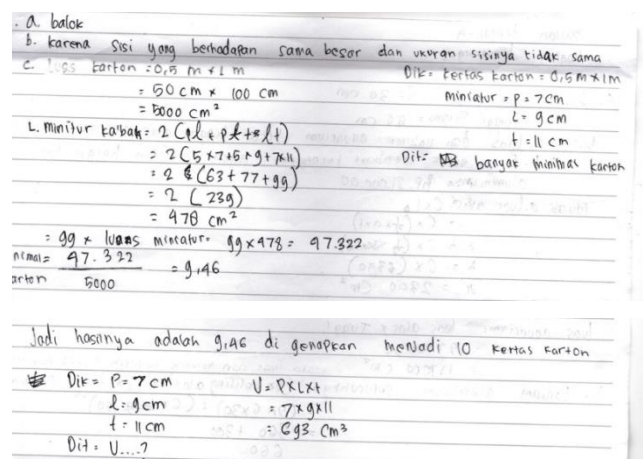
Gambar. Ka'bah

Ka'bah adalah bangunan suci yang disebut pula Baitullah (rumah Allah SWT) yang terletak di kota Makkah. Ka'bah memiliki dimensi  $11,03 \times 12,62$  meter persegi dengan tinggi 13,10 meter. Seorang ayah hendak mengajak anaknya belajar dengan membuat miniatur Ka'bah untuk memperkenalkan Ka'bah kepada anaknya dengan ukuran  $7 \text{ cm} \times 9 \text{ cm} \times 11 \text{ cm}$ . Ayah mempersiapkan kertas karton berukuran  $0,5 \text{ m} \times 1 \text{ m}$  dengan harga Rp 3.000,00. Jika miniatur Ka'bah yang akan dibuat sebanyak 99 buah supaya dapat berbagi kepada sanak saudara dan teman-teman. Maka tentukanlah:

- Apakah bentuk bangun ruang miniatur Ka'bah?
- Mengapa kamu memilih bentuk bangun ruang tersebut?
- Berapa banyak minimal karton yang dibutuhkan untuk membuat 99 buah miniatur?
- Berilah kesimpulan apabila memperoleh hasil dalam bentuk bilangan desimal.
- Hitunglah volume dari sebuah miniatur Ka'bah tersebut.

**Figure 8 Second Question**

The following is answering from experimental class “TDSH” who got score 18 and control class with name cod HM got score 15.



**Figure 9 Result Answer of Second Question in Experimental Class**

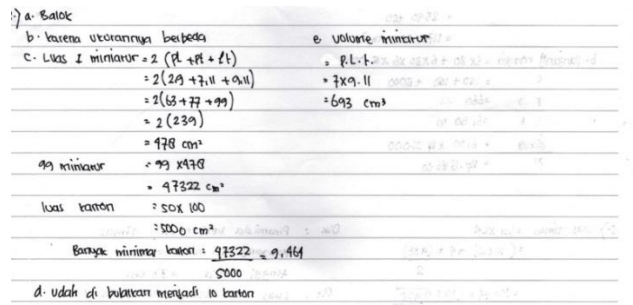


Figure 10 Result Answer of Second Question from Control Class

Based on the analysis on the second question, it can be concluded that students in the experimental class such as student code “TDSH”. The student can obtain a better critical thinking ability score than the control class (seen from student answer sheet “HM”).

**c. Third Question**

The third item of question discusses about cube. The indicators in this question consist of indicators of critical thinking skills which are linked to indicators on the of flat-sided form. This problem is an integration of mathematical material in Islamic teachings. It is regarding the responsibility of mosque administrators that must be emulated, namely respecting and putting the Qur'an in a usable cupboard so that it is neatly arranged by buying a new cupboard from the savings of infaq boxes as a Muslim concern in meeting the needs of the mosque.

Perhatikan gambar disamping.

Pengurus masjid membeli lemari baru untuk tempat meletakkan Al-Qur'an agar tersusun rapi dari hasil tabungan kotak infaq. Lemari tersebut tersusun dari beberapa bentuk kubus. Jika panjang rusuk kubus yaitu 0,7 m. Tentukanlah:

- a. Hitunglah volume 6 buah lemari kubus. (Tugas siswa: Cobalah periksa jawaban berikut ini, jika salah maka perbaiki dengan menuliskan kembali pada lembar jawaban)

Periksa jawaban berikut:

Dik:  $s = 0,17 \text{ m}$

Dit: Volume 6 buah lemari kubus = ...?

Jawab:

$$\begin{aligned} \text{Volume dari 1 buah lemari kubus} &= s^3 \\ &= (0,17)^3 \\ &= 0,343 \text{ m}^3 \end{aligned}$$

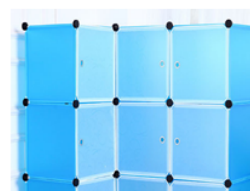
$$\begin{aligned} \text{Volume 6 buah lemari kubus} &= 6 \times \text{Volume 1 buah lemari kubus} \\ &= 6 \times 0,343 \text{ m}^3 \\ &= 2,058 \text{ m}^3 \end{aligned}$$

Maka, Volume 6 lemari kubus adalah  $0,001 \text{ m}^3$

- b. Bagaimana kesimpulanmu mengenai tindakan yang akan dilakukan saat menjawab soal bagian a?
- c. Jika suatu hari dinding lemari tersebut akan dicat dengan warna biru dan warna putih dan biaya untuk membeli cat kedua warna tersebut adalah sama yaitu Rp 30.000,00 per meter persegi. Tentukan biaya pengecatan satu buah kubus lemari tersebut.
- d. Apabila susunan lemari kubusnya menjadi seperti gambar berikut ini



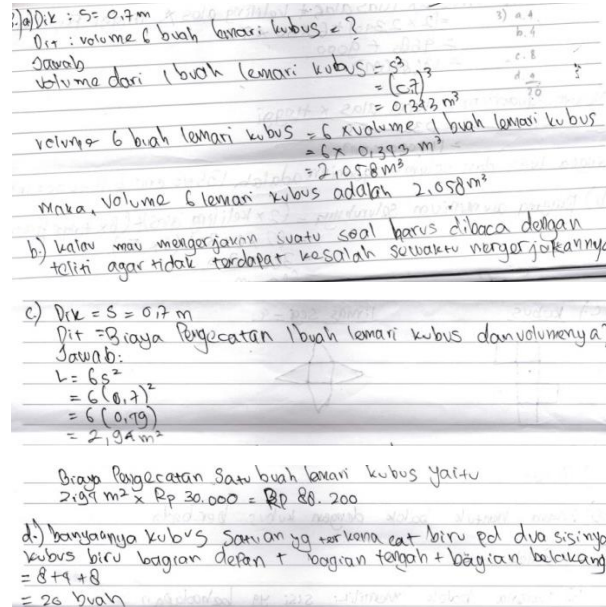
Berapakah banyaknya kubus satuan yang terkena cat warna biru pada dua sisinya?



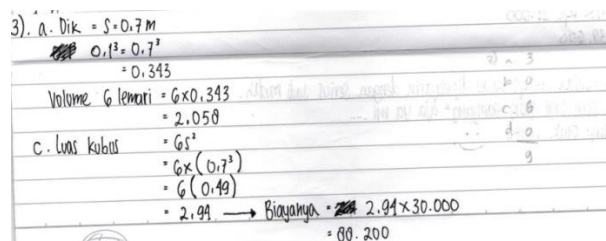
Sumber: <https://sc01.alicdn.com>  
Gambar Lemari Berbentuk Kubus

Figure 11 Third Question

The following are the answer of the experimental class with the code name RS who got a score of 20 and the control class students with the code name DRA got a score of 9.



**Figure 12 Result Answer of Third Question in Experimental Class**



**Figure 13 Result Answer of Third Question in Control Class**

Based on the analysis on the third question, it can be concluded that students in the experimental class with code RS obtained better critical thinking skills scores than the control as an example in student code DRA

#### d. Fourth Question

The fourth question discusses about the prism. The indicators of this question consist of indicators of critical thinking skills which are linked to indicators on the material of flat-sided form. This problem is also an integration of mathematical material in

Islamic teachings regarding an exemplary story by a father of traders who made an effort to make an aquarium, one of which is in the form of a 6-sided prism to obtain sustenance and is always grateful to Allah SWT.

4. Ahmad memperoleh rezeki dari Allah SWT melalui adanya pesanan pelanggan untuk membeli sebuah akuarium berbentuk prisma yang dibuat olehnya dari bahan aluminium. Alas kerangka yang akan dibuat berbentuk segi-6 beraturan dengan panjang 30 cm dan tinggi prisma 50 cm.

- Tentukan luas dan volume aquarium, jika tinggi alas = 26 cm
- Jika harga 1 meter aluminium Rp 21.000,00. Berapakah biaya keseluruhan yang dibutuhkan untuk membuat kerangka aquarium?
- Apa pelajaran yang dapat anda peroleh setelah membaca soal tersebut dan simpulkanlah.



Gambar. Aquarium Prisma Segi-6

Figure 14 Fourth Question

The following is the answer from student in experimental class with code name "TSDH" got score 20 and student in control class with code name DRA got score 16

4. Dik : Panjang sisi = 30 cm  
Tinggi Prisma = 50 cm  
Dit : a. Luas dan volume aquarium jika tinggi alas = 26 cm  
b. Biaya untuk membuat kerangka aquarium jika harga 1m aluminium Rp. 21.000,00

Jawab : a. Luas alas =  $C \times L_p$   
 $= 6 \times (\frac{1}{2} \times a \times t)$   
 $= 6 \times (\frac{1}{2} \times 30 \times 26)$   
 $= 6 \times (390)$   
 $= 2340 \text{ cm}^2$

Luas aquarium = Luas alas x Tinggi  
 $= 2340 \times 50$   
 $= 117000 \text{ cm}^3$

b. Panjang aluminium seluruhnya =  $(6 \times \text{keliling alas}) + (6 \times \text{tinggi prisma})$   
 $= (6 \times (30 + 30)) + (6 \times 50)$   
 $= 360 + 300$   
 $= 660 \text{ m}$

Biaya Aluminium = Rp. 21.000 x 6,6 = 138.600

c. Selalu bersyukur atas apa yang Allah berikan

Figure 15 Result Answer of Fourth Question in Experimental Class

4. Dik : Prisma Segi enam  
 Panjang sisi alas = 30 cm  
 tinggi prisma = 50 cm  
 Dit : a). Luas dan volume prisma  
 jika tinggi alas = 26 cm  
 b). Biaya untuk membuat kerangka prisma jika 1 meter aluminium Rp 21.000,00

Pengelompokan

a. Luas alas =  $6 \times L_a$   
 $= 6 \times \frac{a \times t}{2}$   
 $= 6 \times \frac{30 \times 26}{2}$   
 $= 2.340 \text{ cm}^2$

keliling alas =  $6 \times s$  = 180 cm

Luas permukaan prisma =  $2L_a + K_a \times t$   
 $= 2(2.340) + 180(50)$   
 $= 4.680 + 9000$   
 $= 13.680 \text{ cm}^2$

Volume prisma =  $L_a \times t$   
 $= 2.340 \times 50$   
 $= 117.000 \text{ cm}^3$

b. Panjang kerangka =  $6 \times 30 + 6 \times 50 + 6 \times 50$   
 $= 180 + 180 + 300$   
 $= 660 \text{ cm}$   
 $= 6,60 \text{ m}$

Biaya =  $6.60 \text{ m} \times \text{Rp. } 21.000$   
 $= \text{Rp. } 138.600$

Figure 16 Result Answer of Fourth Question in Control Class

Based on the analysis on the third question, it can be concluded that students in the experimental class with the student code TDSH obtained better in critical thinking skills than the control class, the data is gained from one example of student with code DRA.

**e. Fifth Question**

The fifth item discusses about pyramid. This problem is also an integration of mathematical material in Islamic teachings regarding maintaining good brotherly relationships between brothers and sisters when playing together making pyramids so that parents are happy.

5. Gambar berikut menunjukkan piramida berbentuk limas dengan alas berbentuk persegi. Jika kakak dan adiknya hendak membuat piramida dengan panjang sisi-sisinya 10 cm dan tingginya 30 cm agar dapat bermain bersama sehingga menjalin persaudaraan yang kompak dan orang tua menjadi senang. Hitunglah volume piramida yang dibuat oleh kakak dan adiknya tersebut dan berikan kesimpulanmu setelah membaca soal tersebut.

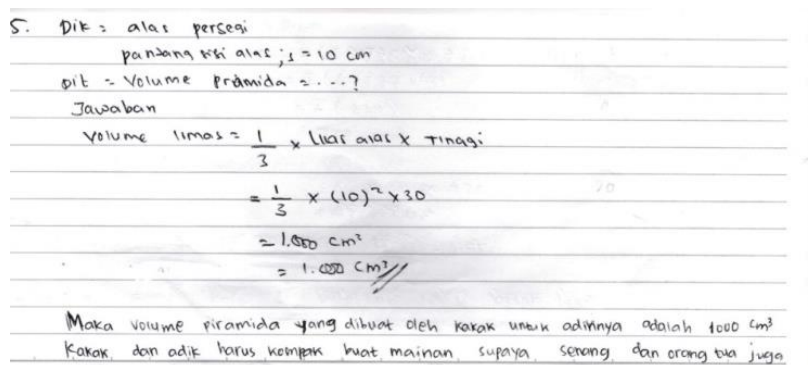


Sumber: <http://1.bp.blogspot.com>

Gambar. Piramida

**Figurer 17 Fifth Question**

The following are the results of the answer from the experimental class with the code name AAN who got a score of 20 and the control class students with the code name RM got a score of 16



**Figure 18 Result Answer of Fifth Question in Experimental Class Siswa**



5) Dik: Piramida berbentuk limas dengan alas persegi  
 Panjang sisi alas = 10 cm  
 tinggi limas = 30 cm  
 Dit = luas & volume piramida  
 Jwb = luas limas =  $La + 4Ls$   
 $= (10 \times 10) + 4 \times \frac{(10 \times 10 \times \sqrt{3})}{2}$   
 $= 100 + 20 \times (10 \times \sqrt{3})$   
 $= (100 + 20 \sqrt{3}) \text{ cm}^2$   
 Volume limas =  $\frac{1}{3} La \cdot t$   
 $= \frac{1}{3} (10 \times 10) \times 30$   
 $= \frac{1}{3} \times 100 \times 30$   
 $= 1000 \text{ cm}^3$

**Figure 19 Result Answer of Fifth Question from Control**

Based on the analysis on fifth question, it can be concluded that students in the experimental class can obtain a better critical thinking ability score (from the answer of student code AAN than the control class (from the example score obtained by the student code RM)

**4. Result of Observation toward Quantum Teaching based on Literacy**

In the implementation of the learning process, the researcher made observations in the experimental class in five meetings. The observations is conducted in three assessments. They are the pre-learning stage, Core learning activities and closing (final learning activities). Based on the three assessments to the teacher, it can be concluded that using literacy-based Quantum Teaching learning models in experimental class are done well.

**DISCUSSION**

Based on the interpretation of data analysis, it shows that there is a significant difference between t count and t table. The results of the analysis of t test obtained t count = 4.226 and the value of t table at a significant level of 5% (1.689). From this score, it can be seen that score t count > t table is 4.226 > 1.689. Therefore, H0 is rejected and Ha is accepted. Thus, the findings of the hypothesis conclude that there is a significant influence of Quantum Teaching learning models based literacy toward students' mathematical critical thinking skills focused on Building Flat form in SMP Plus Darul Ilmi Murni

Quantum teaching learning model based literacy is proven influence the development of learning outcomes, especially in mathematical critical thinking abilities.

Students who are thought through Quantum Teaching learning models based literacy get better results and achieve indicators of mathematical critical thinking abilities than students who were thought by using cooperative learning models.

The description above is also indicated by the average score from the experimental class is 82.474. Meanwhile while the average scores from the control class is 73.053. From the mean score, it can be stated that score of experimental class are higher when it is compared to the control class. Based on the theory of DePorter, he said that quantum teaching is the organization of various interactions within and around the learning environment. These interactions involve the elements of effective learning that influence student success. These interactions can change students' natural abilities and talents into the light that will benefit for themselves and others (DePorter, Reardon, & Singer-Nouri, 2010).

Related to the critical thinking skills by Caroselli's theory, she states that "students' critical thinking habits will have a potential effect on student learning outcomes in school, where the habit of solving problems critically will habituate students to solve problems appropriately and quickly" (Caroselli, 2009). Literacy requires critical thinking skills. Thus, the researchers designed mathematics learning based literacy. It can raise awareness to apply learning concentrate on the one of the most higher-order thinking skills. The researchers made the research instrument in the form of a description. The aim of this to apply learning based literacy and integrate it into the religious values of Islam. This is one of the research to change perception about the difficulty of collaborating between mathematical and Islamic learning.

The use of teaching materials and learning media of this research are supporting for applying mathematical learning based literacy. It occurs because of the problems in Indonesia education system uses instructional media only in school and certain educators. Therefore, this research is one way to provide an alternative solution.

Some of the media and props are used through computer-based media (Microsoft PowerPoint 2010 program and video scribe application software), mind mapping application program (Edraw Mind Map 79), shape props (cubes, blocks, prisms, and limas), millimeter paper to make individual cubes, calendars and cardboard (3D BRSD mesh) to decorate the classroom walls (visualization), and straws to make the shape of a building frame. The use of learning media is related to the advantages of the Quantum teaching learning model which consist two categories; context and content. According to DePorter, he clarified that in the context will find all the parts needed to compose such as

an empowering atmosphere, a solid foundation, a supportive environment, and a dynamic learning design (DePorter, Reardon, & Singer-Nouri, 2010).

Researchers also made an observations to the application of Quantum Teaching model. The observation resulted that students have an interest to participate in learning. they are enthusiastic and active during learning in groups and individually. Each student takes a role in his or her group. This situation enable them to handle group assignments such as review of literacy learning teaching materials and student sheet.

In Quantum Teaching, learning model can also be accompanied by songs and music. These instruments have a positive influence on students because of the elements of art. This is also supported by Jensen's theory which states that "music is very useful for energizing, adjusting the group and generating relaxation, stimulating prior knowledge, setting a theme or tone for the day, stimulating thoughts, facilitating pleasure, and providing aspirations" (Jensen, 2010 ). In the application of this model, the researchers prepared and designed a song that was adjusted in learning. The researchers also designed the song lyrics about the flat side form to train students' critical thinking skills. The song entitled Demanding Knowledge by Nur Asiah Jami. It is the cover of the song. The choice of the song because of the lyric has an emphasis and enthusiasm for studying.

There are some advantages of quantum teaching learning proposed by Shoimin.

1. Guide students towards the same thinking and perception.
2. Quantum teaching involves more students, during the learning process the students' attention can be focused on important thing
3. Because the movements and processes are performed, they do not require a lot of description
4. The learning process is more comfortable and enjoyable.
5. Students are stimulated to be active observer which is suitable between theory and reality, and enable student to practice by themselves
6. Quantum teaching learning model requires creativity from a teacher to stimulate students' innate desire to learn, the teacher indirectly accustoms to thinking creatively every day.
7. The process teaching and learning are easily accepted or understood by students (Shoimin, 2014).

According to DePorter, "Quantum Teaching based on the main principle "bring their world to our world, and deliver our world to theirs" (DePorter, Reardon, & Singer-Nouri, 2010). This is also related to the teacher's decision authorize the students to work together

in groups, choose cover songs, criticize and modify song lyrics. This activity do not seems under pressure for students. Based on the three assessment of observations, giving treatment with the Quantum Teaching learning model in the experimental class for five meetings which were done well

Based on the description above, it can be concluded that quantum teaching based literacy can affect students' mathematical critical thinking skills, especially in the Material of Constructing Flat Form(BRSD).

## CONCLUSION

Based on the results of research, the researchers concluded that observation analysis of quantum teaching based literacy concentrate on the building of flat side to the students of SMP Plus Darul Ilmi had been conducted well. Students' critical thinking ability in the experimental class was higher than control class. It seem from the average score, th students in experimental class can reach 82.474. Meanwhile, the average score obtained by the control class is 73.053. Based on the average score of students and the analysis of the results of students' answers, it can be indicated that students who learn mathematical by using quantum teaching model based literacy get better scores than the students who learn through cooperative learning models.

The results of the analysis with the t test obtained t count = 4.226 and the score of t table at a significant level of 5% (1.689). From this score, it can be seen that the score of tcount> ttable is 4.226> 1.689. Thus, Ho is rejected and Ha is accepted. Finally, the findings of the hypothesis conclude that there is a significant effect of Quantum Teaching learning models base literacy toward students' mathematical critical thinking skills in the material of Building Flat form in SMP Plus Darul Ilmi Murni.

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