
ELEMENTARY MATH LEARNING DESIGN: AN INTEGRATION WITH ISLAMIC ENVIRONMENTAL ETHICS IN THE FIRST GRADE

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Abstract

This research discusses the design of mathematics learning based on Islamic Environmental Ethics (IEE). The purpose of the research was to discover how to implement IEE in elementary mathematics learning, especially grade 1. This qualitative research method begins with the analysis of condition grade 1 to 6. By analyzing the themes of grade 1 to grade 6, then themes are qualified percentage according to the use of terms related to Islamic Environmental Ethics (IEE) and after that, compiled a matrix containing competencies, classes, activities and assessments to implement it. The results of this study are, the first year has the lowest percentage of 32.5 % of its IEE content so it needs to be developed. From the selection of basic competencies, 3.5, 4.5, 3.6 and 4.6 are selected for their implementation. The implications obtained by the IEE component concerning Islamic concern for the earth, especially those listed in the hadith on cleanliness. Based on the hadith, learning activities are arranged using used goods at worksheet one and worksheet 2. Based on its activities, assessment is prepared through rubrics, performance assessments and questionnaires.

Keywords: basic competencies; Islamic environmental ethics; mathematics learning; used goods

Abstrak

Penelitian ini membahas tentang desain pembelajaran matematika berbasis Islamic Environmental Ethics (IEE). Tujuan dari penelitian ini adalah untuk mengetahui bagaimana penerapan IEE pada pembelajaran matematika SD khususnya kelas 1. Metode penelitian kualitatif ini diawali dengan analisis kondisi kelas 1 sampai dengan kelas 6. Dengan menganalisis tema dari kelas 1 sampai dengan kelas 6, maka tema tersebut memenuhi syarat. persentase sesuai penggunaan istilah terkait Islamic Environmental Ethics (IEE) dan setelah itu disusun matriks yang berisi kompetensi, kelas, kegiatan dan penilaian untuk mengimplementasikannya. Hasil dari penelitian ini, tahun pertama memiliki persentase terendah yaitu 32,5% konten IEE-nya sehingga perlu dikembangkan. Dari pemilihan kompetensi dasar tersebut dipilih 3.5, 4.5, 3.6 dan 4.6 untuk pelaksanaannya. Implikasi yang diperoleh komponen IEE tentang kepedulian Islam terhadap bumi, terutama yang tercantum dalam hadits tentang kebersihan. Berdasarkan hadits, kegiatan pembelajaran disusun dengan menggunakan barang bekas pada lembar kerja satu dan lembar kerja dua. Berdasarkan kegiatannya disusun penilaian melalui rubrik, penilaian kinerja dan angket.

Kata kunci: kompetensi dasar; etika lingkungan islam; pembelajaran matematika; barang bekas

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Introduction

The struggle to care for the environment has been passed for decades in America, Europe and Asia (McCrea, 2010); (Mohamed, 2012) The world of education has seriously formulated it, among others in the following programs: Environmental Education, Education for Sustainability Development, Education for Sustainability, Education for Sustainability in early childhood, etc.

By the way, Islam is not left behind, too, giving great attention to environmental concerns (Harahap, 2015) Among other things, Islam has principles of how people adherents behave towards the water, air, earth, animals and plants (Sarvestani, 2008; Shaikh, 2018; Gul & Ali, 2018).

These items contained in the ethics of the environment contained in religion which originally pioneered through Islamic Environmental Education (Khalid & Thani, 2007) and then environmental ethics in Islam (Islam and the environment: ethics and practice), which Fazlun Khalid calls in the 15th General Conference, September 27-29, 2010, with the theme: The Environment in Islam (Khalid, 2010) Islamic values govern human behavior regarding the environment. Not only regarding human relations with humans but guides how humans should treat plants, animals, water, soil (earth), air, and so on. (Manoiu et al, 2016).

The ethical values of environmental education are the responsibility of educators to be disseminated to students. In the implementation of learning, it will be significant to convey the importance of caring for the environment. For primary school level education, it needs to be thought about how to organize learning that can be carried out effectively, encouraging the growth of caring for the environment while encouraging awareness of

religious values associated with environmental preservation.

The implementation of primary school learning in Indonesia uses integrative thematic learning based on the 2013 curriculum. This is because thematic learning has many benefits, including effectively improving performance (Kasiyati & Zulmiyetri, 2018) exceptionally mild intellectual disability students can improve student communication skills (Ashokan & Venugopal, 2016), also improve students' social skills (Ulum, 2018)

In the implementation of thematic learning, all subjects are served theme by theme, including learning mathematics. Mathematics learning is considered irrelevant if it is related to the environment. This doesn't seem right (JIANGUO, 2004). Many uses of mathematics benefit from human life, meaning that it benefits the environment, and many mathematical studies relating to human life and nature. (Dilao, 2004; Sontag, 2005; Spiegel, 2002; Marantika, 2018)

However, the integration of Islamic values into math learning is not optimal yet. Especially concerning Islamic values regarding environmental awareness. There are examples of learning mathematics and science that are integrated with Islamic values (REF1-2) but not about the value of environmental care. There is also an integration of environmental concerns in learning, but it is not viewed in an Islamic way of thinking (REF 1-2). So there is a high need in designing mathematics learning based on Islamic Environmental Ethics, especially at the elementary school level. This paper will find a solution to this problem. In other words, this paper is essential in answering what kind of mathematics learning design in elementary thematic learning, which can integrate Islamic ethical values about environmental care.

Method

This type of research is qualitative by exploring and reviewing the literature. The method used the literature review method and added with the initial stage of R n D, namely the Define and design steps of the Thiagarajan 4D development. The design is as follows: First: Exploration and examining primary sources of international journals on IEE values. Second, assessing the level of urgency for the integration of Islamic values (Define stage) After that, THE third: the Design stage: compiling a matrix of basic competencies, IEE values, activities and assessments. The next step is designing the worksheet for learning. The development stage has not yet completed the Develop and Disseminate stages, so the instrument is enough by researcher to collect, select, sort, and

categorize the data obtained. Validation instruments, trial assessments do not yet exist or have not been carried out.

Results and Discussion

Analysis of the first grade's themes and activity-based implementation framework

In applying the values of environmental ethics in Islam to the learning of mathematics, it starts with reviewing the themes in the teacher and student books related to the critical words of Islamic Environmental Ethics based on the theory of Manoiu (2016), Shaikh (2018) and Harahap (2015). Keyword-based analysis of the theme with Islamic Environmental Ethics Manoiu (Ethics on Water, air, earth, animals, plants) presents in table 1.

Table 1. Analysis of Themes at First Year to Sixth

No	Class.	No of the theme	THEME	IEE	Non IEE	Percentage	Note		
1	I.1		MY SELF		V				
			MY HOBBY		V				
			MY ACTIVITY		V				
			MY FAMILY		V				
			MY EXPERIENCE		V				
						V			
					Clean,Healthy, and Green Environment				
					OBJECTS, ANIMALS, AND PLANTS	V			The CHOSEN theme
2	II.1		Disaster		V		Lowest		
					IEE		37,5		
					NON IEE		62,5		
			Live in Peace		V				
			Play in My Neighborhood	V					
			Daily Tasks		V				
			My School and I	V					
			Stay Clean and Healthy	V					
3	III.1		Water,Earth, and Sun		V				
			Taking care of Animals and Plants		V				
			Safety in Home and Journey		V				
					IEE		62,5		
					NON IEE		37,5		
						V		Chosen Theme	
					Love the Animals and Plants				

No	Class. No of the theme	THEME	IEE	Non IEE	Percentage	Note
	III.2	Memorable Experince		V		
	III.3	Weather and Seasons	V			
	III.4	Heavy wecarry together light wecarry together		V		
	III.5	Lets Play and Work Out	V			
	III.6	theBeauty of Friendship		V		
	III.7	Lets Save Energy for the Future	V			
	III.8	Having a Good Beahavior in Daily Life	V			
	III.9	Save the Environtments	V			
			IEE	NON IEE	66,67 33,33	Highest
4	IV.1	. the Beauty of Togetherness		V		
	IV.2	Save the Energy	V			
	IV.3	Care with Living Creatures	V			
	IV.4	Jobs		V		
	IV.5	Respecting Heros		V		
	IV.6	My Beautiful Country	V			
	IV.7	My FutureGoals		V		
	IV.8	My Neighborhood	V			
	IV.9	Nutritious and Healthy Food	V			
			IEE	NON IEE	55,56 44,44	
5	V.1	. Playing with Objects around You	V			
	V.2	What Happens in Life	V			
	V.3	Live in Peace		V		
	V.4	Health is Important	V			
	V.5	I am Proud as an Indonesian		V		
			IEE	NON IEE	60 40	
6	VI.1	Save the living creatures	V			
	VI.2	Unity in Diversity		V		
	VI.3	Invention		V		
	VI.4	Globalization	V			
	VI.5	Entrepreneur		V		
	VI.6	Health and Society	V			
			IEE	NON IEE	50 50	

Based on the analysis of the themes in the table, all pieces have included indicator values from Islamic Environmental Ethics according to Manoiu, Shaikh, and Harahap. The above research found that the theme in the first grade

has the lowest percentage in the IEE vocabulary, which is 37.5%. Therefore, the theme of the first grade was chosen to be designed for learning. Taking the piece in the first grade is intended to enrich and give meaning to learning with Islamic

Environmental Ethics integration. The highest per cent is in the third grade. The class isn't chosen to be developed because the quality is "environmental kindly" enough. The implementation framework is presented in the following table 2.

Table 2. The Implementation of Islamic Environmental Ethics-Based Math Learning

BASIC COMPETENCY/GRADE	IEE	ACTIVITY (THEMATICAL/INDIVIDUAL)	ASSESMEN T
3.5/1	Hadith About Usage/Cleanliness	Playing With Numerical Patterns From Second-Hand Objects In 3r Principle	RUBRIC/W RITTEN TEST
4.5/1	Hadith About Usage/Cleanliness	Making And Predicting The Numerical Patterns With Second-Hand Objects In 3r Principle	ACTION
3.6/1	Hadith About Usage/Cleanliness	Playing With 2d And 3d Shapes From Second-Hand Object	QUESTIO NER
4.6/1	Hadith About Usage/Cleanliness	Classifying 2d Shapes With Second-Hand Objects	ACTION

Math Learning Worksheets with Islamic Environmental Ethics

The compiled worksheet consists of 2 worksheets, namely: 1) Worksheet 1: Activity playing on number pattern, using the colorful bottle cap s; 2) Worksheet 2: Activity of grouping the one-dimensional shape using the second hand or recycle goods.

Islam strongly encourages its people to become caring people because God hates those who make mischief. This is as written in the Qur'an QS 28:77; QS. 2:60 For that reason, in the worksheet, using goods display in the form of bottle caps and the shopping goods boxes is a part of the maintenance behavior, using goods that are not used. Activities consist of: 1) Play the bottle cap; 2) Arrange the pattern of the bottle cap; 3) Continuing the pattern composed from the bottle cap; 4) Prepare test equipment and materials: make visual aids from flat items; 5) Draw a flat shape, cut and color it; 6) Read the ayah & hadith of Islamic Environmental Ethics with parents/family.

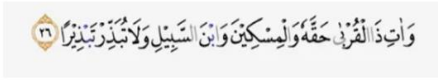
WORKSHEET 1

Basic Competency 4.5: Predicting and making number patterns related to a collection of objects/images/movements or others

Indicators:

1. Students can explain the characteristics of the existing pattern
2. Students can make number patterns using bottle caps
3. Students can mention the number of bottle caps that form a number pattern
4. Students can guess the shape of the next pattern that has not been included
5. Students can say numbers from the advanced pattern that have not been compiled
6. Students can imitate reading hadiths related to the ethics of using goods

AL-QUR'AN: Read with your family members, father, mother, brother or others, the surah Al-Isra 'verse 26



Translate this ayah/verse in Indonesian.

HADITH:

الطُّهُورُ شَطْرُ الْإِيمَانِ رَوَاهُ مُسْلِمٌ

"Kebersihan itu sebagian dari (cabang) keimanan." (H.R Muslim)

"CLEANLINESS IS PART OF FAITH"

FOLLOW THE READING OF THE HADITHS, INVITE YOUR FAMILY MEMBERS TO READ IT

Kids...

Prepare 3 color bottle caps, with 10-20 pieces each

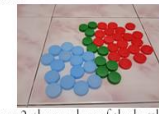





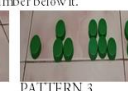
Figure 1: Set of bottle cap Figure 2: three colors of the bottle cap

ACTIVITY 1: Arrange bottle caps into animal or plant or flower shapes according to your imagination.





ACTIVITY 2: Arrange a bottle cap pattern as follows, the color is free, according to the color you have, then write the appropriate number below it.





PATTERN 1 PATTERN 2 PATTERN 3

ACTIVITY 3: Continue the following pattern one step only (color of the bottle cap is free, as you have).


PATTERN 4 PATTERN 5 PATTERN 6

Figure 1: Worksheet 1 about the activity with bottle caps

WORKSHEET 2

Basic competencies: 3.6. Get to know waking up and flat using concrete objects
 Basic competencies: 4.6. Grouping shapes and shapes based on certain properties using concrete objects

Indicator:

1. Students can show rectangles
2. Students can show Triangles
3. Students can show circles
4. Students can show Square
5. Students can group various large and small circles
6. Students can group various large and small circles
7. Students can imitate reading verses related to the ethics of using goods

Read with your family members, father, mother, brother or others, Surah Al-Isra 'verse 27

إِنَّ الْمُبَذِّرِينَ كَانُوا إِخْوَانَ الشَّيَاطِينِ وَكَانَ الشَّيْطَانُ لِرَبِّهِ كَفُورًا

TRANSLATE THE AYAH IN INDONESIAN

HADITH:

الطُّهُورُ شَطْرُ الْإِيمَانِ رواه مسلم
 "Kebersihan itu sebagian dari (cabang) keimanan." (H.R Muslim)

"CLEANLINES IS PART OF FAITH"

READ THE HADITH WITH YOUR FAMILY

ACTIVITY 1:

- a. Prepare tools and materials, old box that is not used, scissors, ruler and stationery / markers



- b. Drawing patterns: circles, rectangles, triangles
- c. Cut out a flat shape pattern
- d. Color it if necessary
- e. Flat risers can be used for learning and playing



ACTIVITY 2

- a. Group the circle shapes
- b. Group the triangular shapes
- c. Group the rectangular shapes
- d. Group the square shapes



SET OF CIRCLE



SET OF TRIANGLE

Figure 2: Worksheet 2 about the activities: making geometric pattern, cutting and grouping one-dimensional shape with shopping goods boxes

Cleanliness in Islam is so important, in God's Messengers, there are comprehensive aspects: material, spiritual and also ritual aspect (Kuscular, 2008; Kiani et al, 2015; Muftic, 1997) It is essentially to campaign for student about cleanliness with the hadith. In other side, Allah doesn't like those who commit excess (QS 7: 31: Adi & Puspitasari (2016). And Islam avoid wasteful activities, as in Qur'an QS.17:26-27, because the wasteful are brothers of devils (Kula, 2001) With this reason, the developed worksheets, show and use the ayahs about the wasteful, and the hadith about cleanliness.

Green tools or green learning media using bottle caps have had used by Cindy Logan for math learning. (https://id.pinterest.com/algebrat_eacher/mathbottle-cap-math/) It makes sense that the color and the variation of the shape can make the student happy in the math learning. The teacher should develop to explore the learning media with used goods, so they can develop the math learning while save the earth. Why student must learning about pattern? Learning patterns can train logical thinking and develop creativity (Mauluah, 2008). Learning by

using a well-known visual, close to students' daily problems, can help students understand the concepts being learned (Prahmana, et al, 2012); (Freudenthal, 1991)) used bottle caps learning patterns are theoretically justified and have a strong foothold in learning mathematics. Also, it is an excellent alternative activity for students to use the boxes that cut forming one-dimensional shapes.

The Implementation of Islamic Environmental Ethics in elementary school for first grade

Implementation of learning using Islamic Environmental Ethics principles in mathematics learning that has been carried out consists of: a) Cultivation of environmental awareness based on Islamic values; b) Students' activities in reading hadith are related to environmental awareness, especially the use of goods; c) Student activities use objects with the 3R principle; d) Practice recognizing patterns and classifying flat shapes; e) Reflection in the form of recalling that has been done in learning, and taking the benefits of the use of used items and orders from the hadith not

to become a wasteful; f) Students' reflections that are using used items to be used are part of carrying out God's commands, and the Apostle; g) Student's reflection that using used items means students have implemented values in religion (Islam).

Implementation of Islamic Environmental Ethics for preschool; elementary and secondary

The implementation of learning at various levels of education, associated with the environment, has many benefits and positive effects. (Erdogan, 2015; Ozsoy, et al, 2012; Mayasari, Natsir & Munfarikhatun, 2019; Zaenuri et al, 2017; Wuryastuti & Ni'mah, 2013) Benefits and effects according to the researchers, among others, regarding environmental literacy, capabilities in problem-solving, clean living habits, and life skills. The researchers have not found any use of education related to the environment, which is about awareness of the existence of his Lord, as well as awareness about the presence of a Creator or the understanding of carrying out the religious orders they hold.

As for this research, by using the reflection step, it was found that there was a student's awareness to use used items as items that could use for learning, as part of carrying out good deeds, carrying out the commands of God and His Apostles. This has become the advantage of the integration of religious values in learning, especially mathematics learning. Material content can be achieved, but students can also obtain the awareness of spiritual values.

Conclusion

The design of integrating Islamic Environmental Ethics values in the first year mathematics learning can be done through meaningful learning activities. Competencies that can be achieved are found in basic competencies

3.5, 4.5, 3.6 and 4.6. The IEE value used is the prophet's hadith about cleanliness

In addition, two worksheets are developed in this research. The worksheet guide the student for math learning based on the IEE value. The IEE value that is implemented is about earth care. Therefore concern for the earth can be compiled: namely the use of used goods in the form of colorful bottle caps and used materials for learning mathematics. Further research can develop the worksheets for upper classes based on IEE, it can also criticize this paper because it has not gone through the Develop and Disseminate stages from 4D stages of Thiagarajan.

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