



Strengthening Numeracy and Science Literacy Skills Based on Religious Moderation

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ABSTRACT

Purpose - This study aims to integrate this concept into the school environment, one way being through learning, which helps students understand and practice the teachings of Islam in a moderate and tolerant manner.

Methodology - This research employs a qualitative and descriptive approach, utilizing the Participatory Action Research (PAR) method. The subjects of our Community Service activities consisted of 19 teachers and 39 students from three Madrasah Ibtidaiyah in the Central Maluku district, namely Madrasah Ibtidaiyah Al Hidayah Liang, Madrasah Ibtidaiyah Salman Al Farisi Liang, and Madrasah Ibtidaiyah Al Kahar 2 Iha Liang.

Findings - Training on strengthening numeracy literacy and science literacy based on religious moderation can improve the ability of teachers at 3 Madrasah Ibtidaiyah in Central Maluku district to implement numeracy literacy-based mathematics learning and science literacy-based science learning. The pre-test results showed an average score of 27, while the post-test average increased significantly to 75.3. On the other hand, for the application of numeracy literacy learning and science literacy based on religious moderation, there are still teachers who struggle to apply it.

Contribution - This research can improve the ability of teachers and students regarding numeracy literacy and science literacy at 3 Madrasah Ibtidaiyah in Central Maluku district, as well as understanding and applying the concept of religious moderation in everyday life.

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INTRODUCTION

In today's digital era, numeracy literacy and science literacy are important for every individual. Numeracy literacy is the ability to formulate, apply, and interpret number concepts and arithmetic operation skills in everyday life (Kemenag, 2020). Meanwhile, science literacy refers to an individual's ability to understand scientific concepts and processes, and apply them in everyday life to make informed, evidence-based decisions (OECD, 2016).

Numeracy and science literacy skills are crucial for individual success in various aspects of life. In the workplace, these skills are essential for completing complex tasks, analyzing data, and making informed decisions. They are also important for making decisions in areas such as health and the environment (OECD, 2019; DeBoer, 2000).

On the other hand, research indicates that numeracy literacy and science literacy in Indonesia remain low. The 2018 Programme for International Student Assessment (PISA) scores showed that Indonesia ranked 62nd out of 79 countries in numeracy literacy and 57th out of 79 countries in science literacy (OECD, 2019). In the 2022 PISA test, Indonesia ranked 70th for numeracy literacy and 67th for science literacy out of 65 participating countries. Despite the increase in rank, Indonesia experienced a decline in scores. In 2018, Indonesian students scored 379 for numeracy literacy and 396 for science literacy. In 2022, students in Indonesia scored 366 in numeracy literacy and 383 in science literacy. (OECD, 2019 & OECD, 2023)

These results align with those obtained at the madrasah level in Indonesia, starting from Madrasah Ibtidaiyah (MI), Madrasah Tsanawiyah (MTs), and Madrasah Aliyah (MA). At the madrasah level, the Indonesian Madrasah Competency Assessment (AKMI) is conducted annually to measure students' reading literacy, numeracy literacy, science literacy, and socio-cultural literacy skills. In AKMI, students' ability in each literacy is differentiated into five levels of proficiency, ranging from the lowest to the highest, including: needs assistance, basic, proficient, skilled, and needs creative space. The AKMI report card for each literacy will describe the ability of students and also each madrasah based on the level of proficiency achieved.

Generally, in Indonesia, the AKMI results are not satisfactory, especially in Eastern Indonesia, including the Maluku province. The data we obtained about the AKMI 2023 report card for 17 MIs in Central Maluku district for numeracy literacy and science literacy, namely, numeracy literacy: 15 MIs were assessed to be in the proficient level, while 2 MIs were assessed to be in the skilled level, with an average score of 58; science literacy: 17 MIs were categorised in the proficient level, with an average score of 50 (Kemenag Maluku Tengah).

Based on initial observations, there are several indications that the level of numeracy literacy and science literacy in MI in Central Maluku is still low. These indications arise because many students still struggle to understand numeracy and science questions, a significant number of students lack interest in science and mathematics subjects, and MI teachers often lack the knowledge and skills necessary to teach science literacy and numeracy literacy. It is feared that this condition will lead to a decline in the quality of human resources in Central Maluku in the future.

Several previous articles have shown that participation in learning or training on numeracy and science literacy leads to an increase in these literacies among teachers and students. Research by Lessy et al. (2023) demonstrated that numeracy literacy-based teaching can enhance students' mathematics learning outcomes, as evidenced by the percentage of learning completeness in mathematics learning across 3 SD/MIs from 3 provinces in Indonesia, at 91.94%. In addition, the article presented by Lessy (2022) states that training for 60 Madrasah Ibtidaiyah teachers from 5 provinces can improve their literacy skills, which can be realized through planning, implementing, and evaluating numeracy literacy learning in the classroom. Research by Rohmaya (2022) demonstrated an increase in students' science literacy through Socioscientific Issues-Based Science Learning. Activities to strengthen numeracy literacy through the dissemination of media and learning platforms, such as PhETcolorado and Canva, conducted by Mifliwa et al. (2024) at elementary schools in the Kuningan district, showed an increase in teachers' ability to design innovative numeracy literacy learning through the use of media and learning platforms. Activities by Akbar et al on science literacy assistance in

implementing the independent curriculum carried out by the Uswatun Hasanah Foundation. The results obtained, namely increased knowledge and insight into science literacy, especially in creating media and utilizing science learning materials. (Akbar et al, 2023)

What distinguishes this research topic from previous ones is the integration of numeracy literacy and science literacy learning with the concept of religious moderation. It is known that the Maluku province is one of the regions not dominated by a single religion. The religious moderation approach was chosen because it is expected to help students understand and practice the teachings of Islam in a moderate and tolerant way. This is crucial in preventing students from being exposed to radicalism and extremism. We can state that one of the applications of religious moderation has been practiced by the Moluccan people for a long time. One of the famous Moluccan cultures' *pela-gandong* is a family relationship between a Muslim village and a Christian village. In a study by Hasanussi (2023), several cultural values of *Pela Gandong* are identified as fostering community harmony in Maluku, based on the Qur'an's perspective, one of which is the value of moderation. The application of this value concept needs to be maintained in the lives of the people of Maluku, and it also needs to be introduced early on to children in Maluku, one way being through the learning process in the classroom.

This study aims to address several key issues related to enhancing the competencies of Madrasah Ibtidaiyah (MI) teachers in Central Maluku Regency. These issues include: the level of teacher competence in implementing mathematics instruction based on numeracy literacy and science instruction based on science literacy; the ability of teachers to integrate the values of religious moderation into the numeracy and science literacy learning process; and the effectiveness of implementing literacy-based learning that combines numeracy and science with the principles of religious moderation in MI environments. These research problems serve as the foundation for evaluating and improving the quality of holistic and contextual learning in the region. The objective of this activity is to enhance the competence of MI teachers in Central Maluku Regency in delivering mathematics lessons grounded in numeracy literacy and science lessons grounded in science literacy, while incorporating the values of religious moderation. In addition, the activity aims to strengthen teachers' understanding and skills in applying a moderate approach to numeracy and science literacy, and to evaluate the learning process to ensure its effectiveness and sustainability within the MI educational context.

The Participatory Action Research (PAR) approach was chosen for this study because it aligns well with the research problems and objectives, which focus on strengthening the competencies of Madrasah Ibtidaiyah (MI) teachers in implementing numeracy literacy, science literacy, and religious moderation-based learning. PAR emphasizes the active involvement of teachers throughout all stages of the research—from problem identification to evaluation—enabling a collaborative and reflective process. By positioning teachers as partners and agents of change rather than merely research subjects, PAR supports the transformation of teaching practices in a contextual, sustainable, and locally relevant manner, while also contributing to the overall goal of enhancing teachers' competencies and understanding.

METHODOLOGY

Research Design

This research employs a qualitative and descriptive approach, utilizing the Participatory Action Research (PAR) method, which is participatory and action-oriented. The presence of researchers in this study served as the primary instrument for data collection, continuing through to the stage of reporting the results. The data sources used in this research are primary data sources, FGDs, interviews, and narratives. (Chevalier & Buckles, 2013)

Community service activities are not positioned as separate from the research process, but rather as an integral part of the Participatory Action Research (PAR) approach used. Community service in this research is designed as a concrete form of action carried out based on the results of problem identification in

collaboration with Madrasah Ibtidaiyah (MI) teachers, who serve as the research subjects. The activities include training, mentoring, and the implementation of learning based on numeracy literacy, science literacy, and religious moderation, which serve as a direct response to the previously identified issues. Community service is not an additional component, but rather an essential part of the reflection–action–reflection cycle in Participatory Action Research (PAR), where teachers play an active role as both agents and evaluators of change. The involvement of the same subjects in both activities reflects the integration between the research process and empowerment activities. Community service activities represent the implementation of action within the PAR cycle and provide a narrative that illustrates how the activities were designed, implemented, and evaluated as part of a collaborative and participatory research process.

Subject

The subjects and informants in this research include: 1) the head of Islamic Education at the Ministry of Religious Affairs office in Central Maluku district, 2) teachers, students, and heads of Madrasah Ibtidaiyah (MI) in Central Maluku district. This research is limited to 3 MIs in the Central Maluku district, namely: 1) MI Al Hidayah Liang, 2) MI Salman Al Farisi Liang, 3) MI Al Kahar 2 Iha Liang.

The subjects of our Community Service activities consist of: teachers and students at 3 MI in Central Maluku district, namely: MI Al Hidayah Liang, MI Salman Al Farisi Liang, and MI Al Kahar 2 Iha Liang. The following table illustrates the number of teachers and students in 3 MI.

Table 1. Number of Service Subjects

School Name	Number of Teachers	Number of Students
MI Al Hidayah Liang	12	17
MI Salman Al Farisi Liang	3	12
MI Al Kahar 2 Iha Liang	4	10
Total	19	39

Data Collection

To obtain comprehensive data, this study employed multiple data collection techniques, including Focus Group Discussions (FGDs), semi-structured interviews, observations, tests, and documentation. The FGD procedure involved developing open-ended question guides, engaging teachers and school principals as participants, and was facilitated by members of the community service team. FGDs aimed to explore participants' perceptions and needs related to numeracy literacy, science literacy, and religious moderation-based learning. Semi-structured interviews were conducted with school principals and teachers using flexible, open-ended guides to explore their experiences, perspectives, and instructional practices. Data obtained from FGDs and interviews were recorded, transcribed, and analyzed qualitatively.

Data Analysis

The data analysis method employed a thematic analysis approach, beginning with a coding process of the transcribed data to identify key themes such as teacher challenges, understanding of literacy concepts, and post-training changes. Meanwhile, quantitative data from pre- and post-tests were analyzed descriptively to determine the improvement in teachers' understanding of the training materials. To ensure data validity, several strategies were applied, including methodological and source triangulation (combining data from FGDs, interviews, observations, and documentation), member checking (confirming findings with participants), and peer debriefing (researcher discussions to validate findings). All processes were systematically documented to ensure transparency and data integrity within the context of participatory research.

PAR Research Procedures

Identifying the Problem

Based on the RAPOR data from the AKMI 2023 results obtained from the Islamic Education section of the Central Maluku District Ministry of Religious Affairs Office, it was found that the average score for numeracy literacy was 58. The average score of science literacy was 50. These results are certainly still far from what is expected.

Furthermore, we selected three MIs in the Central Maluku district as samples to identify the problem of low numeracy literacy and science literacy skills among students. Additionally, observations were conducted to assess the implementation of numeracy and science literacy-based learning, as well as the application of religious moderation.

Planning for Action

This stage is carried out to develop strategies and intervention steps based on the results of problem identification in numeracy literacy, science literacy, and understanding and applying the concept of religious moderation in MI in the Central Maluku district.

Taking Action

This stage is implemented to introduce the mentoring programme, aiming to enhance numeracy, literacy, and science literacy skills among teachers and students at MI in the Central Maluku district, in accordance with the prepared plans.

Reflecting on Action

This stage was conducted to assess the effectiveness of the teacher and student mentoring program at MI in Central Maluku District, aiming to improve numeracy, literacy, and science literacy skills through religious meditation, and to determine the necessary improvement steps.

Revising and Sustaining

This stage is undertaken to enhance and ensure the sustainability of the mentoring programme for numeracy and science literacy skills, based on religious moderation, for teachers and students at MI in the Central Maluku district.

FINDINGS

The initial stage of this activity began with identifying the problem based on the 2023 AKMI report card data obtained from the Islamic Education Section of the Central Maluku District Ministry of Religious Affairs. The data showed that, among 17 Madrasah Ibtidaiyah (MI) in the region, the average numeracy literacy score was only 58, while the science literacy score was 50. These figures are still far below the expected educational standards. From this, three MIs were selected as samples to examine the problem of low numeracy and science literacy skills among students—namely MI Al Hidayah Liang, MI Al Kahar 2 Iha Liang, and MI Salman Al Farisi Liang. The following table presents the observation results from the three Madrasah Ibtidaiyah (MIs).

The next step was planning for action, which involved a follow-up meeting with the three MIs to validate the findings and agree on solutions to be implemented. The agreed-upon plan included developing a mentoring program that consisted of teacher training on numeracy and science literacy teaching based on religious moderation, implementing practice-based learning strategies that actively engage students, and determining success indicators to evaluate students' understanding of numeracy and science literacy within the context of religious moderation. Observations of teachers focused on aspects such as lesson planning, implementation, and evaluation of numeracy or science literacy learning integrated with religious moderation. For students, observations emphasized their ability to understand numerical or scientific information, use data for problem-solving, think critically, represent data visually, and apply values of religious moderation.

Table 2. Observation Results

Observation Focus	Findings
Teacher Participation in Training	Teachers at MI Al Hidayah Liang and MI Al Kahar Iha 2 Liang have never participated in training related to numeracy and science literacy. At MI Salman Al Farisi Liang, only one teacher has attended such training.
Implementation of Numeracy and Science Literacy in Learning	Mathematics and science learning in all three MIs is still not significantly based on numeracy and science literacy.
Teachers' Understanding of Religious Moderation	Teachers in the three MIs still have a limited understanding of the concept of religious moderation.
Integration of Religious Moderation in Learning	Learning activities that incorporate the concept of religious moderation for students are still minimal in all three MIs.

The action stage was carried out through teacher training sessions on integrating religious moderation into numeracy and science literacy instruction. The training materials covered religious moderation concepts, strengthening numeracy literacy, and integrating science literacy. To assess teacher understanding, a pre-test was administered prior to training, and a post-test was administered afterward. Pre-test results showed an average score of 27, while the post-test average increased significantly to 75.3. After completing the training, the teachers from the three MIs prepared to implement the literacy-based lessons in accordance with their subject expertise. During implementation, each teacher was observed by two evaluators to assess their classroom practices. At MI Salman Al Farisi Liang, a science literacy class was conducted with 12 fifth-grade students by teacher HW, using the topic "Seeing Because of Light." Observation results showed the teacher met all the assessment criteria, and students generally performed well, demonstrating good comprehension of the science material and fulfilling all observed aspects in the "GOOD" category. At MI Al Kahar 2 Iha Liang, teacher SSO taught a science literacy class on "Forms and Changes of Substances" for fourth-grade students, attended by 10 students. While the teacher met all science literacy teaching criteria, they had not yet integrated religious moderation values into the lesson. Consequently, although students demonstrated a good understanding of the scientific content, they did not receive exposure to the values of religious moderation. Meanwhile, at MI Al Hidayah Liang, numeracy literacy instruction on the topic "Telling Time" was delivered to 17 second-grade students by teacher AL. The teacher successfully fulfilled all assessment criteria, and students actively participated in the learning process, showing a strong understanding of the material and achieving a "GOOD" performance rating overall.

Reflection on the action revealed varied outcomes in the implementation of religious moderation-based literacy teaching across the three MIs. Teachers at MI Salman Al Farisi and MI Al Hidayah successfully integrated religious moderation into their lessons, as evidenced by students' academic comprehension and understanding of moderation values. Students at MI Al Hidayah were particularly active, suggesting that the teaching approach used helped increase engagement. However, at MI Al Kahar 2, the integration of religious moderation values was not yet achieved. Teachers struggled to incorporate these concepts into science instruction, resulting in students receiving strong academic content but lacking a broader, values-based perspective. To address this, further mentoring is needed for teachers at MI Al Kahar 2 so they can understand and apply religious moderation in literacy education. Case-based learning, discussions, or experiments infused with values of diversity and tolerance could be introduced. Teachers from MI Salman Al Farisi and MI Al Hidayah, who have successfully implemented this approach, can serve as mentors and share best practices to encourage the replication of effective models. Interactive teaching methods such as educational games, simulations, or project-based learning could also help boost student engagement across schools.

In the revision and sustainability phase, improvements are essential in integrating religious moderation into science literacy lessons at MI Al Kahar 2 Iha Liang. Technical guidance is needed for the teachers, while those from MI Salman Al Farisi and MI Al Hidayah can support through knowledge-sharing sessions. Further

workshops or training should introduce context-based teaching techniques, for example, linking the concept of changes in substances with the values of openness and tolerance. Additionally, there is a need to develop modules or teaching materials that embed religious moderation in science literacy. These materials could include case studies, inspirational stories, or science experiments accompanied by reflections on diversity and tolerance. Project-based learning and group discussions are also recommended to boost student engagement. The use of interactive media, such as educational games or videos, can further help students connect numeracy and science literacy with the values of religious moderation.

To ensure that the results of this initiative extend beyond a single cycle, sustainable efforts should be implemented to maintain continuity. These include ongoing monitoring and evaluation to track whether teachers are applying the new approaches in their classrooms. Student and teacher feedback should be regularly collected to refine teaching strategies and improve the learning experience. Establishing a learning community among the teachers of the three madrasahs would facilitate the sharing of experiences and collaborative problem-solving. It is also essential to encourage the involvement of school leaders and stakeholders to maintain consistent support and ensure the long-term sustainability of religious moderation-based literacy education.

DISCUSSION

Research on strengthening numeracy literacy and science literacy based on religious moderation in MI in Central Maluku Regency, which involves training and mentoring, as well as classroom observation in three MI. We report the results of this community service activity to the leadership (Head of Madrasah Ibtidaiyah) so that it can be evaluated at each madrasah.

This research was conducted in three madrasahs in Central Maluku Regency, namely MI Al Hidayah Liang, MI Salman Al Farisi Liang, and MI Al Kahar 2 Liang. Initial observations revealed that teachers have limitations in applying numeracy and science literacy, and they have not effectively incorporated the concepts of religious moderation values into their learning. This reflects the challenges of education in areas with limited access to training activities, both in terms of temporal and sustainable support.

The training aims to enhance teachers' competence in numeracy, literacy, and science literacy by integrating religious moderation values, while also improving numeracy, literacy, and science literacy skills in conjunction with religious moderation. This approach is based on: 1) Multidimensional Literacy Theory (Tomović, 2024), which emphasises that literacy involves more than just reading or calculation skills, but also includes critical abilities in understanding social and cultural contexts. 2) Value-based Character Education (Evisensia, 2025), which shows that integrating values in learning improves students' ability to understand diversity and tolerance.

The pre-test results showed an average score of 27, while the post-test increased to 75.3. There was a 179% increase. This increase confirms the Experiential Learning Theory (Mechouat, 2024). Teachers can understand and apply the concepts after actively participating in the training activities. Teacher training has been widely recognized as an effective strategy for enhancing educators' skills in numeracy and science literacy. Several studies have supported this claim, highlighting how targeted training programs can lead to significant improvements in teaching quality and student learning outcomes.

For instance, Soraya and Pamungkas (2024) conducted a study on training programs focused on strengthening literacy and numeracy within the learning process. Their findings demonstrated that teachers who participated in training involving innovative teaching methods, technology integration, and the development of relevant learning materials were better equipped to improve students' literacy and numeracy skills. Another study by Atika et al. (2019) examined science literacy training designed to enhance the scientific thinking skills of early childhood teachers. The program provided educators with a solid foundation in science literacy and its application in classroom instruction. As a result, there was a marked improvement in both the planning and implementation of science lessons by participating teachers. Similarly, Rahmawati et al. (2023) reported significant progress in teachers' ability to integrate numeracy literacy into classroom practice after

undergoing specialized training. Prior to the program, only 18% of teachers effectively implemented numeracy literacy strategies, but this figure increased dramatically to 79% following the training. This demonstrates the transformative impact of structured professional development on pedagogical practice. Further support for the effectiveness of teacher training can be found in the study by Pratika et al. (2024), which focused on training and mentoring educators in developing PISA-standard science questions. The training enhanced teachers' understanding of science literacy and enabled them to develop assessments aligned with international benchmarks, reflecting an improvement in instructional competency. Lastly, Marlina et al. (2022) emphasized the broader educational benefits of improving teachers' literacy and numeracy competencies. Their study found that such training not only strengthened teachers' instructional skills but also had a positive influence on student achievement in both literacy and numeracy domains. The results suggest that investing in teacher training is a critical step toward elevating the overall quality of education. In summary, consistent evidence from these studies demonstrates that well-structured teacher training programs significantly contribute to enhancing educators' capabilities in delivering adequate numeracy and science literacy instruction, ultimately leading to improved student outcomes.

Post-training observations assessed teacher and student activities in religious moderation-based numeracy and science literacy learning, indicating that most aspects of learning have been met. However, there are challenges in integrating religious moderation values, especially in MI Al Kahar 2 Iha Liang. Students demonstrated a good understanding of the numeracy and science literacy materials; however, their understanding of the value of religious moderation integrated into numeracy and science literacy still needs improvement.

The results of the mentoring activities carried out are in line with several studies, including: 1) Value Integration in Literacy, research by Noor et al. (2023) showed that strengthening literacy based on the value of religious moderation helped improve students' understanding of diversity and tolerance. This is particularly relevant to the activities in Central Maluku, an area characterized by significant cultural and religious diversity. 2) Strengthening Science Literacy, according to a recent study from the OECD (2023), a science literacy-based approach improves students' ability to think critically and solve problems.

The research results, in the form of teacher training and teacher assistance, aim to enhance numeracy, literacy, and science literacy learning in the classroom. We hope to make these activities sustainable, ensuring that teachers can consistently integrate religious moderation values. Additional training is needed, especially in contextual learning methods that integrate moderation values. Higher education institutions can continue to support the strengthening of teacher competence through research-based programs or community service. In general, this research activity made a significant contribution to improving the competence of teachers in 3 MIs related to numeracy literacy, science, and religious moderation values. Although there are challenges in value integration, this training is a crucial first step toward more inclusive and value-based education.

CONCLUSION

Based on the results of our research, several conclusions can be drawn. First, training programs focused on strengthening numeracy and science literacy within the framework of religious moderation have proven effective in enhancing the abilities of teachers at three Madrasah Ibtidaiyah (MI) in Central Maluku District. These programs enabled teachers to implement mathematics learning based on numeracy literacy and science learning based on science literacy more effectively. The development of these competencies is essential for equipping students with critical thinking, problem-solving abilities, and a contextual understanding of scientific and quantitative concepts.

Second, the training also contributed to increasing teachers' understanding of how to integrate religious moderation values into the learning process. This integration is crucial for shaping students' character to be more tolerant, fair, and respectful of diversity, without compromising the focus on developing strong numeracy and science literacy skills. Through this approach, the learning process not only becomes more holistic but also promotes moral and ethical values alongside academic competence.

Finally, it was found that teachers across the three MIs in Central Maluku were generally capable of implementing mathematics instruction based on numeracy literacy and science instruction, even if not always explicitly tied to literacy frameworks. However, challenges remain in applying numeracy and science literacy approaches that are fully integrated with the principles of religious moderation. Some teachers still encounter difficulties in embedding these values effectively into their lessons, indicating a need for continued support and mentoring in this area.

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