

Integrating Islamic Values on Math Learning in Welcoming the Society 5.0: How It Works?

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Abstract. Education plays important role in encouraging students' potential to be a person who has Akhlaqul Karima, problem solver, creative, innovative, competitive, and adaptive to changes in the era of society 5.0, where advanced technologies and service platforms integrate with and empower individuals in a human-based society. Integrating Islamic values in math learning by designing teaching materials with Islamic values, designing math problems with Islamic values, and implementing Islamic values in the math learning process. The technological sophistication of society 5.0 is expected to support the integration of Islamic values in math learning. It can build students' character who has religious-spiritual values and noble character. Teacher competencies related to designing math learning, Islamic values, and its integration also have important roles.

Keywords: math learning · society 5.0 · islamic values

1 Introduction

Human life is always dynamic. Science and technology improve rapidly. The massive use of technology in industrial revolution 4.0 does not always have a positive impact. The emergence of increasingly distant economic disparities, as well as the degraded role of humans, might create new problems. To overcome this problem, in 2019 Japan initiate society 5.0. It is a human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space [1]. This idea is motivated by many changes in the social order in the country. Japan is experiencing a decline in the workforce due to a reduced birth rate and a large population over the age of 65. Therefore, technology is used to replace humans [2]. In the era of the Industrial Revolution 4.0 technology has entered every aspect of human life. But it does not mean that humans can be controlled by technology. It is precisely humans who should be the center of control over technology. To be able to control technology takes adequate expertise and skills. This is where the important role of education is needed. Education is expected to prepare students who will become the next generation in the future to be able to adapt and create new technologies to facilitate

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human life. Education should also be able to prepare students to face all changes and problems that may occur in the future.

Associated with the rapid technological improvements, education plays an important role in preparing students who are creative, innovative, competitive, and adaptive. Discussions about the importance of education for humans are not a new thing. Even the Qur'an emphasized the importance of education and seeking knowledge for Muslims 1500 years ago. As mentioned in Qur'an Surah Al-Mujadilah verse 11. It affirms that God will raise the degrees of those who believe and have knowledge. As stated by Rasulullah , education is a must for every Muslim. Education has a very important role for human beings to maintain their existence in global life. With education, a person will be able to develop himself to form a good personality, spiritual, moral, and be able to live in his social environment [3]. As narrated by Anas bin Malik, Rasulullah stated that Allah makes the path to Paradise easy for whoever takes a path upon which to obtain knowledge. Islam highly values education and the people who are involved in it. The main purpose of education in Islam is to seek the pleasure of Allah SWT [4]. The educational process is expected to produce people who have good morals so that they can bring benefits to themselves, the people around them, and the environment at large.

Indonesian law on the national education system states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills. Through education, a person can develop their potential, become a human being with noble character, able to solve problems and be creative, innovative, competitive, and adaptive to changes and developments by the demands of society 5.0 era. The learning process should not dichotomize between worldly affairs and ukhrowi [5]. Education at schools must be able to develop values in students through religious education. Teachers as educators take a responsibility to cultivate noble character values for students and adaptive human resources [2, 3, 6]. Education today should focus not only on the mastery of science, but also on the formation of attitudes, skills, and thinking abilities. It is intended to produce students who can adapt to technological advances. The concept of Islamic education can be an alternative to cultivating students' character [7].

Considering the importance of forming a student's character, who has religious spiritual values and noble character, the idea to integrate formal education with the spiritual values adopted. It was known that math learning could be integrated with Islamic values in the learning process and the material being taught. The integration of Islamic values in math learning has been widespread, both at the level of Islamic Colleges and madrasahs. It plays an important role in forming students' character. Internalization of various values of a person's character can be used to form their perspective, think, behave, and act [8].

Math taught in schools aims to train students' logical thinking, not only proficiency in counting and processing numbers. Math objects is an abstract object, so students are trained to think logically and use reasoning. Therefore, math as a science can be used as an approach to understanding several things in Islamic teachings [4]. Math learning needs to be carried out with activities, strategies, methods, and more exciting ways [9].

Math is not self-contained knowledge. Math is a tool to help human beings in understanding and overcome problems in their life [5]. As the queen of science, math is related

to other fields of science. For example, in physics, differential and integral matter in determining the position, velocity, and acceleration of an object. While in chemistry, exponential can be used to calculate the mass of the decay of a radioactive element. Even in social sciences such as geography, the concept of logarithms can help determine the population in the discussion of demography. The relationship between math in various fields of science can also be observed in Islamic values. One of the things that are most closely related to Islam is the Qur'an. As the holy book and the main way of life for Muslims, the Qur'an contains many mathematical concepts. Thus, learning can be designed that integrates Islamic values, one of which is the Qur'an, in the material and learning of math.

2 Ease of Use

2.1 Integration of Islamic Values and Math Learning

The objective of math learning is to train students' thinking and reasoning skills to be proficient in solving problems in everyday life using mathematical concepts, facts, principles, and skills. Math objects taught in schools ideally aim to equip students to master math and apply it in daily life as well as organize students' reasoning and shape their personalities [10]. As Math learning aims to develop reasoning, communication, connection, and problem-solving skills, it should be built from the context of life, which is culturally based on Islam (for Islamic Colleges and madrasahs). Otherwise, the learning result is meaningless because the information received is not related to a schematic context built from the everyday culture [11].

School math has been taught still separated from other subjects. It is important to instill character in every learning session. Therefore, it is necessary to design math learning that is integrated with religious values, especially Islam, as part of efforts to build student character. Integrating math learning with Islamic values can be done by combining school math material with religious knowledge so that a strong theory is formed, confirms each other, and complements it [12, 13]. Islam has no dichotomy because Islam is a religion that pays great attention to science [11].

Learning math that is integrated with Islamic values means creating continuity between school math material and the values taught in Islam. This is because math can help Muslims to practice one of the sciences taught in the Qur'an. However, the internalization of Islamic values in the learning of math in various educational institutions has not been implemented optimally. There is no formulation of internalization strategy and model of integration between Islamic values (Al-Quran) and math that can be used as a reference [5]. The integration of math and Islamic values is not a process of Islamizing math, producing Islamic math, or giving religion to math. This integration is done to make people more religious through math. It can be said that the integration of math and Islamic values aim to make math a means for humans to carry out the purpose of their creation [14].

2.2 Math Learning in the Era of Society 5.0

The change from the Industrial Revolution 4.0 to the era of society 5.0 is not just a transformation. In this era, technology has entered every part of human life. The

digitalization of artificial intelligence, robotics, automation, big data, and cyber has become an inseparable part of all human activities which at the same time changes the order from human-centered to technology-based [15]. The era of society 5.0 focuses on how to place human life between technological modification and innovation for the benefit of humans. The main goal is to improve the quality of life by utilizing the potential obtained from the Industrial Revolution 4.0 era. Society 5.0 is a society that can solve various challenges and social problems with the Internet of Things (IoT), Artificial Intelligence (AI), Big Data (data in large numbers), and robots to improve the quality of human life. This transformation will help humans to live more meaningful lives and is considered a human-centered and technologically advanced society [1, 16, 17].

As technology has entered all aspects of life, humans should be the controller of technology. It takes adequate expertise and skills. Today, the challenges in education are increasingly sophisticated and require solemn preparation and thinking. After the 4.0 revolution, the idea of society 5.0 has emerged, although to be more humane, we must still be vigilant [16]. To prepare for the era of society 5.0, education is needed to create creative, innovative, and competitive persons. This can be achieved by optimizing the use of technology as a means of education in the hope that it will produce quality graduates [17]. The 21st-century skills needed in welcoming society 5.0 are:

- 1. Improve critical and creative thinking skills; by presenting math problems that can evaluate critical and creative thinking skills. Students are trained to solve Higher Order Thinking Skills (HOTS) questions or open-ended questions.
- 2. Improve communication and collaboration skills; by forming groups for students to discuss. Students will learn to collaborate, combine ideas, and communicate by presenting the results of the discussion in front of the class.
- 3. Improve student character; as the nature of math: consistent, obeying the rules, and being responsible [2].

3 Methods

This research is a literature review study to develop the results of research that has been done related to integrating Islamic values on math learning in society 5.0. Literature review used to gaining more information from the literature, meaning that data about the object of research is collected through the library in the form of journals. From various sources, they are reduced, compared, synthesized, and analyzed. The results research tries to explain the integration of Islamic values into math learning and presented in the result & discussion section and be compressed in the conclusion.

4 Results and Discussion

Islamic values can be integrated into learning materials or math problems. Previous research themed on integrating Islamic values and math learning materials shows the result can improve students' noble character [13]. In addition to teaching materials, the integration of Islamic values can also be done by giving an Islamic nuance to the math problems presented to students. The following is an example of a math problem that has been integrated with Islamic values:

- 1. A cylinder is inside a triangular prism. The tube is tangent to the prism at the base, lid, and all sides of the prism. The base of the prism is an equilateral triangle with a side length of the number of verses in the Qur'an Surah At Takasur and the height of the prism is the number of verses in Qur'an Surah Al Kafirun. The volume of the cylinder is... [18].
- 2. Given a set A consisting of three members, each member states the number of verses from a letter in the Qur'an. The sum of any two members of set A is 486, 406, and 320. Which of the following statements is true about set A?
 - (A) A = {Al-Baqoroh, Ali Imron, An-Nisa}
 - (B) A = {Al-Baqoroh, Ali Imron, Al-Maidah}
 - (C) A = {Ali Imron, An-Nisa, Al-Maidah}
 - (D) A = {Al-Baqoroh, An-Nisa, Al-Maidah} (Kompetisi Sains Madrasah, 2019)

The strategy of internalizing Islamic values in mathematical learning can be done through infusion, analogy, narrative, and interpretation with an integration model between the Qur'an and math which can be briefly expressed as math from, for, as, to, and with al-Quran [5]. The models to integrate Islamic values to math learning are [14, 16]:

- Math from Al-Quran: develop math from Al-Quran
 Math learning starts by presenting verses that are relevant to math objects. For example, to introduce the concept of sets to students, the teacher gives some examples of Qur'an Surah related to it. There are QS Al-Fatihah contains human groups, QS An-Nuur tells about groups of animals, and QS Al-Fathir tells about groups of angels.
- 2. Math for Al-Quran: using math to implement Al-Quran Mathematical concepts can be used to carry out Allah's commands contained in the Qur'an. For example, after students understand the concept of fractions, they are given questions to apply fractions to faraidl problems (a division of inheritance), or the application of volumetric figures to calculate two kullahs as a valid condition for water that can be used for wudhu'.
- 3. Math as Al-Quran: using math to reveal the mathematical miracle of Al-Quran Math can be used to explore the miracles in the Qur'an. For example, the study of the magic numbers 7, 11, or 19 in the Qur'an utilizes mathematical concepts. This study aims to further strengthen the faith.
- 4. Math to explain Al-Quran: using math to describe the mathematical calculations in the Qur'an
 - Math is used to explain several verses in the Qur'an that contain numbers. For example, a verse that tells about the length of time Ashhabul Kahf lived in a cave. To understand how much time is mentioned in the Qur'an, we can apply the conversion of units of time.
- 5. Math to Deliver Al-Quran: Using Math to Convey the content of Al-Quran Math is used to teach and convey messages in the Qur'an. For example, when learning the concept of a set, the teacher can use the names of prophets, apostles, angels, or months in the Hijri year. Or using the process of tawaf when giving an example of how to calculate the circumference of a circle.

6. Math with Al-Quran: Teaches Math with the Values of the Qur'an. Connecting math and the values contained in the Qur'an. It aims to develop students' morals based on the Qur'an. For example, in integer operations, positive numbers are analogous to honesty and negative numbers are analogous to lies.

Here are some math topics that can be associated with Islamic values [3]:

- 1. Number: Al-Khawarizmi is a Muslim and mathematician. He introduced the number zero to the whole world.
- 2. Build space (cube): Ka'aba is the direction of Qibla for Muslims when shalat. The Ka'aba is in the form of a cube that has 6 sides. The Ka'aba is an example of building space.
- 3. Opportunity: Everyone has the opportunity to go to heaven and hell because only lucky people can enter heaven. This situation certainly happens to someone who obeys Allah's commands and stays away from all His prohibitions.

To carry out Islamic values in math learning, there are some strategies [19]:

- 1. In infusion, the teacher emphasizes the value aspects of the Qur'an in the math objects.
- 2. In analogy, the teacher makes an analogy of the value of goodness.
- 3. Narrative, the teacher tells stories related to math and Muslim mathematicians to learn from.
- 4. Uswah Hasanah, teachers show exemplary behavior related to math, such as honesty, sincerity, accuracy, obedience, and thoroughness.

Islamic values are mainly sourced from the Qur'an and Hadith. Those are a guide for Muslims to live life and achieve happiness. Indicators of Islamic values that can be integrated into teaching materials include: (1) always mentioning the name of Allah SWT, (2) tracing Islamic history, (3) use of Islamic nuanced terms, (4) use of Islamic nuanced visualizations and illustrations, (5) use application or example from Qur'an, hadith, or others Islamic values, (6) insert a paragraph or relevant ayat or hadith, (7) link math with topics in discipline other sciences or Islamic values, (8) Symbol sentences kauniah (verses nature universe) [20, 17].

In the era of society 5.0, which is all digital, learning math integrated with Islamic values can be done by sophisticated technology's support. For example, to provide a more realistic visualization when the teacher presents the concept of the circumference of a circle with tawaf, Virtual Reality technology can be used which can provide a more realistic atmosphere in the Al-Haram Mosque and around the Kaaba. Another alternative, when delivering math topics on fractions with applications in faraidl, math applications can be used to simplify calculations. Sophisticated technology can also be used to observe stars in astronomy with angles as math objects. The function of technology in education, for instance, teachers used technology to assist learning in the classroom and assist the administration, therefore, teachers should learn technology in classroom learning. Also, teachers can provide learning materials and collaborate with technology [21].

As mentioned in Indonesian Law Number 20 the Year 2003 concerning the National Education System that education aims to enable students to develop their potential to have spiritual, religious, self-control, personality, intelligence, noble character, and skills needed by themselves and society. It can be said that the formation of religious spiritual strength and the formation of noble character are important points of holding education in Indonesia. It shows that the quality of education in Indonesia is expected to form humans who can balance the values of faith, morality, and sharia values [3]. It can be held by integrating religious values, especially Islam, into the learning process. This integration can be done in all subjects, including math. Math as a subject that aims to organize reasoning and logic as well as train students' critical and creative thinking skills is certainly related to the formation of students' character. In the era of society 5.0, it is expected that the integration of Islamic values in math learning will be easier. Of course, this is done with the help of various advanced technologies that have been developed. With this facility, the formation of students who has religious spiritual values and noble character will be more effective. The use of technology in education is a basic need for learning in today's era. Furthermore, teachers must allow students in making changes in thinking, such as making their own decisions, innovation in finding learning resources, and learning autonomy. In addition, there are three elements in the era of society 5.0; IoT in all school activities, the use of virtual learning, and the use of AI technology to support the quality of education [21].

It is not easy to design math learning that is integrated with Islamic values. It takes the creativity and innovation of teachers. In addition, it must be ensured that teachers also have a good mastery of the content of knowledge of Islamic values. The teacher must support the development of noble character. They have a great responsibility to instill such character education in students. As a facilitator, teachers must be able to assess Islamic values, so students can understand the values that exist in their religion. The concept of integration is based on the multidisciplinary — interdisciplinary approach which in the industrial era 4.0 is very much needed. That, looking at all the problems of humanity, and life, not only through text (the Qur'an-hadith), but also involves empiricism, real reality, and the subtlety of hearts and feelings [9].

5 Conclusion

Integrating Islamic values on math learning can be done by: (1) designing teaching materials with Islamic values, (2) designing math problems that contain Islamic values, or (3) use Islamic terms to math objects. With the sophisticated technology in the era of society 5.0, it is expected that the integration of Islamic values in math learning can be easier to do. Thus, the formation of students' character who has religious spiritual values and noble character can be realized. However, it needs good knowledge and mastery by teachers as organizers and leaders in the learning process to design math learning that is integrated with Islamic values.

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