Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika
Volume 6, Issue 1, 14-23, June 2024
e-ISSN: 2715-6109 | p-ISSN: 2715-6095
https://journal.ibrahimy.ac.id/index.php/Alifmatika

Virtual learning experimentation with student facilitator and explaining (SFAE) on mathematical representation abilities and understanding mathematics concepts

Indah Resti Ayuni Suri[1*], Netriwati Netriwati[2], Fanny Kusumaningtyas[3], Suherman Suherman[4]
[1,2,3]Mathematics Education, Universitas Islam Negeri (UIN) Raden Intan Lampung, Lampung, 35131 Indonesia
[4]Mathematics Education, University of Szeged, Dugonics tér 6720, Hungary
[1*]indahrestiayunisuri@gmail.com, [2]netriwati@radenintan.ac.id, [3]fannykusumaningtyas08@gmail.com, [4]suherman@edu.u-szeged.hu

Received: December 5, 2023 | Revised: April 25, 2024 | Accepted: May 25, 2024 | Published: June 15, 2024
*Corresponding author

Abstract **:**
In the rapidly evolving world of education, particularly within STEM disciplines, innovation in teaching methods is crucial. This study explores the potential of a new learning approach designed to address the deficiencies of traditional methods, with a focus on mathematics at the secondary school level. The researchers aimed to test the effectiveness of a Virtual Learning model using the Student Facilitator and Explaining (SFAE) approach in enhancing mathematical representational skills and conceptual understanding among high school students. A total of 120 students participated in the study, divided into two groups: 60 students in the experimental group received SFAE-based learning, and 60 students in the control group were taught using standard expository methods. Utilizing a control group design and post-test, the research revealed significant improvements in the experimental group's mathematical representation abilities and conceptual understanding compared to the control group. These findings demonstrate that integrating the SFAE approach within virtual learning environments not only broadens the scope but also enhances the quality of mathematical understanding. This study underscores the substantial potential of innovative learning approaches in the digital era, providing effective solutions to challenges in mathematics education.

Keywords: Learning model; Mathematical representation abilities; SFAE; Understanding mathematics concepts; Virtual learning

How to Cite : Suri, I. R. A., Netriwati, N., Kusumaningtyas, F., & Suherman, S. (2024). Virtual learning experimentation with student facilitator and explaining (SFAE) on mathematical representation abilities and understanding of mathematical concepts. *Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika*, 6(1), 14-23. https://doi.org/10.35316/ lifmatika.2024.v6i1.14-23

Introduction

Virtual learning refers to the educational process that occurs in a virtual classroom setting within the digital realm via the Internet (Chan, 2022; Graeske & Sjöberg, 2021). The implementation of virtual learning can enhance both the quality and effectiveness of educational experiences (Dörnyei & Muir, 2019; Jiang, 2021; Mat & Mustakim, 2021). All necessary materials can be provided online and accessed at any time. Virtual learning utilizes existing networks to accommodate a community of learners and promotes the formation, interaction, and electronic dialogue among them (Caprara & Caprara, 2022; Hollister et al., 2022; Thornhill-Miller et al., 2023). Participants can leverage advances in technology and communication to conduct learning activities not only formally or through direct face-to-face interactions with instructors but also via the Internet (Sarker et al., 2019; Zamiri & Esmaeili, 2024). In the era of development, systems can now be conducted online and in digital formats. However, those who are reluctant to embrace technology must also adapt to this new system (Allioui & Mourdi, 2023; Saarikko et al., 2020). This shift underscores the importance of such transformations. The SFAE approach is a training and learning method where participants educate each other by sharing opinions and ideas. According to Wiwy T Pulukadang, this approach also encourages participants to express their opinions in front of the class (Haris et al., 2021).

However, there exists a significant research gap that prior studies have not addressed. Previous studies have tended to focus on the effectiveness of virtual learning in terms of affordability and ease of access while often neglecting the quality aspects of mathematics learning through abilities in representation and conceptual understanding. Therefore, this research aims to fill that gap by implementing the SFAE model in virtual mathematics education to enhance mathematical representation skills and conceptual understanding at SMA Negeri 1 Penawartama. This approach can motivate and enhance the learning activities of participants, as well as give them a sense of responsibility to comprehend the main reviews (Alfiani & Firmansyah, 2022).

As a crucial component of the learning process, educators must enhance the quality of classroom instruction (Metekohy et al., 2022; Susanti et al., 2022; Ulva & Suri, 2019). The challenge of improving skills in mathematical representation and understanding mathematical concepts is an issue that needs to be addressed in mathematics education. Previous research, such as that conducted by Sonia Andam Sari, has shown that students have difficulties in representing mathematical symbols and objects, which leads to poor learning outcomes (Sari et al., 2020). Students will be more interested in the material presented, increasing enthusiasm during the learning process, enhancing collaboration among students through the learning process, actively engaging students during the learning process, and can improve student learning outcomes (Aldig & Arseven, 2017; Suherman & Vidákovich, 2022). Preliminary research results indicate that students at SMA Negeri 1 Penawartama possess relatively low mathematical representation skills and conceptual understanding, with an average score of only 6. According to Mrs. Nur Layli, a mathematics teacher at SMA Negeri 1 Penawartama, the teaching methods used are still conventional, primarily through lectures.

The importance of representation abilities and conceptual understanding in mathematics education extends beyond mastering content; they are also foundational for developing critical thinking and problem-solving skills among students. By strengthening these aspects, students can more easily comprehend and apply mathematical concepts in various situations, both academically and in daily life (Sanjaya et al., 2018). Modern mathematics education curriculums emphasize the importance of these abilities as a primary goal of mathematics learning, in line with established learning theories and various studies that have proven their effectiveness. This study aims to enhance the mathematical representation abilities and conceptual understanding of students at SMA Negeri 1 Penawartama through the implementation of a virtual learning model with the SFAE approach, which is expected to improve the learning process and student outcomes in accordance with the school's KKM standards.

Research Methods

This study employed a quasi-experimental design, incorporating a true experimental setup with a control group in a posttest-only configuration. Two classes were involved: an experimental class (CE) and a control class (CK), where the experimental class received a specific treatment (Xe) and the control class received no treatment (Xk). The effectiveness of the treatment was measured through tests administered post-treatment, denoted as O_1 for the experimental class and O_2 for the control class.

Table 1. Research Design

Class	Treatment	Post-test
CE	Xe	O_1
CK	Xk	O_2

CE: Class Eksperiment
CK: Class Control
Xe: Treatment in the Experimental group
Xk: Control class without treatment
O_1: Measurement of the dependent variable in the experimental group (post-test)
O_2: Measurement of the dependent variable in the control group (post-test)

The research was conducted at SMAN 1 Penawartama, involving all students from the 11th grade MIA during the 2021/2022 academic year. The total sample size was 30 students, all enrolled in the specified class at the school. Data were collected using two primary instruments: interviews and academic tests. Interviews were utilized to gather qualitative data regarding students' perceptions and responses to the treatment, while academic tests assessed the treatment's effectiveness on students' cognitive aspects. Data were analyzed using the Multivariate Analysis of Variance (MANOVA), which allows for the assessment of independent variables' impacts on multiple dependent variables simultaneously. The test statistics used in this MANOVA included Pillai's Trace, Wilk's Lambda, and Hotelling's Trace, which aided in determining the statistical significance of the treatment effects on student learning outcomes.

The performance indicators applied in this study included: (1) Mastery level of mathematical concepts, measured by scores from standard mathematical tests; (2) Students' perceptions of the teaching methods applied, measured through a Likert scale during interviews; and (3) Student interactions during the learning process, observed directly throughout the teaching sessions. The evaluation of the proposed hypothesis was based on data analysis using MANOVA. The compatibility of the obtained data with the proposed hypothesis was assessed to determine whether the treatment significantly affected the students' learning outcomes.

Results and Discussions

The data analysis of representation ability and understanding of mathematical concepts from the post-test results tested in one experimental class and one control class. Data analysis can be seen in the following Table 2.

Table 2. Data description of students' mathematical representation and understanding of mathematical concepts

Mark	x_{max}	x_{min}	Mathematical Representation			x_{max}	x_{min}	Understanding Mathematical Concepts		
			$\bar{x}$	Std. Dev	N			$\bar{x}$	Std. Dev	N
Experimental Class										
Post-Test	92	50	77.80	12,519	30	87.5	56	74.87	9,375	30
Control Class										
Post-Test	83	50	68.03	10,254	30	81	37	64.30	14,054	30

The table above compares the post-test evaluation results between two classes, namely the Experimental Class and the Control Class, each consisting of two data sets that include the maximum value (x_{max}), minimum value (x_{min}), mean value ($\bar{x}$), standard deviation (SD), and number of samples (N). This evaluation covers two domains: Mathematics and Understanding Mathematical Concepts. In the Mathematics domain, the Experimental Class showed a maximum score of 92, a minimum score of 50, with a mean value of 77.80 and a standard deviation of 12.519 from a total of 30 samples. For the Understanding Mathematical Concepts domain, the results were slightly lower with a maximum score of 87.5, a minimum score of 56, a mean of 74.87, and a standard deviation of 9.375, also from 30 samples. These results demonstrate a level of consistency and effectiveness of the teaching methods used, with maintained variability in concept understanding.

Conversely, the Control Class in the Mathematics domain had a maximum score of 83, a minimum score of 50, a mean of 68.03, and a standard deviation of 10.254, obtained from the same 30 samples. In the Understanding Mathematical Concepts domain, this class recorded a maximum score of 81, a minimum score of 37, a mean of 64.30, and a standard deviation of 14.054. This data indicates higher variability compared to the Experimental Class, which could reflect inconsistencies in teaching methods or a lack of curriculum adaptation to student needs. The comparison between the classes shows that the Experimental Class, with higher mean scores and lower standard deviations, is more effective in teaching Mathematics and related concepts compared to the Control Class. This effectiveness is influenced by potentially more innovative teaching methods or better alignment with student capabilities. These results strengthen the argument that educational interventions designed considering student characteristics and the learning context can improve learning outcomes.

Further research is needed to explore the specific components of the teaching methods in the Experimental Class that contribute to this superior performance. Additionally, an in-depth analysis of student interactions and their responses to various teaching strategies could provide deeper insights into effective practices in Mathematics education.

Table 3. Manova Data Test Results

Multivariate Tests [a]							
Effect		**Value**	**F**	**Hypothesis df**	**df error**	**Sig.**	**Partial Eta Squared**
Intercept	Pillai's Trace	0,977	1197.382 [b]	2,000	57,000	0,000	0,977
	Wilks' Lambda	0.023	1197.382 [b]	2,000	57,000	0,000	0,977
	Hotelling's Trace	42,013	1197.382 [b]	2,000	57,000	0,000	0,977
	Roy's Largest Root	42,013	1197.382 [b]	2,000	57,000	0,000	0,977
Learning model	Pillai's Trace	0,170	5,819 [b]	2,000	57,000	0,005	0,170
	Wilks' Lambda	0,830	5,819 [b]	2,000	57,000	0,005	0,170
	Hotelling's Trace	0,204	5,819 [b]	2,000	57,000	0,005	0,170
	Roy's Largest Root	0,204	5,819 [b]	2,000	57,000	0,005	0,170

a. Design: Intercept + Learning_Model

b. Exact statistics

The Table 3 above presents results from a MANOVA (Multivariate Analysis of Variance) test, used to evaluate the impact of a learning model on dependent variables simultaneously. Two main factors were examined: "Intercept," which represents the baseline or constant of the model, and "Learning model," which is the independent variable. For "Intercept," results indicate very high statistical values across all tests: Pillai's Trace (0.977), Wilks' Lambda (0.023), Hotelling's Trace (42.013), and Roy's Largest Root (42.013), all with the same F value (1197.382) and extreme significance ($p < 0.000$), demonstrating a very significant and substantial effect of the baseline model on the dependent variables.

On the other hand, for "Learning model," the effects were moderate with Pillai's Trace at 0.170, Wilks' Lambda at 0.830, Hotelling's Trace at 0.204, and Roy's Largest Root at 0.204. The F value for this effect is 5.819 with a significance level of 0.005, indicating that the learning model significantly influences the tested variables, although not as strongly as the Intercept. These tests (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) measure the proportion of variability explained by the related model compared to the total variability, and it was found that the intercept contributes much more to the variability than the learning model itself. In conclusion, the Intercept has a dominant influence in this model, while the learning model also shows significant influence, albeit smaller. This analysis indicates the importance of both components in the study, albeit with differing weights of influence.

Next, to find out the 2nd and 3rd hypotheses, a test of the influence between variables was carried out. Test of between-subjects with the help of SPSS. The results of the test can be seen in the following table:

Table 4. Test of Between-Subjects Effects

Test of Between-Subjects Effects							
Source	**Dependent Variable**	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	Mathematical_ Representation	1430.817 [a]	1	1430.817	10,928	0,002	0,159
	Concept_Under standing	1653,750 [b]	1	1653,750	11,588	0,001	0,167
Intercept	Mathematical_ Representation	319010.417	1	319010.417	2436.552	0,000	0,977
	Concept_Under standing	290232.150	1	290232.150	2033,739	0,000	0,972
model	Mathematical_ Representation	1430.817	1	1430.817	10,928	0,002	0,159
	Concept_Under standing	1653,750	1	1653,750	11,588	0,001	0,167
Error	Mathematical_ Representation	7593.767	58	130,927			
	Concept_Under standing	8277.100	58	142,709			
Total	Mathematical_ Representation	328035,000	60				
	Concept_Under standing	300163,000	60				
Corrected Total	Mathematical_ Representation	9024.583	59				
	Concept_Under standing	9930.850	59				

a. R Squared = .120 (Adjusted R Squared = .105)
b. R Squared = .084 (Adjusted R Squared = .068)

The results of the MANOVA test in the table, conclusions can be drawn, namely:
H_0: $\mu_{11} = \mu_{21}$ is rejected , there is an influence of virtual learning with a student facilitator and explaining approach on students' mathematical representation abilities.
H_0: $\mu_{12} = \mu_{22}$ is rejected then there is an influence of virtual learning with student facilitator and explaining approach to ability understanding draft mathematical participant educate .

The table presented above outlines the results of an ANOVA analysis that examines the between-subjects effects on two dependent variables: "Mathematical_Representation" and "Concept_Understanding." This analysis aims to evaluate the impact of a corrected model on these variables. Firstly, the "Corrected Model" section demonstrates the effect of the model on the variables by presenting the Type III Sum of Squares, degrees of freedom (df), Mean Square, F statistic, significance level (Sig.), and partial eta squared. For "Mathematical_Representation," the model shows an F statistic of 10,928 with a significance level (p-value) of 0.002 and a partial eta squared of 0.159, indicating a significant effect. Meanwhile, for "Concept_Understanding," the F statistic is 11,588 with a p-value of 0.001 and a partial eta squared of 0.167, also suggesting a substantial and significant influence.

The "Intercept" part includes the model's constant, which does not depend on predictor variables, showing a very high level of significance ($p < 0.001$) with partial eta squared values exceeding 0.97 for both variables. This implies that a major portion of the variability in the data can be explained by this model. The "Error" component reflects the variability not explained by the model, with a total of 58 degrees of freedom. The "Total" and "Corrected Total" sections provide information about the overall variability observed in the data. Furthermore, the table provides the R Squared and Adjusted R Squared values. For "Mathematical_Representation," R Squared is 0.120, adjusted to 0.105, and for "Concept_Understanding," these values are 0.084 and 0.068, respectively, indicating that the model has moderate accuracy in explaining the variations in the related data. In conclusion, the corrected model exerts a significant and substantial impact on mathematical representation ability and conceptual understanding, although there is still variability unexplained by this model. This suggests that while the model is effective, other factors might also play a role in the observed variability of the two dependent variables.

Virtual learning, as defined by Uwes Anis Chaeruman, occurs in real-time but from different locations, leveraging technology to bridge geographical and temporal barriers (Chaeruman, 2019). This method, combined with the Student Facilitator and Explaining (SFAE), requires students to interact not only as receivers of information but also as initiators and presenters of ideas, allowing them to visualize and discuss the learning material collaboratively and interactively (Coman et al., 2020). Virtual learning supports the use of graphs, symbols, and other visual media that enhance students' representational abilities, while real-time interactions facilitate immediate feedback and clarification of concepts, deepening their understanding. Furthermore, group work within a virtual setting encourages active discussion, helping students not only to comprehend the taught concepts but also to apply and re-express this understanding in different forms.

Results from the MANOVA test indicate a significant influence of the virtual learning model and the SFAE approach on improving students' abilities in concept representation and understanding. With increased engagement in the learning process, students show heightened enthusiasm and capability in discussing and solving problems in groups, which further broadens their understanding of the material. The advantages of this method include enhanced interaction and collaboration among students and the flexibility to access learning from various locations. Additionally, the use of diverse tools and learning media enriches the learning process and accommodates different learning styles. However, its disadvantages include reliance on stable internet connections and supportive technology, as well as the potential reduction of physical interactions, which are also important for students' social and emotional development.

This study supports the findings of Yusuf Hussein, which emphasize the importance of conceptual understanding as a key outcome of mathematical education (Hussein, 2022). Compared to studies using conventional methods, virtual learning especially with the SFAE approach offers higher effectiveness in developing representational skills and conceptual understanding. The results contribute to the educational literature by demonstrating the effectiveness of integrating technology in mathematics education, which not only expands the scope of learning but also facilitates adaptive and responsive teaching to meet students' needs. Thus, this approach provides a potential solution to some of the current challenges in mathematical education, delivering significant impacts on teaching and learning in the digital era.

Conclusions and Recommendations

The results of data analysis in hypothesis testing that has been carried out, the results show that: There is an influence of the virtual learning model with a student facilitator and explaining approach on mathematical representation abilities and concept understanding. Students who received a virtual learning model using a student facilitator and explaining approach got better results than students who were given expository model learning treatment. There is an influence of the virtual learning model with a student facilitator and explaining approach to mathematical representation. Students who received a virtual learning model using a student facilitator and explaining approach got better results than students who were given expository model learning treatment. There is an influence of the virtual learning model with a student facilitator and explaining approach on understanding concepts. Students who received a virtual learning model using a student facilitator and explaining approach got better results than students who were given expository model learning treatment.

Acknowledgments

We thank Raden Intan Lampung State Islamic University Raden Intan Lampung for supporting this research to be carried out. Then, University of Szeged, Hungary, for support an idea.

References

Aldig, E., & Arseven, A. (2017). The contribution of learning outcomes for listening to creative thinking skills. *Journal of Education and Learning*, *6*(3), 41-53. https://doi.org/10.5539/jel.v6n3p41

Alfiani, H., & Firmansyah, D. (2022). Analisis kemampuan pemahaman matematis siswa ditinjau dari soal TIMSS [Analysis of students' mathematical understanding abilities reviewed from TIMSS questions]. *Jurnal Ilmiah Dikdaya*, *12*(1), 55–60. http://doi.org/10.33087/dikdaya.v12i1.274

Allioui, H., & Mourdi, Y. (2023). Exploring the full potentials of iot for better financial growth and stability: A comprehensive survey. *Sensors*, *23*(19), 1-68. https://doi.org/10.3390/s23198015

Caprara, L., & Caprara, C. (2022). Effects of virtual learning environments: A scoping review of literature. *Education and Information Technologies*, *27*(3), 3683–3722. https://doi.org/10.1007/s10639-021-10768-w

Chaeruman, U. A. (2019). Merancang model blended learning designing blended learning model [Designing a blended learning model designing a blended learning model]. *Jurnal Teknodik*, *17*(4), 053–063. https://doi.org/10.32550/teknodik.v17i4.577

Chan, V. (2022). Using a virtual reality mobile application for interpreting learning: listening to the students' voice. *Interactive Learning Environments*, *39*(4), 1–14. https://doi.org/10.1080/10494820.2022.2147958

Coman, C., Țîru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: students' perspective. *Sustainability*, *12*(24), 1-24. https://doi.org/10.3390/su122410367

Dörnyei, Z., & Muir, C. (2019). Creating a motivating classroom environment. *Second handbook of English language teaching, 2019*(10), 719-736. https://doi.org/10.1007/978-3-030-02899-2_36

Graeske, C., & Sjöberg, S. A. (2021). VR-Technology in teaching: Opportunities and challenges. *International Education Studies*, *14*(8), 76. https://doi.org/10.5539/ies.v14n8p76

Haris, I., Pulukadang, W. T., Husain, R., Ilham, A., & Abdullah, G. (2021). Improving the quality of competency-based assessment through a classroom training activity. *MEXTESOL Journal*, *45*(2), 1-9. https://mextesol.net/journal/index.php?page=journal&id_article=23565

Hollister, B., Nair, P., Hill-Lindsay, S., & Chukoskie, L. (2022). Engagement in online learning: student attitudes and behavior during COVID-19. *Frontiers in Education*, *7*(5), 1-16. https://doi.org/10.3389/feduc.2022.851019

Hussein, Y. F. (2022). Conceptual knowledge and its importance in teaching mathematics. *Middle Eastern Journal of Research in Education and Social Sciences*, *3*(1), 50–65. https://doi.org/10.47631/mejress.v3i1.445

Jiang, L. (2021). Virtual reality action interactive teaching artificial intelligence education system. *Complexity*, *2021*, 1–11. https://doi.org/10.1155/2021/5553211

Mat, H., & Mustakim, S. S. (2021). The effectiveness of virtual learning to enhance higher order thinking skills in year 5 students. *International Journal of Academic Research in Progressive Education and Development*, *10*(2), 577-584. https://doi.org/10.6007/ijarped/v10-i2/10140

Metekohy, L. M., Daliman, M., Metekohy, B., & Ming, D. (2022). The impact of teaching and learning quality process to school and university education for sustainable future. *JPPI (Jurnal Penelitian Pendidikan Indonesia)*, *8*(1), 143-151. https://doi.org/10.29210/020221203

Saarikko, T., Westergren, U. H., & Blomquist, T. (2020). Digital transformation: Five recommendations for the digitally conscious firm. *Business Horizons*, *63*(6), 825–839. https://doi.org/10.1016/j.bushor.2020.07.005

Sanjaya, I. I., Maharani, H. R., & Basir, M. A. (2018). Kemampuan representasi matematis siswa pada materi lingkaran berdasar gaya belajar honey mumfrod [Students' mathematical representation ability on circle material based on Honey Mumford's learning style]. *Kontinu: Jurnal Penelitian Didaktik Matematika*, *2*(1), 72-87.

https://doi.org/10.30659/kontinu.2.1.72-87

Sari, S. A., Nasution, E. Y. P., & Laswadi, L. (2020). Penerapan model student facilitator and explaining (SFE) dengan media poster untuk meningkatkan kemampuan representasi matematis siswa [Application of the student facilitator and explaining (SFE) model with poster media to improve students' mathematical representation skills]. *Logaritma : Jurnal Ilmu-Ilmu Pendidikan Dan Sains*, *8*(01), 105–118. https://doi.org/10.24952/logaritma.v8i01.2380

Sarker, M. N. I., Wu, M., Cao, Q., Alam, G. M., & Li, D. (2019). Leveraging digital technology for better learning and education: a systematic literature review. *International Journal of Information and Education Technology*, *9*(7), 453–461. https://doi.org/10.18178/ijiet.2019.9.7.1246

Suherman, & Vidákovich, T. (2022). Tapis patterns in the context of ethnomathematics to assess students' creative thinking in mathematics: A rasch measurement. *Mathematics Teaching Research Journal Fall*, *14*(4), 56-79. http://publicatio.bibl.u-szeged.hu/id/eprint/26083

Susanti, S., Harapan, E., & Kesumawati, N. (2022). The teaching quality of teachers in a learning process. *Journal of Social Work and Science Education*, *3*(1), 18–21. https://doi.org/10.52690/jswse.v3i1.266

Thornhill-Miller, B., Camarda, A., Mercier, M., Burkhardt, J.-M., Morisseau, T., Bourgeois-Bougrine, S., Vinchon, F., El Hayek, S., Augereau-Landais, M., Mourey, F., Feybesse, C., Sundquist, D., & Lubart, T. (2023). Creativity, critical thinking, communication, and collaboration: assessment, certification, and promotion of 21st century skills for the future of work and education. *Journal of Intelligence*, *11*(3), 54. https://doi.org/10.3390/jintelligence11030054

Ulva, M., & Suri, I. R. A. (2019). Pengaruh model pembelajaran auditory intellectualy repetition (AIR) terhadap kemampuan komunikasi matematis peserta didik [The influence of the auditory intellectual repetition (AIR) learning model on students' mathematical communication skills]. *Union: Jurnal Ilmiah Pendidikan Matematika*, *7*(1), 15–22. https://doi.org/10.30738/union.v6i3.3080

Zamiri, M., & Esmaeili, A. (2024). Methods and technologies for supporting knowledge sharing within learning communities: A systematic literature review. *Administrative Sciences*, *14*(1), 1-34. https://doi.org/10.3390/admsci14010017