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Integration of Culture and Islam in Learning Mathematics in The Independent Curriculum

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ABSTRACT

Learning mathematics must experience changes in the context of improving the quality of education to improve optimal learning outcomes. Therefore, efforts continue to be made to realize innovative learning following the times and technology. In addition to harmonizing education with technological advances, education is also expected to build the values and character of each student through local culture and religious values. The integration of mathematics with Islamic values and local cultural wisdom developed through exploratory literature. This paper presents the idea of formulating a method for integrating mathematics with local culture and integrating mathematics with religious values. This integration aims to make students more familiar with local cultures and motivate them to learn mathematics. The integration of mathematics with religious values seeks to provide an overview of the interpretation of several verses of the Qur'an related to faith, which are then integrated into discussions in mathematics.

Keywords: culture, Islam, mathematics learning, independent curriculum

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INTRODUCTION

Science will be complete when there is interconnection or integration; sometimes, science develops through these two things. For example, integrated mathematics will be more contextual when incorporated or interconnected with other fields, such as mathematical problems in physics, biology, social humanities, religion, culture and so on. Integrating Islam into every mathematical concept will make it easier to develop it in every learning process. Many ways can be done to teach integrated Islamic mathematics to children (Kurniati, 2016).

Developments in mathematics education and their demands must be connected to everyday life. This is understandable because schooling, among other things, aims to prepare people who can live appropriately in society. Primary and secondary education aims to prepare students to face changing circumstances in everyday life and in an ever-

evolving world through training to act based on logical, rational, critical, careful, honest, effective, and efficient thinking (Anggreni & Langsa, 2019).

In efforts to achieve national education/education goals, mathematics learning must undergo changes to improve the quality of education and the development of mathematics itself, which is aligned with the development of science and technology. (Maarif, 2015) states that scientific and technological progress is one of the ways and means to achieve the result of the Muslim world. Islam calls on Muslims (Muslims) to pursue knowledge, as the Prophet Muhammad said, as narrated by Ibn Majah, that seeking knowledge is an obligation for every Muslim. Al-Quran is the holy book of Muslims, which is the source of all sources of knowledge; in practice, it should be reflected in the overall behavior of a Muslim. Mathematics as a science, even dubbed as the king of science, mathematics is a part of the Koran. Therefore, in developing science and improving the quality of education through learning mathematics, it is essential to create a model of learning mathematics that is suitable for facing today's challenges to realize the noble goals of national education/education (Mutijah, 2018).

The curriculum determines the goals of education because the scope of the curriculum is a set of learning plans for the material to be studied and the learning process. As well as the curriculum also directs how to evaluate as a benchmark for students' success in mastering learning (Qolbi & Hamami, 2021). The Indonesian government's efforts to improve and perfect education have experienced several curriculum changes. As in the 2013 curriculum, the government wants to provide meaningful learning for education in Indonesia (Rigusti & Pujiastuti, 2020). The 2013 curriculum is implemented as a preparation for welcoming and shaping future generations, which aims to form students so that they have the 5M abilities (Observing, Asking, Seeking Information, Associating, and Communicating) after carrying out learning (Turmuzi & Wahidaturrahmi, 2021). Curriculum changes also follow the times. During the COVID-19 virus pandemic, the Ministry of Education of the Republic of Indonesia adopted a policy of using the latest curriculum, namely the independent learning curriculum, which is designed with the hope that it can be implemented and is following the current situation (Hasim, 2020). The principles in the latest independent curriculum are (1) the USBN (National Standardized School Examination) is replaced with an assessment exam to assess student competence, (2) the UN (National Examination) changes to AKM (Minimum et al.), (3) RPP (Implementation Plan Learning) contained in the previous curriculum changed to Teaching Modules. (4) PPDB Regulations (New Student Admissions), which are proportionally oriented (Maulinda, 2022). With the independent learning curriculum, teachers are expected to be able to connect with the formation of the character of students in the subject matter, which emphasizes talent in the form of abilities that are mastered by each student in their field and the intelligence of students. Especially in mathematics lessons, students are free to explore their potential and thinking skills. As well as equipped with ways of thinking, reasoning, and using logic with continuous mental activity (Nuryanti & Daha, 2022).

Therefore, experts develop learning models based on educational principles, psychological, sociological, psychiatric theories, systems analysis, or other theories.

Abdussakir, a mathematician from UIN Malang, has compiled or developed a mathematics learning model in order to create systematic and directed mathematics learning in order to realize national education/education goals, namely the integration model of mathematics and the Koran (Abdussakir, 2018).

Every learning process that takes place should benefit students, both for building cognitive, affective, and psychomotor skills. It can also provide noble values that can shape the character of himself and the nation. In students' minds, learning mathematics is only about how to master the material taught by the teacher. Learning can be used to instill the character of Islamic values to increase students' faith and piety by integrating essential competencies. Integrating mathematical concepts with Islamic values is very important to be applied to form national character. Thus, it is necessary to continuously develop the analysis of mathematical material by associating the verses in the Al-Quran and with the moral principles and attitudes that Islam instills, whose lessons can be taken by all humanity (Fitriyani & Kania, 2019).

Religion, culture, and learning support each other in the framework of realizing national education/education goals. (Supriadi, 2014) stated that the socio-cultural context that exists in society when it is used as the basis for learning mathematics, knowledge becomes less "abstract." Thus, the context can be a starting point for students to get encouragement for student involvement and generate their thinking (Webb & Geist., 2011). The importance of real-life contexts in learning mathematics was also pointed out by (Jennings & Dunne, 1999), who said that most students experience difficulties in applying mathematics in their daily lives because in learning mathematics, the real world is only used as a place to apply concepts, not as a tool and resource in learning—math knowledge.

Islam, in its development, cannot be separated from Islamic culture. According to Picktchall (Widyastini, 2004) Islamic culture is a system with ideal, perfect, practical, and actual characteristics; its existence is recognized and always expressed. The development of Islamic culture requires revelation in the form of the words of Allah SWT contained in the Koran and requires a leader of the people, namely the Prophet and Rasulullah Muhammad SAW, and the sole purpose of worshiping Allah.

METHOD

This research is a qualitative study of literature intended to describe the integration model of mathematics with Islamic values and local cultural wisdom in learning mathematics. The method of data collection is done by documentation and literature review. The data analysis technique used in this study is content analysis.

FINDING AND DISCUSSION

Cultural Integration in Independent Curriculum Mathematics Learning

Integrating local wisdom in learning functions to design the formation of individual character; indirectly, the individual will get a complete picture of his identity and identity as a member of society bound by the culture his predecessors have nurtured. In addition, local wisdom-based education develops individual students who can develop their knowledge

from the local community's local wisdom, have skills in understanding society in the process of life, and have attitudes and behaviors that are in harmony with this local wisdom (Lukluah, 2016). Local wisdom is local (local) ideas that are wise, full of wisdom, and of good value that are embedded and followed by community members. Local wisdom or socio-culture is influenced by the culture of each region (Umbara, 2015).

The idea to utilize socio-cultural elements in learning mathematics was initiated in 1977 by a Brazilian mathematician, Ubiratan D'Ambrosio. He termed mathematics practiced by cultural groups such as urban and rural groups, labor groups, children of specific age groups, or indigenous peoples as ethnomathematics. Integrating mathematics into learning mathematics is one way to overcome students' difficulties in learning mathematics (Ubayanti et al., 2016).

The cultural value of mathematics emanates from the role of mathematics in the world of art and the appearance of mathematics in showing the level of human civilization. The mode of life of the members of society is primarily determined by technological and scientific advances, which depend on the progress and development of mathematics. Therefore, lifestyle changes and, thus, culture are continuously affected by the progress of mathematics. In addition, mathematics also helps in the maintenance and continuation of our cultural traditions.

Ethnomathematics broadly uses mathematical concepts related to various mathematical activities, including grouping activities, counting, measuring, designing buildings or tools, playing, determining locations, etc.

Mathematics teaching for everyone should be adapted to their culture (D'ambrosio in Shirley, 1995). For that, we need a bridge that connects mathematics outside of school with mathematics in schools. Students already have initial knowledge (initial concepts) from their socio-cultural environment. This knowledge still needs to be explored, built, and developed during the teaching and learning process to produce new knowledge that is more actual. Meanwhile, understanding students' initial concepts is a challenging activity because students' initial concepts are individual. However, if the teacher ignores the initial concept, it will result in learning difficulties.

The scope of local wisdom is vast, depending on what perspective is used in viewing the local wisdom itself. The local wisdom of the Indonesian nation is very numerous and varied because Indonesia consists of various ethnic groups, speaks various regional languages, and carries out different traditional rituals. According to (Lukluah, 2016), local wisdom includes cultural and non-cultural elements relevant to the local community. At the same time, the physical dimension includes traditional ceremonies, cultural heritage, natural tourism, traditional transportation, traditional games, cultural infrastructure, traditional clothing, cultural heritage, museums, cultural institutions, the arts, cultural villages, arts and crafts, folklore, children's plays, and wayang. Thus, local wisdom is part of culture and contextual culture originating from human life.

Ethnomathematics is used in the learning process in many ways/methods, such as being used as a learning resource, conceptualized in learning material, in the form of descriptive questions used to measure students' mathematical ability, or used as a learning

model/method, so that ethnomathematics has a broad scope in learning mathematics. Some ethnomathematics research that has been carried out, such as research (Khoiri, 2018), explores ethnomathematics in the typical batik of the city of Pasuruan. Introducing Indonesian culture as typical Pasuruan batik to students also motivates them to learn mathematics. The research (Lubis et al., 2018) explores ethnomathematics on the Gordang Sambilan musical instrument. Gordang Sambilan is a well-known musical instrument as a Mandailing identity. Gordang means drum or drum, while Sambilan means nine. Gordang Sambilan is a traditional art of the Mandailing tribe,. It consists of nine drums with different heights and diameters so that they produce different tones and are usually played by five players (Parinduri, 2016). Gordang Sambilan is a typical Mandailing percussion instrument that is unique, both in terms of size, number of players, and rhythm, and is different from other musical instruments. Gordan Sambilan ethnomathematics can be used as material or questions in learning mathematics. The results of exploring ethnomathematics forms in the art of the Gordang Sambilan musical instrument have applied the basic concepts of geometry to their shapes. This ensemble consists of nine large, tall drums shaped like a tube or truncated cone. The smallest drum (drum 1) has a diameter of 20 cm, the second drum has a diameter of 25 cm, the third drum has a diameter of 30 cm, and so on, the more significant with a difference of 5 cm in diameter, the most giant drum has a diameter of 60 cm. Likewise, the height of the drum from the smallest drum is about 120 cm to 180 cm.

Meanwhile, the research conducted (Linda & Putri, 2017) states that the results of exploring ethnomathematics forms in the art of tambourine musical instruments have used the basic geometry concepts applied in their manufacture. A *tambourine* is a percussion instrument that belongs to the membranophone group or musical instruments whose sound source comes from the membrane or skin of animals such as cows and goats. The shapes and sizes vary; the frame is made of circular wood with a 25-30 cm diameter. One side is covered with tanned animal skin and nailed to the edge of the frame. There is a tambourine whose frame is given various metal pieces, as many as 3-4 pieces around the tambourine so that it makes a tinkling sound when played. A shape with curved sides is a simple closed curve, namely a polygonal flat shape in the form of a circle in its physical form. In addition, it also applies the geometrical concept of a polygonal prism, namely a prism with a lid and a circular base, commonly known as a cylinder shape. A polygonal pyramid, or what is known as a cone, is also used to support the shape and appearance of tambourines.

From some of the research done above, information can be obtained that mathematics is very close to us as humans. However, due to the need for more integration with lessons at school, mathematics is often considered a tedious and real lesson. Ethnomathematics can motivate students to learn mathematics and introduce them to the cultures that exist in the area.

Integration of Islamic Values in Mathematics Learning in the Independent Curriculum

schools have implemented the Merdeka curriculum, especially in learning mathematics. These changes will not change the learning objectives—especially in the

religious context. Therefore, in the process of learning mathematics, we can integrate it with Islamic values in it.

1. The Mathematics of Faith

The mathematical concept of faith can be seen through the material of opportunity; as conveyed by Firdaus (2018), the magnitude of the opportunity value is between 0 and 1. An event that has an opportunity value of 1 is an event that is certain or has occurred—for example, events day and night. Meanwhile, an event that has a probability value of 0 is an event that is impossible or unlikely to occur—for example, the incident of a cat giving birth to a chicken. The greater the value of the opportunity, the more likely an event will occur. The power of Allah Subhanahu Wata'ala can be said to have an opportunity value of 1 because Allah can easily make or create the universe and its contents. In other words, Allah's destiny is inevitable. Whereas everything that happens to humans, humans can only try to get opportunities from what they want by praying and endeavoring in the way of Allah Subhanahu Wata'ala.

In addition, the concept of limits, for example, The author tries to raise the concept of limits for this topic. There is a simple question: "In a natural number sequence, namely 1, 2, 3, 4, . . … Is the range finite or infinite?" From these questions, it is clear that the answer is infinite, and humans cannot determine the exact answer. What meaning can we take from the concept above, that life in this world is nothing but the word immortality or immortality because these two characteristics only belong to God.

2. Mathematical Tolerance

Mathematical tolerance can be seen through the concept of set material. In Q.S. Al-Hujurat verse 13. This means O people, verily. We created you from a male and a female and made you nations and tribes so you may know each other. Indeed, the most honorable among you in the sight of Allah is the most pious among you. Indeed Allah is All-Knowing, All-Knowing."

Here, Allah says that He created human beings into nations and tribes so that they may know one another. So we should be able to appreciate the name of difference, not intolerance, but must be tolerant of differences.

3. Mathematics as human existence in the world

In mathematics, geometry is a branch of mathematics that studies the shape of objects and their characteristics. Geometry is a representation of the universe in mathematics. Of course, the universe contains many meanings we must express, including the geometric approach in mathematics. One of the things that I want to study in this paper is human existence in this world.

For example, triangles and quadrilaterals, the existence of triangles and quadrilaterals exist because of definitions so that a triangle and quadrilateral are well defined. If it is possible to define that three sides bound, a triangle and a quadrilateral are bounded by four sides, each of which intersects. What delimits the two is the edge, which is a line segment. That is why if there are edges that do not exist or boundaries that are missing, both are not well defined. Not only in the second dimension but also in the third

dimension, a well-defined geometric shape must be limited by plane-shaped sides. The other dimensions may be the same, too. So, every dimensional being has limitations.

If we want to make an analogy with one of Allah's characteristics, "mukholafatullilkhawaditsi," it means more or less that Allah is different from His creatures. Every creature of Allah has dimensions so that it is limited or has limitations, which we call the limiting side. Allah is different from his creatures, so he is not limited, or no one limits it so that no one can define Allah physically.

4. Honest mathematics

In mathematics, there are many laws that we call postulates, theorems, and corollary lemmas that must be obeyed and are binding and coercive. If not, it will violate the rules, so the conclusion will be wrong. So, in living life, we must carry out Allah's rules to symbolize our obedience to the One who gives life in this universe.

We must also interpret these rules as an effort to approach ourselves to Allah. As an example, there is Allah's rule that we as humans must behave honestly; in the concept of mathematics itself, we can see the principle of honesty in the concept of multiplication:

a. positive $\times$ positive = positive
b. positive $\times$ negative = negative
c. negative $\times$ positive = negative
d. negative $\times$ negative = positive

It can be analogized that if something is correct, then say it is right; if something is wrong, then say it is wrong; this is the right behavior.

5. Mathematics as a surrender

Let us look at which one is bigger between 1/2 and 1/3…of course, 1/2 is bigger…. retake a look... 1/3 with 1/4, which one is bigger? 1/4 with 1/5, 1/5 with 1/6, and so on. which is confident the number on the left will be more significant so that, the greater the value of a denominator, the number will be smaller (fraction number) until in the end, the greater the divisor (in the sense of infinity) then 1/infinite = 0 The concept has meaning if 1 = Allah (Al-ahad) which is positioned as the number that is distributed (that Allah is the giver of mercy and guidance), and infinity = humans as servants of Allah. It is not enough to indicate human nature that he acts arrogantly and arrogantly and feels that he is the greatest with all his power and intelligence. If humans do this, then in the eyes of Allah, the value is "0" (1/infinite = 0).

6. The mathematics of the unity of the people

The unity of the ummah is likened to the existence of similarities in building the ummah. In mathematics, an equation will appear when there is a solution, so when it is entered into a system of these equations. For example, 2x = 10, x=5 is the solution of the equation above. What if there are two different equations? In mathematics, it is known as the principle of "Elimination" or "Substitution." In this case, the differences can only be united by eliminating selfishness and complementing each other's shortcomings.

In addition to the Islamic values contained in mathematics above, the following also describes the integration model of mathematics and the Koran in mathematics learning

that has been developed, along with a review of the integration model formulated by (Abdussakir, 2018).

1. Developing mathematics from the Koran

One practice that can be done is by studying the verses of the Qur'an. For example, in learning basic statistics in tertiary institutions, you can start by studying Surah Al Kahfi verse 96 to teach the mean, Al Kahf verse 54 to learn the mode, Al Maidah verse 66 to teach the median, and about the hypothesis, you can start by studying Surah Al Baqarah verse 78. , Yunus verse 66, Saba verse 53, Az Zukhruf verse 20, and Al Jasiyah verses 24 and 32.

2. Using mathematics to implement the values in the Qur'an

Studying mathematics is used to carry out God's commandments. In practice, learning mathematics is taught to develop intellectual and spiritual potential. Examples of this integration model include using mathematics to determine the Qibla direction, prayer times, zakat and inheritance, and others.

3. Using mathematics to understand the miracles of the Koran

Studying mathematics is used to explore the mathematical miracles contained in the Koran, mathematics is used for explanations of verses of the Koran related to mathematical calculations and other mathematical aspects, and mathematics is used to teach and convey the material content of the Koran.

4. Teaching mathematics with the values of the Qur'an

Mathematics is associated with the content of Al-Quran values , which are then internalized into learning mathematics. Mathematics is based on the values of the Koran to develop noble character. In the practice of learning mathematics, teaching mathematics is carried out using the strategy of infusion (the teacher emphasizes aspects of the values of the Koran in the material in teaching mathematics), analogy (the teacher makes an analogy of good values in teaching mathematics), narration (in teaching mathematics the teacher tells stories of mathematics and Muslim mathematicians to learn from), and Uswah Hasanah (in teaching mathematics the teacher shows exemplary behavior related to mathematics, for example honesty, sincerity, accuracy, obedience, and thoroughness).

CONCLUSION

Every learning process that takes place should be able to benefit students in building cognitive, affective, and psychomotor skills. In addition, it can provide noble values that can shape the character of himself and the nation. Integrating mathematical concepts with Islamic values and local culture is essential for forming national character. Thus, it is necessary to continuously develop the analysis of mathematical material by linking local culture and verses in the Koran with the moral principles and attitudes that Islam instills, whose lessons can be taken by all humanity.

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