International Journal of Trends in Mathematics Education Research
Vol. 7, No. 3 (2024), pp. 156-162
ISSN 2621-8488 (online)
DOI: https://doi.org/10.33122/ijtmer.v7i3.308

SAINTIS publishing

Research Article/Review Article

Islamic-Based Mathematics Learning Model for Islamic Boarding School Students

Faizzatul Maulidiyah, Salma Aniqotizzahro, Sa'diyatul Abadiyah, Abdul Halim Fathani*

Department of Mathematics Education, Universitas Islam Malang, Jawa Timur, Indonesia, 65144
*Corresponding Author: fathani@unisma.ac.id | Phone: +6281334843475

Received: 29 August 2024 *Revised: 27 September 2024* *Accepted: 30 September 2024* *Available online: 23 December 2024*

ABSTRACT

Islamic boarding schools are one of the Indonesian instructive educate that utilize formal and informal curricula. In their learning activities, some students have difficulty taking formal subjects, especially a subject in this research, namely mathematics. This research aimed to develop an Islamic-based mathematics learning model for Islamic boarding school students to suit the students' needs. The research design was Research & Development. Information collection was carried out through interviews, questionnaires, tests, and perception sheets. The research results from the try- out of an Islamic boarding school student mathematics learning model that integrated mathematics with Qur'an values had a significant effect on learning outcomes and increased student motivation in learning. Therefore, this learning model was very feasible and suitable to be implemented for Islamic boarding school students.

Keywords: Learning Model; Islamic Boarding School Student; Mathematics; Qur'an

1. INTRODUCTION

The learning system in Islamic boarding schools is not the same as learning exterior schools. Learning at Islamic boarding schools prioritizes religious knowledge. However, as the era progressed, general science learning in Islamic boarding schools began to improve, both in terms of the quality of teaching staff and facilities and infrastructure. It was in line with research conducted by Mendova, R. N., Izwita D., and Elmanani, S. (2024), who stated that mathematics education had experienced a paradigm shift, with a center on innovative methodologies that integrated philosophy, culture and instructional method to extend intrigued, engagement, and student accomplishment in mathematics. Hopefully, it might move forward the quality of Islamic boarding school student resources. Thus, Islamic boarding school students were required to divide their time between studying religious knowledge and general knowledge. Moreover, most students complained that mathematics subject were challenging to understand.

It was supported by Sendi Ramdhani et al. (2020), stating that obstacles and difficulties when learning mathematics according to students were sleepiness due to numerous activities in Islamic boarding schools. They were too severe in learning mathematics; hence, they got bored. The mathematics materials were difficult to understand. Mathematical formulas were complicated to memorize. There was not enough time to learn mathematics. In addition, there were many numbers and letters in the mathematics material, a lack of confidence in solving mathematics problems, and difficulty in working on problems that did not match the examples.

In their daily activities, students could not be separated from reading and understanding the Qur'an verses. Therefore, teaching staff could update learning methods through integrating mathematics with the Qur'an. As stated by Fathani (2019), students really enjoyed learning the Quran based on his observation. Thus, an educator could create a system of curiosity and enthusiasm in students' souls by taking a surah between subjects to be studied based on a mathematical perspective; for instance, inviting students to understand the operation of adding numbers by studying verses from the Qur'an. The Islamic boarding school students would have the motivation to learn mathematics, which was integrated with the Qur'an. An example of mathematics integrated with the Qur'an, according to Abdussakir (2017) is as follows:

Two verses of Surah al-Fatihah are presented below.

بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ ﴿١﴾ ٱلْحَمْدُ لِلَّهِ رَبِّ ٱلْعَٰلَمِينَ ﴿٢﴾

The hadith explained that the reward for reading one letter in the Qur'an is 10. Students were asked to determine the number of rewards from reading the two verses of Surah Al- Fatihah.

Mathematics is essential for everyone, including Islamic boarding school students. The religious sciences studied by students, e.g., faraid science, zakat science, inheritance science, astronomy science, and others, certainly require the ability to think and calculate. Thus, students must have the ability to think. These thinking skills include deduction, analogy, induction, and conclusion (Hallaq, 1985). Islamic boarding school students will later become a cadre of ulema, preachers, teachers, or community role models. Apart from mastering Islamic religious knowledge, they must also have good thinking skills. Thinking skills are vital for a student. Therefore, the subject that can be used to develop thinking skills is mathematics (Hiebert, 1997).

The education and teaching system in Islamic boarding schools is fundamentally have done through books written in Arabic and studying the content of the holy verses of the Qur'an, which are then explained by the kyai. It has become a habit and daily practice for students to read and understand the holy verses of the Qur'an. Hence, the researchers developed a student mathematics learning model, which was packaged with two elements, namely mathematics and the Qur'an, which was appropriate to be implemented on students when studying at Islamic boarding schools. This research objective is to develop a student mathematics learning model for formal education at Islamic boarding schools.

2. RESEARCH METHOD

The research method was Research & Development. Sugiyono in Aprili, Supriatna, and Triansyah (2020) state that the advancement investigated strategy points to create particular items and explore the adequacy of this products. This research was carried out on seventh-grade students of MTs Mu'allimat, Malang City, with mathematics as the subject being tested. The research was carried out synchronously to prove that the model developed could be used for students pursuing formal education at Islamic boarding schools. The type of procedural model was the ADDIE development model proposed by Dick et al. (in Rukmi & Wibawa, 2023), i.e., a model that involved development stages with five development phase stages: Analysis, Design, Development, Implementation, and
Evaluation.
The research stages are:

a. Analysis Stage
   In this first stage, researchers analyzed the teachers' and students' needs through observations during the mathematics learning process and interviews with seventh- grade mathematics teachers at MTs Mu'allimat, Malang City. The analysis employed was an analysis of the students' and teachers' needs regarding the learning model used.
b. Design Stage
   In the second stage, the researcher carried out a design to develop the student mathematics learning model, including preparing the syntax of the student learning model and compiling research instruments.
c. Development Stage
   At this third stage, the researcher prepared a research instrument consisting of developing teaching modules, teaching materials, student worksheets (LKPD), pretests, posttests, and assessment instruments. Validation was also carried out by material experts, design and learning media specialists, and practitioner experts. After approval, the developer analyzed validation questionnaire outcomes.
d. Implementation Stage
   After the research instrument for the student mathematics learning model in the form of a product had been declared reliable for use in research, then a try-out stage was carried out on seventh-grade students at MTs Mu'allimat, Malang City. The product try-out aimed to determine Islamic boarding school students' responses after using the student mathematics learning model product and to test the feasibility of the research instrument based on students' assessments.
e. Evaluation Stage
   The researchers prepared an assessment instrument consisting of a questionnaire after the try-out and observation sheets for students and teachers at this stage. This assessment instrument was employed to determine responses from users regarding the product being developed. Furthermore, researchers made improvements according to the results of the questionnaire and observation sheet. The purpose of the evaluation was to measure the achievement of development goals.

Data collection was carried out through interviews, questionnaires, tests, and perception sheets for students. In expansion, the researcher also created a learning prototype, which was a supporting instrument and product output whose feasibility must be analyzed to support the development of the Islamic Boarding School Mathematics Learning Model. The prototypes developed in our research included: (a) Syntax Development; (b) Teaching Module Development; (c) Development of Teaching Materials; (d) Development of Student Worksheet (LKPD); (e) Pretest Development; (f) Posttest Development; (g) Assessment Instrument; (h) Islamic Boarding School Mathematics Learning Model Cycle: (i) Syntax Table for Islamic Boarding School Student Mathematics Learning Model. The activity scheme complied by researchers would later be presented after the product has been adequately tested and produces actual value in developing the learning model. The scheme that will be implemented by researchers is:

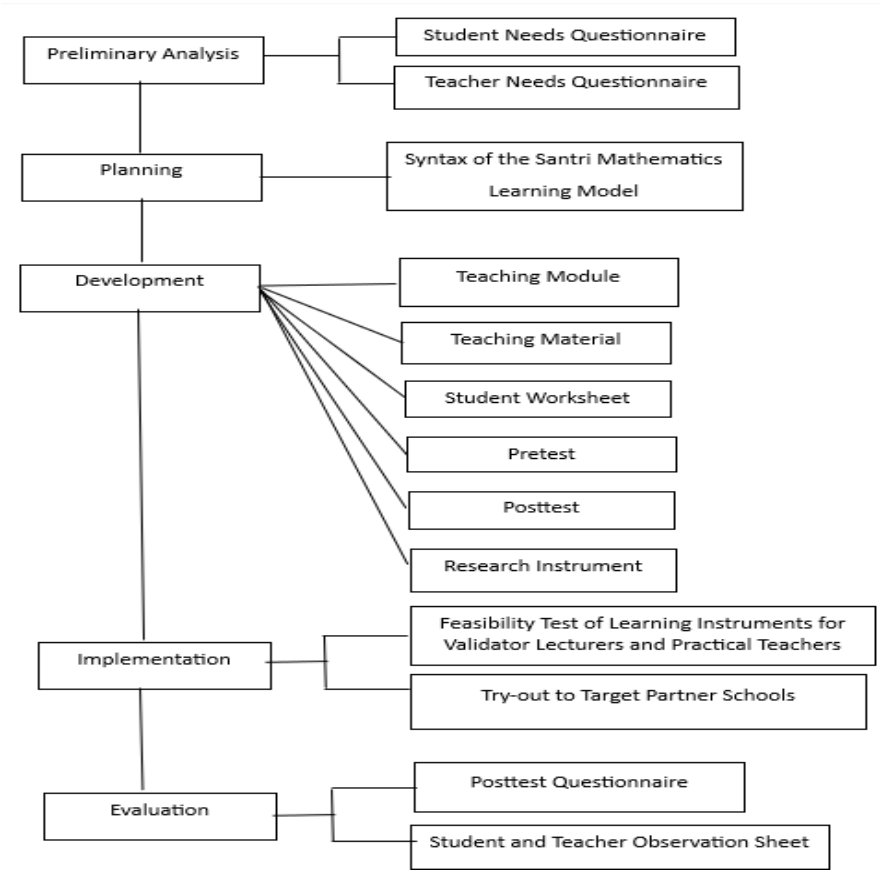

Figure 1. Islamic Boarding School-Mathematics Learning Model Development Scheme

3. RESULTS AND DISCUSSION

The Islamic Mathematics Learning Model in this research was a learning model that combined mathematics and religion by using the Qur'an content as a reference. This learning model trained students' reasoning in exploring religious knowledge sourced from the Qur'an to link it with mathematics. As stated by Umam et al. (in Noperta, 2023), there are verses in the Qur'an that relate to mathematical concepts. Teachers could use it as a guide to relate mathematics material to Qur'an verses. The mathematics learning carried out was relevant for students, especially MTs/MA students, as explained that MTs/MA needed mathematics related to the Al-Qur'an. Furthermore, the research results obtained were a student mathematics learning model with the syntax as follows:

Table 1. Syntax of the Islamic Boarding School Student Mathematics Learning Model

Syntax	Teacher Activities	Student Activities
Stage 1: Mapping mathematical abilities and understanding of the Qur'an	The teacher grouped students based on the results of the questionnaire that has been given	Students formed groups
Stage 2: Orientation to mathematical material in the Qur'an	The teacher motivated students and explained mathematics material contained in the Qur'an	Students observed and understood the material the teacher presented
Stage 3: Study of mathematics and Qur'an material	The teacher encouraged students to gather information and intervened in the discussion.	Students discussed the material the teacher had given.
Stage 4: Presenting the results of the assessment	The teacher provided direction and assistance to the group in making the presentation.	Students made presentations of the results of group work.
Stage 5: Integrative Reflection	The teacher carried out evaluations of both mathematics and religion as a review of the activities that had been carried out and self-reflection	Students were asked to summarize what they understood

Meanwhile before implementing the Islamic boarding school mathematics learning model, the researcher created a learning instrument using the Islamic Boarding School student mathematics learning model according to this link: http://bit.ly/pembelajaran-matematika-santri. The student questonnaire outcomes before the try-out implementation are:

Table 2. The Student Questionnaire Outcomes Before the Try-out

No.	Question	Option			
		A	B	C	D
1.	What is the learning atmosphere in class during mathematics lessons?	4	17	4	0
2.	Do you find it difficult to learn mathematics?	1	20	1	3
3.	What do you think about the mathematics learning model applied in class?	4	10	10	1
4.	Do you need a mathematics learning model that suits the students' needs?	1	6	10	8
5.	If you were given an Islamic boarding school student mathematics learning model, would you be motivated to learn mathematics?	2	15	5	3

Information:

A = Not fun/not difficult/poor/unnecessary/demotivated.
B = Fun enough/difficult enough/good enough/necessary enough/motivated enough.
C = Fun/difficult /good/necessary/motivated.
D = Very fun/ very difficult/ excellent/ very necessary/ highly motivated.

Data from a questionnaire on the students' needs totaling 25 students indicated that 0.16% of students mentioned that the learning atmosphere in class when learning mathematics was not enjoyable. Then, 0.68% of students conveyed that the learning atmosphere in class when learning mathematics was quite enjoyable. Furthermore, 0.16% of students stated that the learning atmosphere in class when learning mathematics was fun. In addition, 0% of students revealed that the learning atmosphere in class when learning mathematics was very enjoyable; 0.04% of students felt no difficulty in learning mathematics; 0.08% of students felt quite difficult to learn mathematics; 0.04% of students experienced difficulties to learn mathematics, and 0.12% of students also felt complicated to learn mathematics

Furthermore, 0.16% of students conveyed that the mathematics learning model applied by the teacher was poor. Then, 0.4% of students stated that the mathematics learning model was quite good; 0.4% of students also stated that it was good. In addition, 0.04% of students revealed that the mathematics learning model was excellent; then, 0.04% of students said they did not need a mathematics learning model that suited the students' needs. In contrast, 0.24% of students said they needed a mathematics learning model that suited the students' needs. Furthermore, 0.4% of students said they needed a mathematics learning model that suited of students' needs; additionally, 0.32% of students said they certainly required a mathematics learning model that suited of students' needs.

In addition, 0.08% of students stated that when learning mathematics using the student mathematics learning model, they were demotivated; 0.6% of students were quite motivated; and 0.2% of students felt motivated. Moreover, 0.12% of students stated that they felt highly motivated. In short, 0.68% of students mentioned that the learning atmosphere in class when learning mathematics was quite enjoyable. Furthermore, 0.08% of students found it quite difficult to learn mathematics. Furthermore, 0.4% of students stated that the mathematics learning model implemented by the teacher was quite good; 0.4% of students also stated that it was good. Then, 0.4% of students stated that they needed a mathematics learning model that suited the students' needs; 0.6% of students said that the mathematics learning model made them feel quite motivated. The results of observations for each student before and after testing the student mathematics learning model are:

Table 3. Pretest and Posttest Observation Results during the Try-out

Interval Value	Frequency	
	Pretest	Posttest
39-57	6	2
58-76	8	10
77-95	11	13
Total	25	25

Based on the data above, the pretest scores were obtained, namely six students in the 39-57 interval, eight students in the 58-76 interval, and 11 students in the 77-95 interval. Then, posttest scores were obtained, namely two students in the 39-57 interval, ten students in the 58-76 interval, and 15 students in the 77-100 interval. The data was presented in the form of a bar chart below:

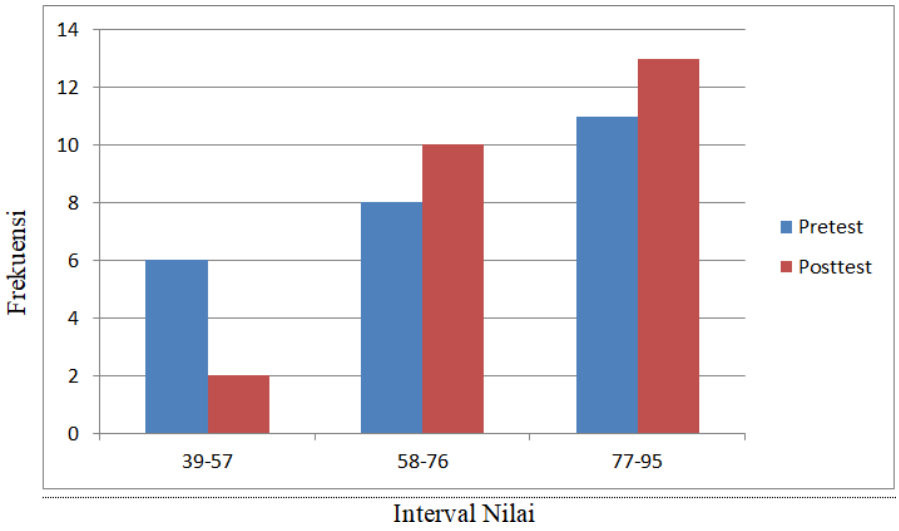

Figure 2. Frequency of Pretest and Posttest Scores for Learning Outcomes Using the Islamic Boarding School Student Mathematics Learning Model

The diagram above emphasized that the posttest value decreased in the value interval 39-57. Furthermore, in the value interval 58-76, it increased until the last value interval, namely 77-95. Meanwhile, the pretest score increased in the value interval from 39-57 to the final value interval, namely 77-95. The final results of the observations are presented in the table below:

Table 4. Final Observation Results after Try-out

	Pretest	Posttest
Total Islamic Students	25	25
Total score	1760	2011
Average	70.4	80.44
Maximum	90	95
Minimal	50	65

Based on the table above, the pretest score from 25 students could be obtained with a total score of 1760. Their mean score was 70.4. The minimum score was 50, and the maximum score was 90. Then, for the posttest score, the total score was 2011. The mean score was 80.44. The minimum score was 65, and the maximum score was 95. The data demonstrated that the usage of the student learning model had a significant effect, e.g., the scores obtained by the students have highly increased. It was due to the integration of mathematics with the content of the holy verses of the Qur'an, which was very suitable for the scope of students who took formal education at Islamic boarding schools. It was in line with Mutijah's (2018) research, which revealed that in achieving the noble goals of national education, a learning model was needed and should be appropriate to face the challenges of the times in developing knowledge and moving forward the quality of education.

This student mathematics learning model can raise students' interest in mathematics subjects because the teacher can provide an give an outline of the verses of the Al-Qur'an and As-Sunnah, which are very thick with the feel of an Islamic boarding school. It was in line with Saksono's (2015) research, which revealed that student learning outcomes could be improved by adding selected verses to mathematics learning questions. Then, motivation to learn mathematics could be increased by learning mathematics that was adapted to the Islamic boarding school environment, which was very steeped in the Islamic world (Hasanah, 2014). Furthermore, the integration of mathematics with the Al-Qur'an fosters students' interest in solving mathematical problems linked to the Qur'an verses. It is in line with Dazrullisa's (2018) opinion, which mentions that mathematics material with contextual problems related to students can increvement students' interest in learning mathematics.

In addition, mathematics learning integrated with the holy verses of the Qur'an can improve students' learning outcomes. It was in line with research by Zahroh and Faridah (2019), which stated that mathematics learning integrated with Qur'an values could have a great affect on students' learning results and mathematics learning motivation. Then, in this learning model, students are required to be able to solve problems given by the teacher. Students will have the capacity to think critically, creatively, innovatively, and communicatively, and can collaborate with other students. It was in accordance with research by Mansur et al. (2018), which stated that mathematics learning integrated with the Qur'an could improve students' complete abilities, namely cognitive, psychomotor, and affective. Moreover, learning mathematics, which is integrated with the holy verses of the Qur'an, can help develop a good personality. It was in line with research by Anggreni (2019), which revealed that good character could grow through learning mathematics integrated with the Qur'an.

Hopefully, in this increasingly developing era, students can become the driving force of the younger generation who have an open view of the outside world. Hence, this mathematics learning model can trigger creative and innovative ideas in the era of the Industrial Revolution 4.0. It was in accordance with research by Maarif (2015), who stated that one of the ways and means to achieve development in the Muslim world was progress in science and technology (IPTEK).

4. CONCLUSION

In short, the research activities and output products implemented were successful in creating the development of a mathematical learning model for students. From a series of research results to develop a student mathematics learning model that was carried out at Mts Mu'allimat, Malang City, various data were obtained; it indicated that the prototype developed by researchers was appropriate to be implemented on learning within the Islamic boarding school.

RECOMMENDATIONS

Based on the findings of this research, it is recommended that educational institutions consider Islamic-based mathematics learning to be applied to the mathematics curriculum at their respective institutions.

ACKNOWLEDGEMENTS

This article was an output from the Social Humanities Research Student Creativity Program (PKM-RSH) 2023. Therefore, the analysts would like to thank the Ministry of Education and Culture for providing grant funds to the PKM-RSH program, as well as the Universitas Malang for supporting and providing guidance to the entire PKM team that has passed and funded by the Ministry of Education and Culture.

AUTHOR'S CONTRIBUTIONS

All authors discussed the results and contributed to from the start to final manuscript.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

REFERENCES

Abdussakir & Rosmanindar. (2017). Model Integrasi Matematika dan Al-Quran serta Praktik Pembelajarannya. Makalah dipresentasikan pada Seminar Nasional Integrasi Matematika di Dalam Al-Quran, Jurusan Pendidikan Matematika, IAIN Bukittinggi.

Aji, R. H. S. (2023). Khazanah Sains dan Matematika dalam Islam. Salam:Jurnal Filsafat dan Budaya Hukum, 1(1), 166 – 167.

Anggreni, F. (2019). Relevansi Pembelajaran Matematika dengan Nilai-Nilai Al-Qur'an dalam Membentuk Karakter Siswa pada Materi Pecahan. Jurnal Ilmiah Pendidikan Matematika Al Qalasadi, 3(1), 10–18.

Dazrullisa. (2018). Pengaruh Pembelajaran Matematika Berbasis Kearifan Lokal terhadap Minat Belajar Siswa. Jurnal Genta Mulia, 9(2), 141–149.

Fathani, A. H. (2019). Pembelajaran Matematika Bagi Santri Pondok Pesantren Berbasis Kecerdasan Majemuk. Anargya: Jurnal Ilmiah Pendidikan, 2(1), 49-52.

Huntley, M. A. (1998). Design and Implementation of a Framework for Defining Integrated Mathematics and Sciences Education. Journal School Science and Mathematic, 98(6), 320-327.

Kamarullah. (2017). Pendidikan Matematika di Sekolah Kita. Al Khawarizmi: Jurnal Pendidikan dan Pembelajaran Matematika, 1(1), 21-32.

Kurniati, A. (2016). Pengembangan Modul Matematika Berbasis Kontekstual Terintegrasi Ilmu Keislaman. Al-Khwarizmi: Jurnal Pendidikan Matematika dan Ilmu Pengetahuan ALam, 4(1), 43-58.

Lase, D. (2019). Pendidikan di Era Revolusi Industri 4.0. Jurnal Sunderman, 1(1), 29-45. Maarif, S. (2015). Integrasi Matematika dan Islam dalam Pembelajaran Matematika.

Infinity Jurnal Ilmiah, 4(2), 223-236.

Mansur, M., Helsa, Y., & Kenedi, A. K. (2018). Al-Quran Based Learning Strategy in Teaching Mathematics at Primary Education. Proceedings of the International Conference of Early Childhood Education (ICECE), 304-306.

Mendova, R. N., Izwita D., Elmanani, S. (2024). Philosophy-Infused Culture-Based Learning Models In Mathematics Education. Mathline Journal, 9(1), 47-62.

Mutijah. (2018). Model Integrasi Matematika Dengan Nilai-Nilai Islam dan Kearifan Lokal Budaya dalam Pembelajaran Matematika. Jurnal Pendidikan Matematika, 1(2), 64-92.

Nasaruddin. (2014). Pembelajaran Matematika Berbasis Islam. Jurnal Al-Khawarizmi II, 2(2), 59–68

Novitasari, D. (2016). Pengaruh Penggunaan Multimedia Interaktif Terhadap Kemampuan Pemahaman Matematis Siswa. Jurnal Pendidikan Matematika & Matematika, 1(1), 8-18.

Rahmah, N. (2013). Hakikat Pendidikan Matematika. Jurnal Al-Khawarizmi II: Jurnal Pendidikan Matematika dan Ilmu Pengetahuan Alam, 1(2), 2-10.

Ramdhani, S., Suryadi, D., & Prabawanto, S. (2021). Hambatan Belajar Matematika di Pondok Pesantren. Jurnal Analisa, 7(1), 46-55.

Rukmi, D. A., & Wibawa, S. (2023). Pengembangan Flipbook Berbasis Project Based Learning Berbantu Canva Pada Mata Pelajaran Pendidikan Pancasila SD. Pendas : Jurnal Ilmiah Pendidikan Dasar, 8(3), 5557-5570.

Saksono, D. Y. (2015). Pengembangan Pembelajaran Matematika Berbasis Al-Qur'an di Sekolah Menengah Pertama Muhammadiyah 9 Gemuh Pondok Pesantren Darul Arqam 4 Kendal. Publish Disertation. Surakarta: Universitas Muhammadiyah Surakarta.

Satchwell, R. E., & Loepp, F. L. (2002). Designing and Implementing an Integrated Mathematics, Science, and Technology Curriculum for the Middle School. Journal of Industrial Teacher Education, 39(3), 41–66.

Handayani, S., Sri U. M. W & Rizza M., (2020). Buku Ajar Strategi Pembelajaran Ekonomi "Model-Model Pembelajaran Inovatif di Era Revolusi Industri 4.0". Malang: Edulitera Malang.

Hallaq, W. B. (1985). The Logic of Legal Reasoning in Religious and Non-Religious Cultures: The Case of Islamic Law and the Common Law. Cleveland State Law Review, 34(9), 79-95.

Hasanah, U. R., Murni, A., & Yuanita, P. (2014). Upaya Meningkatkan Motivasi Belajar Matematika Siswa Kelas X IIS 1 SMAN 10 Pekanbaru Dengan Menerapkan Pembelajaran Kooperatif Pendekatan Struktural Think Pair Square. Jurnal Media Neliti, 2(1), 1-13.

Hiebert, J. (1997). Making Sense: Teaching and Learning Mathematics with Understanding. Canada: Pearson Education Publisher.

Zahroh, F., & Faridah, S. (2019). Pengaruh Model Integrasi Matematika dan al Quran terhadap Hasil dan. Proceeding of International Conference on Islamic Education: Challenges in Technology and Literacy Faculty, 4(1), 27–31.