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Exploration of Mathematical Concepts on Interpretation the Principal of Ukhuwah Islamiyah through Autoethnographic Study

Amrul Huda Fathir*
*Study Program of Elementary School Teacher Education, Faculty of Education, Universitas Negeri Surabaya, Indonesia
E-mail: amrul.21004@mhs.unesa.ac.id

Neni Mariana**
**Study Program of Elementary School Teacher Education, Faculty of Education, Universitas Negeri Surabaya, Indonesia
E-mail: nenimariana@unesa.ac.id

Naif Mastoor Alsulami***
***Curriculum and Instruction Department, Faculty of Education, University of Jeddah, Saudi Arabia
E-mail: nsulami@uj.edu.sa

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Abstract

Mathematics is a fundamental science that extends beyond the classroom and plays a crucial role in daily life, including within religious contexts, like the principle of Ukhuwah Islamiyah in Islam. Divergent perspectives often overlook this principle, which aims to unite Muslims, thereby impacting children's understanding of diversity. This study explores how mathematical concepts can be interpreted through the lens of Ukhuwah Islamiyah to reinforce both the principle and mathematical thinking. Using a qualitative method with an autoethnographic approach, the researcher (first author) reflects on personal experiences related to Qur'anic and Hadith teachings. Data were collected through narrative writing, narrative inquiry, document analysis, and expert interviews and validated using trustworthiness and authenticity criteria. The findings highlight various mathematical concepts linked to Ukhuwah Islamiyah, such as numbers and operations, geometry (lines and angles), building nets, and the alignment of lines and angles in congregational prayer. These insights provide a basis for integrating Islamic values into elementary mathematics education, fostering meaningful learning experiences. In conclusion, these mathematical elements provide valuable opportunities for classroom instruction, promoting character development, enhancing mathematical reasoning, and reinforcing the principle of Ukhuwah Islamiyah.

Keywords: *mathematics education, Islamic teachings, ukhuwah islamiyah.*

Abstrak

Matematika adalah ilmu fundamental yang melampaui ruang kelas dan memainkan peran penting dalam kehidupan sehari-hari, termasuk dalam konteks keagamaan, seperti prinsip Ukhuwah Islamiyah dalam Islam. Perspektif yang berbeda sering mengabaikan prinsip ini, yang bertujuan untuk menyatukan umat Muslim, sehingga

memengaruhi pemahaman anak-anak tentang keragaman. Studi ini mengeksplorasi bagaimana konsep matematika dapat diinterpretasikan melalui lensa Ukhuwah Islamiyah untuk memperkuat prinsip dan pemikiran matematis. Dengan menggunakan metode kualitatif dengan pendekatan autoetnografi, peneliti (penulis pertama) merefleksikan pengalaman pribadi yang berkaitan dengan ajaran Al-Qur'an dan Hadits. Data dikumpulkan melalui penulisan naratif, penyelidikan naratif, analisis dokumen, dan wawancara ahli, serta divalidasi menggunakan kriteria kepercayaan dan keaslian. Temuan menyoroti berbagai konsep matematika yang terkait dengan Ukhuwah Islamiyah, seperti angka dan operasi, geometri (garis dan sudut), membangun jaring, dan penyelarasan garis dan sudut dalam salat berjamaah. Wawasan ini memberikan dasar untuk mengintegrasikan nilai-nilai Islam ke dalam pendidikan matematika dasar, sehingga mendorong pengalaman belajar yang bermakna. Kesimpulannya, unsur-unsur matematika ini memberikan peluang berharga untuk pengajaran di kelas, mendorong pengembangan karakter, meningkatkan penalaran matematika, dan memperkuat prinsip Ukhuwah Islamiyah.

Kata kunci: *pendidikan matematika, ajaran Islam, ukhuwah islamiyah.*

INTRODUCTION

Mathematics plays a crucial role in solving various problems in everyday life. Permatasari et al. (2023) emphasize that mathematics is a fundamental science in daily life and is introduced early to every individual. Anggreni (2019) argues that mathematics, as part of the education curriculum, should serve as a means to achieve educational goals, fostering changes in students' attitudes and behaviors. This includes the development of moral values such as commitment, honesty, creativity, cooperation, courtesy, scientific and democratic attitudes, tolerance, and mathematical thinking skills that emphasize logical and systematic thinking. This perspective highlights that mathematics is not just a school subject but also a vital tool that underpins many activities in daily life, including within a religious context.

Recent scholarship has increasingly recognized the importance of integrating Islamic values into mathematics education. Kusno et al. (2020) explored the integration of mathematics with Islamic spiritual values in Islamic-based junior high schools, demonstrating positive impacts in shaping better lives for Muslim youth. Lateh (2023) developed a comprehensive model for integrating Islamic values and local contexts into mathematics instruction for secondary students, emphasizing the need for culturally responsive pedagogy. Furthermore, Putri et al. (2022) investigated teachers' perceptions about Islamic values integration into mathematics learning through various media, finding that 87.5% of teachers believed that Islamic values and mathematics are inherently integrated. Nurjanah (2021) examined the integration of Islamic values in mathematics learning at Madrasah Ibtidaiyah, highlighting four key benefits: (1) improving students' positive character, especially religious attitudes; (2) increasing students' interest and motivation to learn mathematics; (3) improving students' ability to solve math problems; and (4) enhancing student learning outcomes. These studies consistently show that contextual integration strengthens students' mathematical reasoning while simultaneously developing their religious character and understanding of Islamic principles.

Al-Ghazali, as cited in Ibrahim (2015), aims to demonstrate that science and Islam can complement each other rather than conflict. Through the concept of causality, which emphasizes that God is the primary cause of everything while also acknowledging natural

causes, the integration aligns with the Qur'anic directive to contemplate and understand the universe (*al-Kawn*). This integration between *Naqli* knowledge (Islamic knowledge such as aqida, fiqh, tafseer, and hadith) and *Aqli* knowledge (rational knowledge) is essential. Majid & Mariana (2024) assert that mathematics is indispensable in daily life, earning the title of "The Queen of Science." Mathematical principles, laws, and formulas are deeply integrated into Islamic practice and Qur'anic teachings. They demonstrate their practical significance in various religious applications such as calculating 'ushr, zakat, prayer times, and fasting schedules as well as determining divinely prescribed acts of worship that depend on the movements of the sun and moon (Yusraa, 2022). The Qur'an, as the holy book of Muslims, illustrates natural phenomena with mathematical precision, showcasing the perfect order and balance of the world.

Islam is a comprehensive religion that addresses all aspects of human behavior, encompassing relations with God and fellow beings (Rambe et al., 2023). The perfection of Islamic teachings lies in their balance in regulating relationships with God (*habluminallah*) and with others (*habluminannas*) (Hasiholan & Abdillah, 2022). Islam meticulously regulates all aspects of life to foster harmony and mutual benefit. The Qu'ran serves as a moral and legal compass for daily living. In human interactions, Islam emphasizes Ukhuwah, or brotherhood. Ukhuwah Islamiyah refers to the bond of brotherhood formed through faith in Islam (Suriati dkk., 2020). Rahman & Sadewa (2021) explain that "Ukhuwah Islamiyah" signifies a brotherhood guided by Islamic teachings. It refers to the deep sense of unity, solidarity, and mutual support among Muslims, based on shared faith and values. It emphasizes the idea that all Muslims are part of a single community (Ummah), bound by their belief in Islam, regardless of nationality, ethnicity, or social status. This concept encourages compassion, cooperation, and collective responsibility, fostering strong relationships among believers. Sopiyah et al. (2023) stress the importance of Ukhuwah Islamiyah in uniting Muslims amidst existing divisions caused by various factors and conflicting interests, as mentioned in Surah Ali Imran, verse 103:

اعْتَصِمُوْا بِحَبْلِ اللّٰهِ جَمِيْعًا وَّلَا تَفَرَّقُوْاۚ وَاذْكُرُوْا نِعْمَتَ اللّٰهِ عَلَيْكُمْ اِذْ كُنْتُمْ اَعْدَاۤءً فَاَلَّفَ بَيْنَ قُلُوْبِكُمْ فَاَصْبَحْتُمْ

بِنِعْمَتِهٖٓ اِخْوَانًاۚ وَكُنْتُمْ عَلٰى شَفَا حُفْرَةٍ مِّنَ النَّارِ فَاَنْقَذَكُمْ مِّنْهَاۗ كَذٰلِكَ يُبَيِّنُ اللّٰهُ لَكُمْ اٰيٰتِهٖ لَعَلَّكُمْ تَهْتَدُوْنَ

Translation: *"And-hold-firmly together to the rope of Allah1 and do not-be-divided. Remember Allah's-favour upon you-when you were enemies, then He-united your-hearts, so you by His-grace became-brothers. And you were at the brink of a fiery pit-and He saved you from it. This-is-how-Allah makes His revelations-clear to you, so that you may-be ˹rightly˺ guided."* (QS. Ali Imran: 103).

The verse emphasizes the importance of maintaining Ukhuwah (brotherhood) in Islam, as it is not just a social relationship but also a form of worship and obedience to Allah SWT. Islam teaches that fellow Muslims are brothers, as stated in a hadith of Rasulullah Shallallahu 'Alaihi Wasallam, "*None of you will have faith till he wishes for his (Muslim) brother what he likes for himself.*" (Bukhari, no. 13). Therefore, maintaining Ukhuwah is not only a social obligation but also a command from Allah SWT, which, if followed correctly, would bring blessings in social and religious life.

However, Muslim communities, especially in Indonesia, still face internal divisions. Differences in religious understanding among various Islamic organizations like Nahdlatul Ulama (NU), Muhammadiyah, and others often lead to conflict. These differences, whether in worship practices such as determining the beginning of Ramadan or religious traditions, can cause friction within the Muslim community. It is essential to accept these differences as long as they are based on sound evidence without harming Ukhuwah Islamiyah. This phenomenon also affects children growing up in environments with diverse religious understandings. Without a proper understanding of Ukhuwah Islamiyah principles, children may develop judgmental attitudes towards other groups, undermining the value of Ukhuwah Islamiyah. Therefore, instilling the value of Ukhuwah from an early age is crucial to foster respect for diversity.

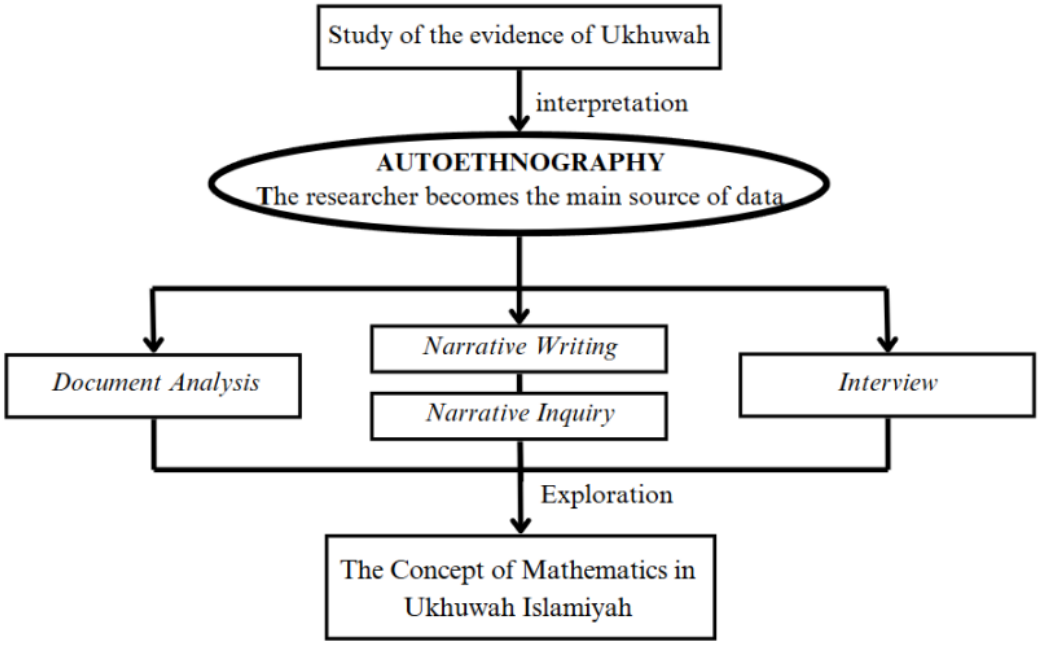
While extensive research has been conducted on integrating Islamic values into mathematics education, a critical gap exists in the literature. Previous studies have predominantly focused on general Islamic values (such as honesty, discipline, and gratitude), worship practices (such as prayer and zakat calculations), and Qur'anic contexts (such as patterns and geometry in Islamic art). However, no studies have specifically explored the integration of mathematical concepts with the principle of Ukhuwah Islamiyah (Islamic brotherhood) as a central focus. This gap is significant for several reasons. First, Ukhuwah Islamiyah represents a core social and theological principle in Islam that directly addresses contemporary challenges of division and conflict within Muslim communities. Second, unlike other Islamic values that have been integrated into mathematics education, Ukhuwah Islamiyah offers unique opportunities to connect mathematical concepts with social relationships, community building, and collective identity formation. Third, given the increasing diversity within Muslim communities and the challenges children face in navigating different Islamic understandings, educational approaches that foster respect for diversity while maintaining unity are urgently needed. Furthermore, while autoethnography has been employed in educational research (Wall, 2006; Adams et al., 2014), its application in mathematics education research, particularly in exploring the intersection between mathematical concepts and Islamic principles, remains limited. The use of autoethnographic methodology in this context provides a novel approach to uncover personal, experiential connections between mathematical thinking and religious values that may not be accessible through traditional research methods.

Therefore, this study aims to address this gap by employing an autoethnographic approach to explore the connection between Ukhuwah Islamiyah and mathematical concepts. By analyzing personal experiences and interpreting Ukhuwah Islamiyah principles, the researcher aims to identify mathematical concepts that can be linked to mathematics learning outcomes in elementary schools. This exploration involves examining Qur'anic verses, Hadith, and related literature, validated by experts, to uncover mathematical concepts within Ukhuwah Islamiyah. This research titled "Exploration of Mathematical Concepts on Interpretation of the Principal of Ukhuwah Islamiyah Through Autoethnographic Study" contributes to the literature by (1) providing the first systematic exploration of mathematical concepts specifically related to Ukhuwah Islamiyah; (2) demonstrating how autoethnographic methodology can be effectively employed to investigate the intersection of mathematics and

Islamic values; and (3) offering practical insights for elementary mathematics educators seeking to integrate character education focused on unity and brotherhood into their teaching.

METHODS

This research employs a qualitative approach using autoethnographic methodology. Autoethnography is a form of ethnographic research in which a researcher connects personal experiences to wider cultural, political, and social meanings and understandings (Ellis et al., 2011). It is considered a form of qualitative and arts-based research that has been increasingly recognized in educational research for its capacity to provide deep, reflexive insights into complex phenomena (Keleş, 2022). Autoethnography is particularly well-suited for research at the intersection of personal religious experience and mathematical understanding because it acknowledges the inseparable link between the individual and their cultural context, allowing for nuanced exploration of how personal beliefs and cultural meanings shape and are shaped by mathematical and religious phenomena (Bilgen, 2022). Second, this approach allows the researcher to examine problems related to identity, life, relationships, and personal experiences, which are central to understanding Ukhuwah Islamiyah as both a theological concept and lived reality. Third, autoethnography moves beyond traditional positivist methodologies toward more interpretive and narrative approaches that foster transformation within educational settings. In this study, the researcher (first author) serves as both the primary participant and the analyst, reflecting on personal experiences as a Muslim individual navigating different Islamic organizational backgrounds and interpretations. This dual role is consistent with autoethnographic practice, where the researcher's subjectivity and positionality are explicitly acknowledged and utilized as valuable sources of data (Bolade et al. 2023).



The research was conducted through five interconnected phases. First, the researcher engaged in reflexive journaling, documenting personal experiences related to Islamic

brotherhood from childhood to the present, particularly interactions within different Islamic organizational contexts such as Nahdlatul Ulama, Muhammadiyah, and integrated Qur'an education institutions. Second, based on the reflexive journals, the researcher crafted detailed narrative accounts structured chronologically and thematically, focusing on two major narratives: "Journey to Discover Islam" and "The Believers are but Brothers." Third, the researcher conducted narrative inquiry to identify patterns and themes within the narratives, coding significant statements related to Ukhuwah Islamiyah principles and identifying moments where mathematical concepts appeared. Fourth, systematic document analysis was performed to review Qur'anic verses, Hadith from authenticated sources (Sahih Bukhari, Sahih Muslim, Sunan Abu Dawud), Islamic scholarly interpretations, and mathematics education literature. Fifth, expert consultation and validation were conducted with Islamic scholars, mathematics educators, and qualitative research methodologists to ensure reliability and credibility of interpretations.

Four primary data collection techniques were employed in this study. First, narrative writing served as the primary data source, where the researcher systematically documented personal experiences related to Ukhuwah Islamiyah following the principles of evocative autoethnography (Ellis et al. 2011). The narratives incorporated detailed descriptions of settings, dialogue, emotional states, and reflections. Second, narrative inquiry was employed to analyze written narratives for patterns, themes, and meanings, connecting individual stories to broader cultural and religious contexts (Saint & Sinko, 2021). Third, document analysis involved systematic review of religious texts (Qur'an translations, authenticated Hadith collections), Islamic scholarly works, mathematics education resources, and online educational materials from recognized scholars. All documents were evaluated for credibility by verifying sources from official Islamic institutions and peer-reviewed academic publications. Fourth, semi-structured expert interviews were conducted with 2 experts: one Islamic scholar specializing in Qur'anic interpretation and one mathematics educator with experience in Islamic school contexts and qualitative research methodology. Interviews are transcribed, focusing on validating interpretations and assessing connections between mathematical concepts and Ukhuwah Islamiyah.

Data analysis employed multiple iterative and reflexive strategies. Thematic analysis following Braun and Clarke in (Byrne, 2022) was conducted through multiple readings of narratives, generating initial codes, searching for themes, and refining connections to Ukhuwah Islamiyah and mathematical concepts. Interpretive analysis of religious texts used established Islamic interpretive principles, including identifying literal meanings (ma'na zhahir), understanding contexts of revelation (asbab al-nuzul), and reviewing scholarly interpretations. Conceptual mapping illustrated connections between Ukhuwah Islamiyah principles, Qur'anic verses, Hadith, mathematical concepts, and potential educational applications. Triangulation combined insights from narratives, documents, and expert interviews, while member checking with experts validated preliminary findings through feedback sessions.

Following Lincoln & Guba's (1985) criteria as adapted by Taylor & Medina (2011), trustworthiness was established through four dimensions. Credibility was ensured through prolonged engagement with Islamic contexts, detailed narrative documentation, triangulation across data sources, and peer debriefing with experts. Transferability was supported by thick

description of contexts and experiences, clear documentation of researcher positionality, and explicit connections to existing literature. Dependability was maintained through audit trails of analytical decisions and systematic documentation of research processes. Confirmability was achieved through reflexive journaling, clear distinction between description and interpretation, and grounding interpretations in multiple data sources. Authenticity was demonstrated through fair representation of multiple perspectives, enhanced researcher understanding, and potential to stimulate reflection in Islamic mathematics education contexts.

RESULTS AND DISCUSSION

Narrative 1: Journey to Discover Islam

Since childhood, I was educated by my parents and family with a Nahdlatul Ulama background, the largest Islamic organization in Indonesia, founded by KH Hasyim Asy'ari in 1926. aims to preserve, develop, and practice Islamic teachings based on the Al-Qur'an, *As-Sunnah*, *Al-Ijma* (agreement of scholars), and *Al-Qiyas* (analogy) in understanding and interpreting Islam from its sources (Ishak & Sulaiman, 2022). When I was in high school, I had a close friend with different beliefs from mine. Despite our differing beliefs, we spent a lot of time together during adolescence. I was also close to other friends who had different beliefs. These folks often raised questions in my mind about how they could remain united and embrace each other, even though they were a minority in our school. They always reminded each other during worship times and sought each other out if absent, believing it strengthened their unity. Over time, my curiosity about religion grew, and I often wondered, “God does exist, but there are so many religions in this world; which one is right? Which one is perfect? Which one deserves my trust?” Such questions led me to seek information, read books and holy texts, engage in discussion across beliefs, and compare different faiths.

However, this only increased my curiosity about Islam, particularly due to the Tawhid sentence "Laa ilaaha illallah," meaning "There is no God but Allah." I delved deeper into the meaning of this sentence, questioning why it begins with a denial rather than an affirmation. Why does it not say “Allah is God”? After critical analysis, I found that the Tawhid sentence starts with a denial (laa ilaaha) to reject anything unworthy of worship, followed by an affirmation (illallah) that Allah is the only God. According to Mariana (2017), in the sentence of Tawhid, there is a simple arithmetic concept. The word “Laa ilaaha (there is no God)” in mathematics can be analogized as the number zero (0), which is interpreted as nothingness, and the word “illallah (other than Allah)” is analogous to the number 1, which shows the existence of a single (wahid). The change from zero to one can be interpreted as an existence that emerges from emptiness. This concept resonated with me, reinforcing my belief that the Islam that I was born with encourages critical thinking using common sense before believing in something. I was convinced that Islam, with its concept of Tawhid, was not only right for me but for all of humanity.

During the COVID-19 pandemic, with limited outdoor activities, I was encouraged by my mother to join Qur'an learning sessions at an integrated Al-Qur'an Education Institution called Roudhlotul Qur'an. This institution is specifically for teenage classes. In this institution, all students and Ustadz-ustadzah come from various Islamic backgrounds. Although it is not uncommon for the surrounding community to say that the institution is

inclined to Muhammadiyah, many students also come from Nahdlatul Ulama and are active in the institution. The existence of banjari activities breaks the stigma of the community, who think the institution is inclined to Muhammadiyah. This encouragement was the beginning of my return to studying the Qur'an with enthusiasm and high curiosity about Islam, without feeling confined to one particular understanding. As time went on, several teenagers around the house joined the youth class, accompanying me in my studies. We studied twice a week under the guidance of dedicated ustadz-ustadzah. Although my friends at that time already had a good ability to read the Qur'an because they attended Islamic schools, I, who was still in volume 4, got the title "Most Diligent Santri" because I was never once absent from the recitation activities. The camaraderie during this recitation was very close, even though we only met twice a week. One of the most unique things is how those of us who have just met can show how we care for each other. If a friend was absent, we would look for them, like saying, "Eh, come on, why aren't you reciting the Quran?" It was like a running alarm that always reminded us not to miss the time to learn the Qur'an. Even if someone was unable to attend due to illness, we did not hesitate to visit and encourage them to recover quickly and be able to join the recitation again. The brotherhood that is formed is so close, even though we just know each other. The backgrounds of the friends in this recitation are quite diverse. Some come from Nahdlatul Ulama (NU), Muhammadiyah, and other Islamic organizations. Not infrequently, these differences in understanding had caused a little "scratch," but not a cause of dispute. In fact, we often use these differences as jokes or discussion material that can actually strengthen relationships. For example, a friend joked, "Eh, you don't play banjari?" Then his friend replied, "No, I'm Muhammadiyah, hahaha." But the funny thing is, at the end of the session, he actually enjoyed playing banjari with us.

This experience taught me an important lesson about how ukhuwah Islamiyah can unite differences. Allah Almighty says, "And hold firmly *together to the rope of Allah and do not* be *divided. Remember Allah's favor upon you—when you were enemies, then He united your hearts, so you by His grace became brothers. And you were at the brink of a fiery pit, and He saved you from it. This is how Allah makes His revelations clear to you so that you may be ˹rightly˺ guided."* (QS. Ali Imran: 103). The first part of the sentence, "And hold fast to the rope (religion) of Allah..." can raise the question of why it has to be with a rope; why not a wooden rod or iron, which is more sturdy? At that time, I discussed with the mentor, who explained that "Because the rope is dynamic like a human being, try to imagine when the rope is held by several people, some are loose, some are upright, and some are weak." Islam itself has various madhhabs; in Indonesia there are many mass organizations that have many different understandings, but all of them equally include Islam, Iman, the Qur'an, and the sentence of Tauhid Laa illahailallah. So we are holding on to a rope that is very strong and will not break." This verse really came alive in our recitation. With the spirit of brotherhood, the differences between us did not become a reason to be divided but instead became a strength to complement each other. When we hold on to the rope of Allah's religion and establish brotherhood for the sake of Allah, it feels much different compared to unity that is only based on worldly goals. Brotherhood built on faith and love for Allah has blessings that cannot be found in ordinary relationships. It also keeps us from disunity, which often occurs when people are not based on godly values.

A year on, I can be said to have improved rapidly in the quality of reading the Qur'an. To be precise, at the end of 2021, I was recommended to take a Tashih, or test, to obtain the Qur'an teacher certification. Unexpectedly, I passed the tashih and continued the Al-Qur'an teacher certification. A miracle that was never expected at that time, I, who had only studied the Qur'an for a year, managed to take tashih to become a Qur'an teacher. This is where I understood a hadith from Abu Musa r.a., from the Prophet, who said, *"A believer to another believer is like a building that strengthens each other. And he (demonstrated this by) crossing his fingers."* (HR. Bukhari No. 481). This success cannot be separated from one of the roles of ukhuwah brothers and sisters who have accompanied and always provided endless support and enthusiasm, struggling together for lillah. Based on this experience, I also realized that by studying the Qur'an, my life really felt different. Slowly, the guidance of understanding Islam began to touch my heart, opening my eyes to the perfection of Islam.

Math Concept Analysis Narrative 1: Journey to discover Islam

Basic Number and Arithmetic Concepts

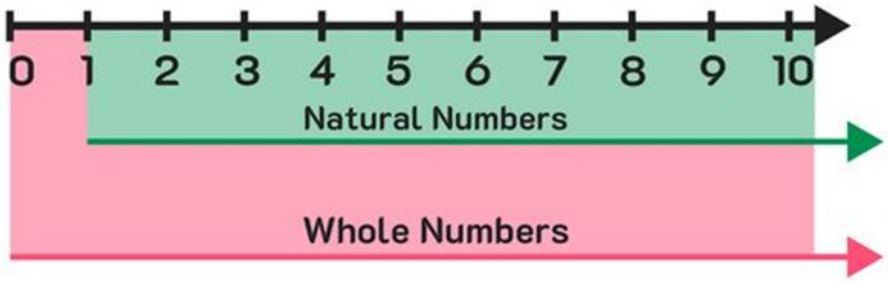


Figure 1: Natural Numbers and Whole Numbers
Source: https://www.mashupmath.com/blog/what-is-a-whole-number-in-math

*"*And *hold firmly together to the rope of Allah and do not* be *divided. Remember Allah's favor upon you—when you were enemies, then He united your hearts, so you by His grace became brothers. And you were at the brink of a fiery pit—and He saved you from it. This is how Allah makes His revelations clear to you so that you may be ˹rightly˺ guided."* (Qur'an, 2:103).

This verse emphasizes the importance of Muslim unity in adhering to the religion of Allah, based on the Qur'an and Sunnah. Islam, as the religion of Allah, is rooted in monotheism and adheres to the Qur'an and Sunnah. In the sentence of monotheism, there is a simple arithmetic concept, where the phrase "Laa ilaaha (there is no God)" is akin to the number zero (0), representing nothingness, and "illAllah (other than Allah)" is analogous to the number 1, signifying singularity. The transition from zero to one mirrors the emergence of existence from emptiness (Mariana, 2017).

Whole numbers, which start from zero and are used for counting or identifying objects in a set, align with this concept. The number 1 symbolizes a definite and singular entity. Starting from zero (emptiness) and moving towards the number 1 illustrates how something non-existent can come into existence. Natural numbers are a set of integers starting from the number 1 and increasing sequentially without limit (Indriani et al. 2024). Just as numbers beyond 1 depend on the number 1 as a foundation, the diversity of Islamic schools (Hanafi, Maliki, Shafi'i, and Hanbali) exists due to the monotheistic (Tawheed) principles of Islam

rooted in the Qur'an and Sunnah. Without the number 1, other numbers would not exist; similarly, without Islam as the primary foundation, the diversity of understanding in the madhhab would not exist. All madhhabs still trace back to the basis of monotheism in Islam, adhering to the Qur'an and Sunnah. Without Tawhid as a foundation, the diversity in Islam would lead people astray. The unity in diversity within Islam (Ukhuwah Islamiyah) reflects the interconnected nature of numbers in mathematics. By uniting in monotheism (Tawhid) and following the Qur'an and Sunnah, Muslims can stand strong.

This finding resonates with broader research on integrating Islamic values in mathematics education. Kusno et al. (2020) demonstrated that such integration positively impacts students' spiritual development and mathematical understanding. However, this study extends beyond previous research by specifically connecting the foundational concept of Tawhid to basic number concepts, offering a novel pedagogical approach that simultaneously teaches mathematical reasoning and reinforces Islamic theological principles of unity in diversity.

Concept of Line and Angle in Geometry

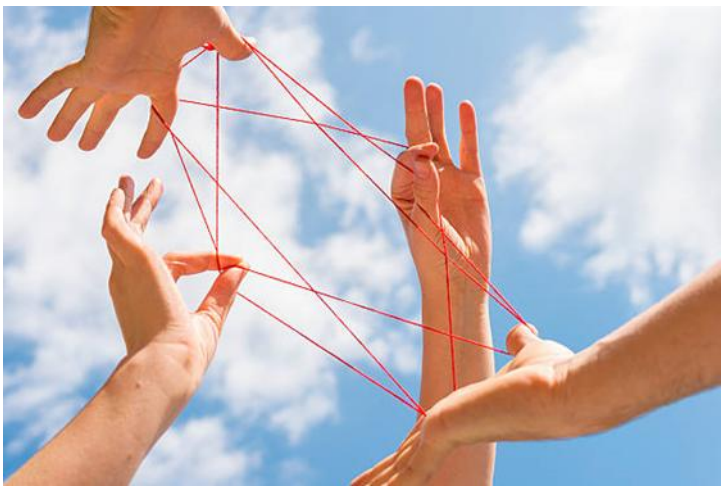


Figure 2. The hand holding the rope embodies a mathematical concept.
Source: https://www.istockphoto.com/id/foto-foto/hands-holding-rope

"And hold firmly together to the rope of Allah and do not be *divided. Remember Allah's* favo*r upon you—when you were enemies, then He united your hearts, so you by His grace became brothers. And you were at the brink of a fiery pit—and He saved you from it. This is how Allah makes His revelations clear to you so that you may be ˹rightly˺ guided."* (QS. Ali Imran: 103).

In geometry, a line is a set of connected points without a base or endpoint, making its length infinite. A line segment, on the other hand, has defined endpoints, making its length measurable and finite (Udiyono & Yuwono, 2019). The angles formed by parallel lines illustrate how lines can intersect and create specific angles. The Qur'anic verse, "Hold fast all of you to the rope (religion) of Allah and do not be divided..." (Qur'an, 2:103), likens the rope to a line in geometry. Just as lines connect points to form unity, Muslims are connected through the rope of Allah's religion. A rope, being dynamic, symbolizes the diverse nature of humanity still capable of fostering unbroken relationships. The concept of angles between parallel lines mirrors the different perspectives within Islam. Despite varying directions, the

two lines remain in the same shape and are not separated. This mirrors how Muslims, despite differing schools of thought and viewpoints, remain within the teachings of Islam. Similarly, the rope of Allah signifies unity among Muslims, connecting them despite differing opinions, similar to how lines connect dots to form a unified shape. The rope of Allah's religion unites Muslims under the common teachings of Islam derived from the Qur'an and Sunnah.

This interpretation aligns with contemporary research on integrating local contexts into mathematics instruction. Lateh (2023) developed models for contextualizing mathematics within Islamic frameworks, emphasizing that such integration must respect diversity while maintaining core principles. The geometric interpretation of Ukhuwah Islamiyah presented here extends this work by demonstrating how fundamental geometric concepts can serve as metaphors for social and theological principles of Islamic unity. Moreover, the rope metaphor connects to network theory and graph theory in mathematics, where nodes (representing individual Muslims or Islamic communities) remain connected through edges (representing shared faith, values, and practices). The strength of the network depends not on uniformity but on the quality and number of connections, echoing the Islamic principle that brotherhood strengthens the entire community.

3D Nets in Spatial Structures

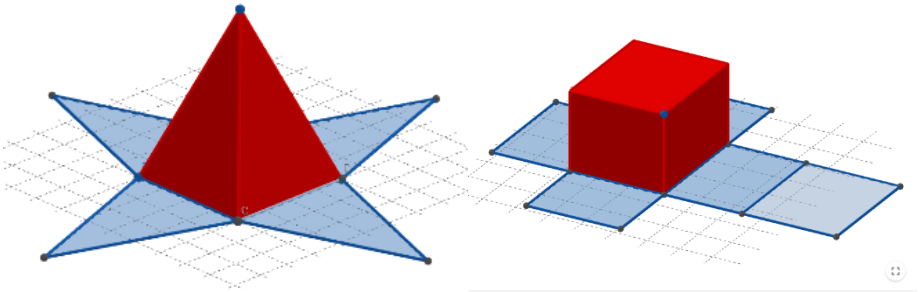


Figure 3. 3D Nets
Source: https://bbgpdiy.kemdikbud.go.id/labs/visualisasi-jaring-jaring-bangun-ruang-3d/

"A believer *to another believer is like a building whose different parts enforce each other." The Prophet (□) then clasped his hands with the fingers interlaced (while saying that)." (HR. Bukhari No. 481)*.

In geometry, nets in three-dimensional shapes are patterns made up of two-dimensional shapes that, when arranged correctly, create a three-dimensional shape. They are created by unfolding a three-dimensional shape into its two-dimensional form and then assembling the shapes along their sides to the three-dimensional shape (Batubara, et al. 2024). Each side of the net has a specific position that must connect with the other sides accuratel. If a side is missing or not in the correct position, the solid figure would not form correctly. Additionally, the nets of three-dimensional shapes have edges and vertices that must align with other parts to create a perfect three-dimensional shape. This concept aligns with the Hadith that states, *"A believer to another believer is like a building whose different parts enforce each other"* (HR. Bukhari No. 481). Just as the framework of a three-dimensional structure is composed of interconnected flat shapes, the Muslim community consists of individuals with different characters and backgrounds. If the framework of a three-dimensional structure is well-

constructed, it will form a sturdy structure. Similarly, in Islam, Islamic brotherhood (Ukhuwah Islamiyah) will be strongly established if all Muslims can perfect Tawhid as its foundation.

This finding contributes to research on spatial reasoning in mathematics education. Batubara et al. (2024) identified that students often struggle with understanding the fundamental concepts of nets and surface area of three-dimensional shapes. The connection to Ukhuwah Islamiyah offers a contextually meaningful approach to teaching these concepts, where students can experientially understand how individual components combine to form cohesive wholes both in geometric structures and in their social and religious communities. Furthermore, this interpretation extends the work of Majid & Mariana (2024), who explored mathematical concepts in Islamic prayer movements. While their work focused on angle measurement in prayer positions, the current study expands the scope to include three-dimensional spatial reasoning connected to community building and mutual support offering additional contexts for integrating Islamic values into mathematics education.

Narrative 2: The Believers are but Brothers
When Steps to the Mosque Unite the Hearts of Believers

"The believers are but a single brotherhood, so make peace between your two brothers, and be mindful of God that you may receive mercy." (Q.S. Al-Hujurat: 10).

In the month of Ramadan in 2022, I spent a significant amount of time with a younger brother who was three years younger than me. He had a background in an Islamic boarding school and was a Quran hafiz, which was quite different from me, as I had only been studying the Quran for a year. He often invited me to pray in congregation at the mosque, even though I only went to the mosque for Friday prayers. Initially, I accepted his invitation without much thought, only going if he asked. Gradually, we started going to the mosque together almost daily. After prayers, we would often chat on the mosque's terrace. During one of our conversations,

I asked him, *"Why do you always invite me to the mosque?"*

He replied, *"Because this is one way I express my gratitude to Allah for bringing us together as brothers."*

Surprised, I asked, *"What have I done for you?"*

He responded, *"During the break from the boarding school, you accompanied me to explore the neighborhood, taught me how to socialize with others when I felt shy, and helped me interact with the opposite sex. Perhaps these seem simple to you, but they hold great meaning in my life. Since life at the boarding school and here is different, this is my way of thanking you by inviting you to the mosque."*

His answer made me ponder: why attend congregational prayers at the mosque? Initially, I thought he just wanted to spend time together, and coincidentally, the only thing we could do daily was attend congregational prayers. I also believed that praying in congregation was equivalent to praying alone 27 times, based on a hadith: From Abdullah ibn Umar (narrated), the Prophet Muhammad PBUH said, "Praying in congregation is more virtuous than praying alone by twenty-seven degrees." (Bukhari, No. 609).

However, I soon realized there was more to it. He explained that praying in congregation at the mosque was a way to unite our hearts as Muslims. How could praying in congregation unite the hearts of Muslims? It took me a few days to grasp this concept, but eventually, I understood that praying together created a space for Islamic brotherhood to flourish. Each time I met fellow believers and prayed in congregation, social interactions developed gradually. Starting with warm smiles, greetings, or simply inquiring about each other's well-being, brotherhood becomes more tangible. I felt that the mosque became a place to nurture Islamic brotherhood among the congregation, regardless of their backgrounds or social status. This bond deepened over time, as we consistently gathered in the same place with the same purpose: seeking the pleasure of Allah SWT. In a verse from the Quran, it is stated, "And establish prayer, give zakat, and bow with those who bow" (Qur'an, 2:43). The meaning of bowing here is prayer, while "bow with those who bow" refers to praying together with others, that is, in congregation. Congregational prayer symbolizes unity in Islam, where individuals from diverse backgrounds can come together in worshiping Allah SWT. In congregational prayer, we stand in a straight line, facing the same direction, and supplicate to the same God, despite our differing backgrounds, understandings, and experiences. This highlights the significance of Islamic brotherhood, which unites the hearts of Muslims toward a noble goal: drawing closer to Allah SWT.

One aspect of perfecting congregational prayer is the straightness and tightness of the rows. "Straighten your rows, for straightening the rows is part of the perfection of prayer." (Muslim no. 433). Another important hadith to reflect on is from Ibn Mas'ud, may Allah be pleased with him, who said, "The Prophet PBUH would place his hand on our shoulders before prayer and say, 'Keep straight, don't be irregular, for there would be dissension in your hearts. Let those of you who are sedate and prudent be near me, then those who are next to them, then those who are next to them." (Muslim, no. 654). From the Companion Abdullah ibn Umar, may Allah be pleased with him, he said: The Messenger of Allah PBUH said, "Set the rows in order, stand shoulder to shoulder, close the gaps, be pliant in the hands of your brethren, and do not leave openings for the devil. If anyone joins up a row, Allah will join him up, but if anyone breaks a row, Allah will cut him off." (Abu Dawud, no. 666).

In another hadith, it is also said, "Stand close together in your rows, bring them near one another, and stand neck to neck, for by Him in Whose hand my soul is, I see the devil coming in through openings in the row just like a small black sheep." (Abu Dawud no. 667) Imam Abu Dawud, while explaining the Prophet's statement, said, "The meaning of his statement, 'Softly touch the hands (arms) of your brothers,' is that if someone comes toward the row and tries to enter, then everyone should soften their shoulders for him so that he can enter the row." Another hadith states, "Straighten your rows, for I see you from behind my back." Anas added, "Everyone of us used to put his shoulder with the shoulder of his companion and his foot with the foot of his companion" (Bukhari No. 725).

An interesting observation that occurred during congregational prayer was when one of the guides prayed with his daughter. During the prostration and rising movements, the daughter consistently sought out the foot of the person next to her so that her ankle could touch theirs. By the end of the prayer, the person next to her remarked, "Wow, you're smart to find the mother's foot. Where do you go to school?" Isn't this simple act a reflection of Islamic brotherhood? Even though they were strangers, it left a positive impression. This

insight could provide new perspectives for researchers who previously believed that a tight and straight row was sufficient without the need to touch feet. To delve deeper into this matter, I watched a video lecture on YouTube titled "How to Straighten and Align the Prayer Rows According to the Sunnah" by Ustadz Adi Hidayat. In the lecture, it was explained that aligning the rows according to the Sunnah involves the meeting of the ankles and shoulders, aligning with the guide's experience and the researcher's analysis. Although not mandatory, aligning the ankles and shoulders is more preferable. The video emphasized, "It feels different when you just stand straight compared to aligning the ankles and shoulders. The feeling is definitely different."

I compared the experience of praying in congregation under two different conditions. Firstly, in a mosque where most worshippers did not touch feet and shoulders. Some seemed reluctant if their skin was touched. Secondly, in a mosque with friends who understood and practiced this sunnah. The difference was significant, creating a strong bond and sense of solidarity. Due to this, I became interested in teaching this context to the students at Roudhlotul Qur'an, where I teach the Qur'an. Initially, the students responded positively, though some found it uncomfortable due to not being accustomed to it. However, after practicing, their unity during congregational prayer was evident. Based on the mentor's experience and my observations, the mosque serves as the House of Allah, where Allah unites the hearts of Muslims from diverse backgrounds through congregational prayer. One aspect of its perfection lies in aligning the rows straight and tightly, fostering Islamic brotherhood (Ukhuwah Islamiyah).

Mathematical Concept Analysis Narrative 2:
The Believers are but Brothers When Steps to the Mosque Unite the Hearts of Believers

Parallel lines

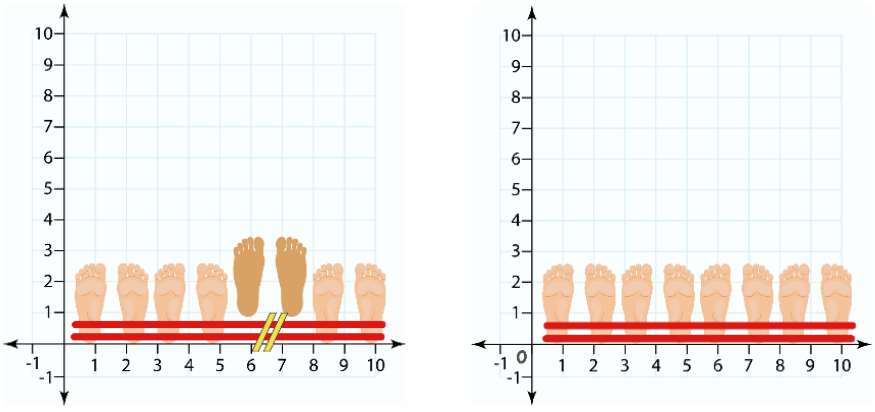


Figure 4. Parallelism in congregational prayer

"Set the rows in order, stand shoulder to shoulder, close the gaps, be pliant in the hands of your brethren, and do not leave openings for the devil. If anyone joins up a row, Allah will join him up, but if anyone breaks a row, Allah will cut him off" (HR. Abu Dawud no. 666).

In geometry, two lines are considered parallel if they maintain the same distance at every point. In congregational prayer, we can apply mathematical concepts, specifically the idea of lines extending from one end of the row to the other (Syafiulia & Mariana, 2021). To ensure the prayer rows are straight, it is important for shoulders and ankles to be aligned,

meaning each individual must stand in the same position to create parallel lines. When everyone in the row stands with aligned shoulders, the congregation forms a straight horizontal line. Any movement forward or backward from this line causes the row to become misaligned and disorderly. If we view each individual in the row as a point on a coordinate plane (x, y), with all points sharing the same y-value (e.g., $y = 0$ for the first row), they will form a parallel line. However, if an individual stands at $y \neq 0$, there will be a deviation from the straight line, resulting in non-parallelism. Failure to maintain parallelism within the congregation leads to a non-straight row.

This interpretation extends previous research on mathematical concepts in Islamic worship. Syafiulia & Mariana (2021) explored mathematical concepts in Tarawih prayers, identifying similar geometric patterns. However, the current study deepens this analysis by explicitly connecting the concept of parallel lines to the principle of Ukhuwah Islamiyah, demonstrating how mathematical precision in physical alignment reflects and reinforces spiritual and social unity among Muslims. Furthermore, this finding resonates with research by Lateh (2023) on integrating local contexts into mathematics instruction. The practice of congregational prayer provides a culturally authentic context for teaching parallel lines, one that students experience regularly and can physically embody, making the abstract mathematical concept concrete and meaningful.

The Concept of the Angle of Congregational Prayer

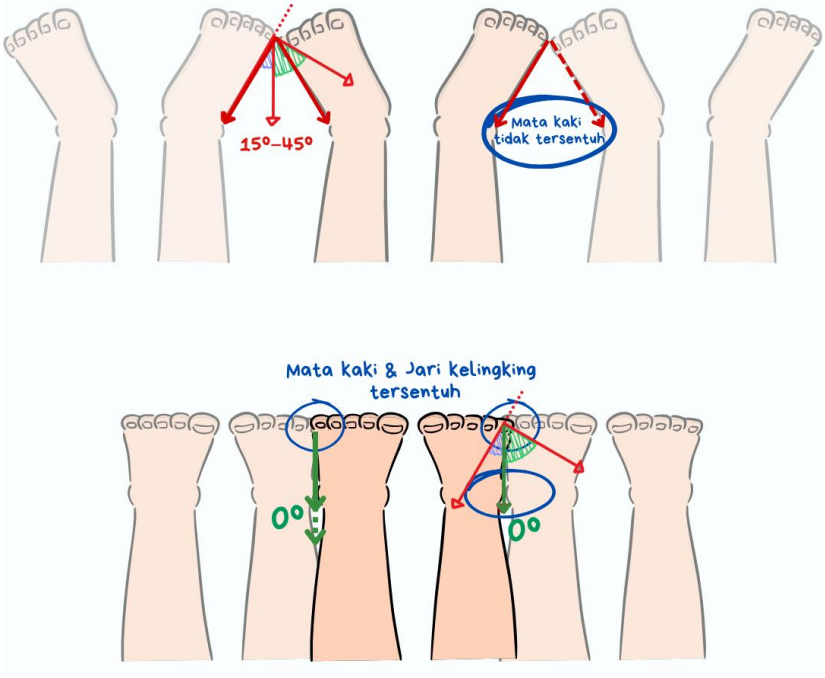


Figure 5. Angle of the feet in congregational prayer

"Straighten your rows for I see you from behind my back." Anas added, "Everyone of us used to put his shoulder with the shoulder of his companion and his foot with the foot of his companion" (HR. Bukhari no.725).

In In the context of congregational prayer, the alignment of worshippers in straight rows is emphasized to create a unified and organized prayer space. The Prophet Muhammad (peace be upon him) instructed his followers to straighten their rows, ensuring that each

individual aligned their shoulder and foot with their companion's. This alignment not only reflects unity but also enhances the focus and concentration of the worshippers during prayer.

From a mathematical perspective, the alignment of feet with shoulder width and avoiding a "V" shape can be explained through angles. When our feet and the feet of the person next to us are both pointed straight forward, the angle between the two feet meeting is 0° or close to 0° (ideally 0°-2°). This position allows the ankles to touch properly, making the rows tighter and neater in line with the Sunnah for straightening the rows in congregational prayer. On the other hand, if our feet form an outward angle (e.g., a "V" shape), the angle between the feet would be larger, e.g., 15°–30°, preventing the ankles from aligning perfectly. In this case, only the tips of the toes touch, and the shoulders may also struggle to align properly. The ideal distance between the feet should be parallel to the width of the shoulders, around 40-45 cm, to ensure a stable and comfortable body position. Wider spacing between the feet (more than 45 cm) may still align the ankles but can cause the shoulders to misalign. Conversely, if the feet are too close together and not aligned with the shoulders, it can lead to discomfort and imbalance, affecting the focus of prayer. This alignment is crucial for creating a tight, straight, and comfortable row, supporting the perfection of the row and enhancing the focus of prayer. Sheikh Muhammad Nashiruddin Al-Albani suggests that ilzaq, the act of attaching shoulders and feet in prayer, is a Sunnah that has been neglected by Muslims. This opinion is based on a hadith narrated by Anas bin Malik and Nu'man bin Basyar.

CONCLUSION

This autoethnographic study reveals profound connections between mathematical concepts and the Islamic principle of Ukhuwah Islamiyah (Islamic brotherhood), demonstrating that religious values and academic content need not exist in separate domains but can be meaningfully integrated to enhance both mathematical understanding and character development. Through reflexive analysis of personal experiences in diverse Islamic educational contexts, the research identifies specific mathematical concepts—including whole numbers and natural numbers representing Tawhid and Islamic diversity, geometric lines and angles symbolizing unity within difference, three-dimensional spatial structures exemplifying mutual support, parallel lines manifesting in congregational prayer alignment, and angular relationships in prayer posture precision—that serve as both representations and reinforcements of Ukhuwah Islamiyah principles. These findings address a critical gap in mathematics education literature by focusing specifically on Islamic brotherhood, a core social and theological principle that has received limited attention despite its relevance to contemporary challenges of division within Muslim communities. The study demonstrates that autoethnographic methodology, while unconventional in mathematics education research, provides unique insights into the experiential connections between mathematical thinking and religious values that remain inaccessible through traditional research approaches. For elementary mathematics educators in Islamic contexts, these findings offer practical opportunities to design learning experiences that simultaneously develop mathematical reasoning skills and foster essential values of unity, mutual support, respect for diversity, and community-building competencies urgently needed in increasingly diverse societies. By recognizing and utilizing the mathematical structures embedded in Islamic practices and teachings, educators can create culturally responsive pedagogy that validates students'

religious identities while advancing their mathematical proficiency, ultimately contributing to the development of Muslim youth who are both mathematically competent and deeply committed to principles of brotherhood and social harmony.

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