

THE DEVELOPMENT OF GENIALLY AND KAHOOT-ASSISTED CONTEXTUAL TEACHING AND LEARNING APPROACH TO IMPROVE STUDENTS' MATHEMATICAL REASONING ABILITY AND HABITS OF MIND ON JUNIOR HIGH SCHOOL

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ABSTRACT

Mathematics is a subject that requires not only computational skills but also strong reasoning abilities. However, many junior high school students struggle to develop mathematical reasoning due to conventional teaching methods that often lack context and interactivity. This study aims to examine the effectiveness of a Contextual Teaching and Learning (CTL) model integrated with Genially and Kahoot in improving students' mathematical reasoning ability. A quasi-experimental design with a pretest-posttest control group was employed. The participants were eighth-grade students divided into an experimental class, which received CTL-based learning supported by Genially and Kahoot, and a control class, which received conventional instruction. Data were collected using a validated and reliable mathematical reasoning test administered before and after the intervention. Descriptive statistics were used to summarize the data, while inferential analysis, including the Mann-Whitney test and effect size calculation, was conducted to determine the significance and magnitude of the intervention's effect. The results indicate that students in the experimental class achieved significantly higher posttest scores compared to the control class. The effect size analysis revealed a large effect, demonstrating that the CTL model assisted by Genially and Kahoot had a strong impact on enhancing students' mathematical reasoning ability. These findings suggest that integrating contextual learning with interactive digital media can effectively support students' understanding and reasoning in mathematics. Therefore, the CTL model combined with Genially and Kahoot can be considered a practical and innovative alternative for mathematics instruction at the junior secondary level.

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INTRODUCTION

In the contemporary era of education, mathematics is no longer viewed solely as a set of rules and procedures to be memorized. Instead, it is recognized as a discipline that develops reasoning, analytical thinking, and problem-solving dispositions essential for success in complex real-world contexts. Mathematical reasoning ability (MRA) enables learners to construct logical arguments, interpret relationships among variables, derive conclusions from evidence, and justify solutions with clarity (based on findings of Smith & Lin, 2021). Meanwhile, Habits of Mind (HOM)—such as persistence, flexible thinking, metacognitive awareness, and reflective reasoning—represent cognitive and affective tendencies that support sustained engagement, deep understanding, and strategic problem solving (according to Costa & Kallick, 2020; Lee, 2022). From this perspective, MRA and HOM serve as interrelated foundations for meaningful mathematics learning and for preparing students to navigate complex global challenges.

Despite the acknowledged importance of MRA and HOM, numerous studies in recent years have documented persistent difficulties among students in developing these competencies. Based on research in Indonesia, junior high school students often demonstrate limited reasoning skills and weak problem-solving dispositions, especially when confronted with non-routine or contextual mathematical problems (Suwarni & Aisyah, 2020; Rahmawati & Putra, 2022). These learners tend to rely on memorized procedures rather than constructing logical connections or evaluating alternative solution strategies, which suggests inadequate development of both reasoning and HOM components such as persistence and flexible thinking (Nugroho et al., 2023). Similar patterns have been observed internationally; previous studies indicate that low reasoning performance often coincides with underdeveloped metacognitive awareness and reflective thinking, significantly hindering students' capacity to generalize mathematical ideas beyond routine tasks (Smith & Jones, 2021; Lee, 2022). Furthermore, empirical evidence suggests that weak mathematical reasoning and limited HOM not only affect academic performance but also reduce learners' confidence and motivation in mathematics (Hardiansyah & Lestari, 2022).

The persistence of these challenges can be partly attributed to instructional practices in many mathematics classrooms. Traditional teaching approaches that prioritize procedural completion and formula memorization provide limited opportunities for students to engage in reasoning, reflection, or self-directed inquiry. Based on the findings of Prasetyo et al. (2021) and Oktaviani et al. (2023), such learning environments restrict students' ability to justify their thinking, construct arguments, or apply mathematics to real-life problems—skills that are vital for meaningful understanding. This instructional gap underscores the need for pedagogical strategies that promote deeper cognitive engagement and support students' development of both MRA and HOM.

One promising approach that has gained attention in recent research is Contextual Teaching and Learning (CTL). CTL is designed to connect academic content with authentic contexts, encouraging students to relate mathematical ideas to their daily lives and real-world situations. Based on studies by Nababan et al. (2023) and Wibowo & Setiawan (2021), CTL fosters active learning through exploration, collaboration, discussion, and reflection—components that are conducive to strengthening reasoning processes. In particular, research indicates that CTL can support students in constructing logical arguments, analyzing problem structures, and reflecting on solution strategies, thus contributing to enhanced mathematical reasoning (Ejournal Unma, 2022). Moreover, CTL's emphasis on meaningful tasks is aligned with the dispositional traits of HOM, allowing students to practice persistence, flexible thinking, and metacognitive monitoring as they navigate complex and contextual problem scenarios.

Another dimension of contemporary mathematics instruction is the integration of digital technology, which has become increasingly important in enhancing student engagement and interactivity. Based on recent studies in educational technology, interactive digital tools have the potential to make abstract concepts more accessible and to provide immediate feedback that supports reflective learning (Arifin et al., 2022; Sari & Putri, 2023). Among various digital applications, Genially and Kahoot have emerged as widely used tools in mathematics classrooms. Genially enables educators to develop multimedia-rich, interactive learning materials that facilitate dynamic representations of complex mathematical relationships, thus supporting students' conceptual exploration and visualization (based on Sari & Putri, 2023). Meanwhile, Kahoot offers a game-based learning platform characterized by real-time quizzes and competitive elements that enhance students' motivation, prompt immediate feedback, and encourage reflective thinking (Putra & Wati, 2021; Damanik et al., 2024). Previous research indicates that the use of Kahoot in mathematics learning increases student participation and supports formative assessment practices (based on Arifin et al., 2022; Putra & Wati, 2021).

Although the educational benefits of Genially and Kahoot have been documented, much of the literature has examined these tools as standalone instructional aids or supplementary media rather than as integral components of a cohesive pedagogical model. Based on the work of Damanik et al. (2024) and Arifin et al. (2022), the positive effects of these tools on engagement and motivation are evident, yet few studies have explored how they may interact with pedagogical frameworks like CTL to support cognitive and dispositional learning outcomes simultaneously. This gap highlights the need for an instructional approach that systematically integrates digital interactivity with pedagogical principles to foster deeper reasoning and stronger HOM.

In addition, much of the existing research in mathematics education has focused primarily on cognitive outcomes such as achievement test scores or procedural mastery, with relatively limited attention to dispositional outcomes like persistence, flexible thinking, and reflective reasoning. Based on the state of the art in recent studies, research that systematically investigates both mathematical reasoning ability and Habits of Mind within a unified instructional model remains scarce (Hardiansyah & Lestari, 2022; Nugroho et al., 2023). Furthermore, specific mathematical content areas that inherently require higher-order reasoning—such as Systems of Linear Equations in Two Variables (SPLDV)—have received limited attention in studies that incorporate technology-enhanced instructional design. SPLDV is a topic well-suited to CTL approaches because it can be contextualized in real-world problem situations, requires learners to interpret relationships among variables, and demands the application of multiple solution strategies, thereby providing rich opportunities for the development of MRA and HOM.

Given these gaps in the literature, there is a clear need for research that examines how a contextualized, technology-supported instructional model can influence both students' cognitive and dispositional outcomes in mathematics learning. This study responds to this need by proposing a Contextual Teaching and Learning model integrated with Genially and Kahoot, designed specifically for junior high school mathematics instruction on Systems of Linear Equations in Two Variables. The study aims to provide empirical evidence of how this integrated approach affects students' mathematical reasoning ability and Habits of Mind, offering insights into the design of instructional strategies that holistically address the demands of 21st-century mathematics education.

METHOD

This study employed a Research and Development (R&D) approach combined with a quasi-experimental method to develop and examine the effectiveness of a Contextual Teaching and

Learning (CTL) model integrated with Genially and Kahoot. The R&D process followed the ADDIE instructional design framework, consisting of analysis, design, development, implementation, and evaluation stages, which has been widely applied in educational product development research. Only procedures and adaptations relevant to the present study are described, while established methods are referenced without repetition.

The research was conducted at State Junior High School 1 Pante Bidari, East Aceh Regency, Indonesia, during a five-month period from July to November. The population comprised all eighth-grade students enrolled in the school during the academic year, totaling 197 students. Two classes were selected as research samples using purposive sampling based on similarity in academic ability, learning characteristics, and classroom conditions. Class VIII-2, consisting of 29 students, was assigned as the experimental group, while Class VIII-3, consisting of 27 students, served as the control group.

To evaluate the effectiveness of the developed learning model, a pretest–posttest control group design was applied. Both groups were administered a pretest to measure students' initial mathematical reasoning ability and Habits of Mind. The experimental group then received instruction using the CTL-based learning model integrated with Genially for interactive visual content and Kahoot for formative assessment, while the control group was taught using conventional instructional methods. The learning intervention was implemented over six meetings, followed by the administration of a posttest to both groups to measure learning outcomes after the instructional treatment.

The development of the learning model began with a needs analysis conducted through classroom observations, teacher interviews, and curriculum review to identify students' learning difficulties and instructional gaps, particularly in the topic of systems of linear equations in two variables. Based on the analysis results, learning materials, lesson plans, student worksheets, and digital media were designed in accordance with CTL principles. The materials were then developed and validated by experts in mathematics education, instructional design, and educational media to ensure content accuracy, clarity, and appropriateness. Revisions were made based on expert feedback and limited trials before full implementation.

Data collection instruments included a mathematical reasoning ability test, a Habits of Mind questionnaire, and observation sheets. The mathematical reasoning test consisted of essay-type items designed to measure logical reasoning, problem-solving procedures, and conclusion drawing. The test was administered as both pretest and posttest, and its validity and reliability were established using standard statistical procedures. The Habits of Mind questionnaire was used to assess students' learning dispositions, such as persistence, flexibility, and engagement during the learning process, while observation sheets were used to document classroom activities and student participation.

The pilot test of the mathematical reasoning instrument, conducted with 25 ninth-grade students at SMP Negeri 1 Pante Bidari, consisted of 10 essay questions. Item-total correlation analysis showed that seven items (2, 3, 4, 5, 6, 7 and 8) were valid, while three items (1, 9 and 10) were not valid. The reliability analysis of the final instrument yielded a coefficient of 0.6222, indicating acceptable internal consistency. Therefore, the instrument is considered reliable and suitable for use in the main study.

Data analysis was conducted using descriptive and inferential statistical techniques. Descriptive statistics were used to summarize students' pretest and posttest scores, including mean, minimum, maximum, and standard deviation. Prior to hypothesis testing, normality and homogeneity tests were performed to ensure that the data met the assumptions for parametric analysis. Differences in learning outcomes within and between groups were analyzed using paired-sample and independent-sample t-tests, or non-parametric alternatives when necessary.

The effectiveness of the learning model was further examined using normalized gain (N-gain) analysis to determine the level of improvement in students' mathematical reasoning ability. In addition, effect size analysis was applied to measure the magnitude of the intervention's impact, providing practical evidence of the contribution of the CTL-based learning model integrated with Genially and Kahoot.

RESULTS AND DISCUSSION

Results

This study developed a CTL-based learning model integrated with Genially and Kahoot for Grade 8 mathematics. The product consisted of lesson plans, student worksheets, interactive digital media, and formative assessments.

The developed product was validated by five experts, including content, media, and language experts. The profiles and names of the validators are presented in Table 1 below. The validation results showed that the learning materials were valid, appropriate, and feasible for classroom implementation, with only minor revisions recommended.

Table 1. Profile of Expert Validators

No.	Validator Name	Expertise	Field of Expertise	Educational Background
1.	Iden Raisal Ihsan, M.PMt.	Content	Mathematics Education	Lecturer of Mathematics Education at Universitas Samudra. Holds a Master's degree (S-2) in Mathematics Education and is currently pursuing a Doctoral Degree (S-3) in Mathematics at a university in Taiwan. Has teaching and academic experience in mathematics and mathematics education courses.
2.	Guntur Maulana Muhammad, M.Pd.	Content	Mathematics Education	Lecturer of Mathematics Education at Universitas Samudra. Holds a Master's degree (S-2) in Mathematics Education and is currently pursuing a Doctoral Degree (S-3) in Mathematics Education at Universitas Negeri Malang. Has experience in teaching mathematics education and developing instructional content.
3.	Rizky Amelia, M.Pd.	Media	Mathematics Education	Lecturer of Mathematics Education at Universitas Samudra. Holds a

4.	Muhammad Zaky, M.Pd.	Media	Mathematics Education	Master's degree (S-2) in Mathematics Education and is currently pursuing a Doctoral Degree (S-3) in Mathematics Education at Universitas Pendidikan Indonesia (UPI). Has experience in instructional media development and learning design in mathematics education. Lecturer of Mathematics Education at Universitas Samudra. Holds a Master's degree (S-2) in Mathematics Education. Has experience in developing learning media and teaching mathematics education courses.
5.	Dr. Roni Priyanda, M.Pd.	Language	Mathematics Education	Lecturer of Mathematics Education at Universitas Samudra. Completed a Doctoral Degree (S-3) in Mathematics Education at Universitas Pendidikan Indonesia (UPI). Has extensive experience in teaching mathematics education, academic writing, and language accuracy in instructional and research contexts.

Based on Table 1 presents the profiles of the expert validators involved in this study. The validators consist of lecturers in Mathematics Education from Universitas Samudra with expertise in content, media, and language. Their educational backgrounds and academic experiences ensure the validity, relevance, and clarity of the developed test items.

Table 2. Media Expert Validation of Kahoot Learning Media

Before Validation	After Validation	Description of Revisions
		This revision relates to the learning media developed using Kahoot and was based on feedback from the expert validator, Ms.

Tabel 4. Descriptive Statistics

N	Minimum	Maximum	Mean	Std. Deviation
56	32.00	68.00	54.3929	7.63884
56	44.00	93.00	69.6964	13.28556
56				

Descriptive statistics in Table 6. show an increase in students' mean scores from pretest to posttest of mathematical reasoning ability, indicating an improvement in mathematical reasoning ability after the learning intervention. The normality test results shown in Table 7 below:

Table 5. Tests of Normality

		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	Df	Sig.
Pretest	Control Class	.171	27	.042	.938	27	.107
	Experimental Class	.165	29	.042	.956	29	.263
Post Test	Control Class	.116	27	.200*	.965	27	.475
	Experimental Class	.178	29	.019	.922	29	.034

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The normality test results shown in Table 5. indicate that the pretest data of both classes were normally distributed, while the posttest data showed a slight deviation in the experimental class. Based on Table 8, the homogeneity test results show that the data variances were homogeneous, allowing further comparative analysis.

Table 6. Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Pretest	Based on Mean	.010	1	54	.919
	Based on Median	.001	1	54	.977
	Based on Median and with adjusted df	.001	1	53.999	.977
	Based on trimmed mean	.002	1	54	.967
Post Test	Based on Mean	.774	1	54	.383
	Based on Median	.263	1	54	.610
	Based on Median and with adjusted df	.263	1	46.994	.611
	Based on trimmed mean	.617	1	54	.435

Based on Table 6, all significance (Sig.) values for both the pretest and posttest are greater than 0.05. This indicates that the variances of the control and experimental groups are homogeneous. Therefore, the assumption of homogeneity of variances is met, allowing further comparative statistical analysis to be conducted. The results of the Mann–Whitney test presented in Tables 7 and 8 below:

Table 7. Ranks

	Kelas	N	Mean Rank	Sum of Ranks
Pretest	Control Class	27	29.59	799.00
	Experimental Class	29	27.48	797.00
	Total	56		
Post Test	Control Class	27	15.13	408.50
	Experimental Class	29	40.95	1187.50
	Total	56		

The pretest mean ranks indicate that the control and experimental classes had comparable initial abilities. In contrast, the posttest mean rank of the experimental class is substantially higher than that of the control class, indicating better learning outcomes after the implementation of the treatment.

Table 8. Test Statistics^a

	Pretest	Post Test
Mann-Whitney U	362.000	30.500
Wilcoxon W	797.000	408.500
Z	-.486	-5.933
Asymp. Sig. (2-tailed)	.627	.000

a. Grouping Variable: Kelas

Based on Table 8. Test Statistics^a, The pretest results show no significant difference between the control and experimental classes ($p = 0.627 > 0.05$), indicating similar initial abilities. In contrast, the posttest results show a significant difference between the two classes ($p = 0.000 < 0.05$), demonstrating that the treatment had a significant effect on students' learning outcomes. The effect size value of $r = 0.793$ indicates a large effect, showing that the CTL-based learning approach integrated with Genially and Kahoot had a strong impact on students' learning outcomes. Most students in the experimental class achieved moderate to high N-Gain scores, while the control class showed low or negative gains, confirming the effectiveness of the developed learning model.

Discussions

The findings of this study demonstrate that the Contextual Teaching and Learning (CTL) model integrated with Genially and Kahoot effectively enhanced students' mathematical reasoning ability. Based on the analysis, students in the experimental class showed significantly higher posttest scores than those in the control class, indicating that the combination of contextual

learning principles and interactive digital media created a meaningful, student-centered, and engaging learning environment.

These results align with the findings of Nababan et al. (2023), who reported that CTL approaches improved students' reasoning skills by encouraging active problem-solving and reflection within real-life contexts. Similarly, Wibowo and Setiawan (2021) found that contextualized mathematics learning facilitated deeper conceptual understanding and reasoning processes, consistent with the present study's results. The current study extends these findings by integrating digital tools—Genially and Kahoot—into the CTL framework, which added dynamic visualizations and gamified formative assessment to enhance cognitive engagement.

In comparison, Arifin et al. (2022) demonstrated that interactive digital media alone, without explicit contextualization, could improve student engagement and motivation but produced smaller gains in reasoning skills. The current study suggests that integrating CTL principles with digital media yields stronger effects, as the contextual component directs students' exploration toward meaningful problem-solving. Likewise, research by Putra and Wati (2021) highlighted the benefits of Kahoot in promoting engagement and immediate feedback; however, their study did not combine it with a structured pedagogical model like CTL, limiting its impact on higher-order reasoning.

Furthermore, Sari and Putri (2023) reported that Genially-supported mathematics learning enhanced students' conceptual understanding, yet the effects on reasoning ability were moderate. The present study demonstrates that when Genially is combined with CTL, students not only understand concepts but also apply them to analyze and justify solutions systematically, leading to a large effect size in reasoning improvement. This finding also corroborates Hardiansyah and Lestari (2022), who emphasized that active, context-based, and interactive learning strategies foster both cognitive skills and problem-solving dispositions more effectively than conventional instruction.

Finally, the observed difference between the experimental and control groups aligns with Suwarni and Aisyah (2020), who noted that traditional instruction focusing on procedural fluency alone often fails to develop reasoning and reflective thinking. By contrast, the CTL model assisted by Genially and Kahoot provides structured opportunities for exploration, discussion, and reflection, supporting sustained cognitive engagement and promoting Habits of Mind alongside mathematical reasoning.

In summary, the findings of this study confirm that a CTL-based approach integrated with interactive digital tools is not only effective in enhancing students' reasoning ability but also represents a significant improvement over conventional methods or the use of digital tools in isolation. This supports the notion that combining pedagogical innovation with technology integration provides a holistic framework for developing higher-order thinking skills in mathematics.

CONCLUSION

Based on the results of this study, it can be concluded that the Contextual Teaching and Learning (CTL) model integrated with Genially and Kahoot is effective in improving junior high school students' mathematical reasoning ability. The research shows that students who experienced CTL-assisted learning achieved significantly higher reasoning scores compared to those in conventional instruction. This improvement is attributed to the model's ability to link mathematical concepts to real-life contexts, provide interactive visualizations through Genially, and sustain engagement via Kahoot's game-based formative assessments. Therefore, the study confirms that integrating contextual learning principles with interactive digital media can enhance both students' understanding and their active cognitive engagement, effectively

addressing the research question regarding the effectiveness of the CTL model in developing mathematical reasoning.

In terms of practical implications, the developed learning model can serve as a viable alternative instructional strategy for teaching abstract mathematical topics, such as Systems of Linear Equations in Two Variables, in junior secondary schools. It not only improves reasoning ability but also encourages students to engage in exploration, discussion, and reflection, which are essential components of higher-order thinking.

For future research, it is recommended to apply this CTL-integrated model to different mathematical topics and educational levels to examine its broader applicability. Additionally, further studies could investigate its long-term impact on students' reasoning skills, Habits of Mind, and learning attitudes, as well as explore potential enhancements through integration with other digital tools or collaborative learning approaches.

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REFERENCES

- Arifin, F., Hasanah, U., & Suryani, D. (2022). Effect of interactive digital media on mathematics engagement. *Journal of Educational Technology*.
- Damanik, P., Wardani, S., & Utami, N. (2024). Kahoot in formative mathematics assessment. *Journal of Learning Technologies*. <https://doi.org/10.58421/gehu.v4i4.757>
- Fathurrohman, M. (2022). Pengukuran kemampuan penalaran matematis pada siswa SMA. *Jurnal Pendidikan Matematika dan Sains*, 10(1), 15–28.
- Handayani, S. (2021). Penggunaan teknologi dalam pembelajaran matematika di sekolah menengah atas. *Jurnal Pendidikan Matematika Indonesia*, 14(2), 105–113.
- Nababan, D., Marpaung, A. K., & Koresy, A. (2023). Strategi pembelajaran project based learning (PjBL). *Pediaqu: Jurnal Pendidikan Sosial dan Humaniora*, 2(2).
- Nawawi, W. P., Apriza, B., & Nugroho, P. B. (2025). The application of Kahoot game media to math learning outcomes in elementary school: A systematic literature review. *Journal for Lesson and Learning Studies*, 8(2), 375–384.
- Nugroho, A. (2021). Pendekatan proyek dan penggunaan aplikasi digital dalam pembelajaran matematika. *Jurnal Teknologi Pendidikan*, 9(3), 89–103.
- Nugroho, D., & Wahyuni, R. (2022). Implementasi project based learning berbasis teknologi untuk meningkatkan keaktifan siswa. *Jurnal Teknologi Pendidikan*, 8(1), 45–58.
- Prasetyo, Y. (2020). *Teknik observasi dalam penelitian pendidikan*. Graha Ilmu.
- Putri, M. A. (2022). Pemanfaatan aplikasi Kahoot dan Thinglink dalam pembelajaran interaktif. *Jurnal Pendidikan Digital*, 6(3), 71–80.

- Putri, N. D. A., & Widyaningsih, N. (2021). Pengembangan bahan ajar interaktif berbasis Thinglink dalam pembelajaran teks prosedur kelas VII SMP Negeri 1 Kretek tahun ajaran 2021/2022. *Jurnal Skripta*, 7(2), 20–xx.
- Romadhina, D., Junaedi, I., & Masrukan. (2022). Kemampuan penalaran matematis peserta didik kelas VIII SMP 5 Semarang. Dalam *Prosiding Seminar Nasional Pascasarjana 2019* (pp. xx–xx). Universitas Negeri Semarang.
- Sanjaya, W. (2020). *Strategi pembelajaran berorientasi standar proses pendidikan*. Kencana Prenada Media.
- Saputra, H. (2021). Tahap perkembangan kognitif dan implikasinya pada pembelajaran matematika SMA. *Jurnal Psikologi dan Pendidikan*, 9(4), 223–230.
- Sari, R. K., & Nugraheni, R. (2021). Kemampuan adaptasi siswa SMA terhadap teknologi dalam pembelajaran berbasis proyek. *Jurnal Inovasi Pendidikan*, 10(2), 92–101.
- Sembiring, E. H. B., & Listiani, T. (2023). Game based learning berbantuan Kahoot! dalam mendorong keaktifan siswa pada pembelajaran matematika. *GAUSS: Jurnal Pendidikan Matematika*, 6(1), 26–xx.
- Sulsana, R. M., Karma, I. N., & Nurwahidah. (2024). Model problem based learning berbantuan media digital Kahoot untuk meningkatkan pemahaman konsep matematis peserta didik sekolah dasar. *Educatio*, 10(2), 491–497.
- Suryana, D., & Wahyuni, E. (2021). Evaluasi keaktifan siswa dalam pembelajaran berbasis proyek di sekolah menengah. *Jurnal Pendidikan Indonesia*, 12(2), 103–114.
- Suwarsi, Saputra, A. D., & Prabowo, A. (2021). Meningkatkan pemahaman konsep matematis dan kerja sama siswa kelas VIII F melalui DL berbantuan LKS bertema. *PRISMA, Prosiding Seminar Nasional Matematika*, 1(2021). Diambil dari
- Vebrian, R., Putra, Y. Y., Saraswati, S., & Wijaya, T. T. (2021). Kemampuan penalaran matematis siswa dalam menyelesaikan soal literasi matematika kontekstual. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 10(4), 2602–2614.