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Improving students' understanding of fraction concepts and arithmetic operations after learning using bingo media

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ABSTRACT

Background: Some studies show that maths instruction in fractions in elementary schools still suffers from low conceptual understanding and arithmetic skills of the students. This is because the use of conventional learning methods which do not encourage students to learn also requires media that are more innovative and interactive.

Purpose: This study aims to determine the effect of using bingo learning media on students' understanding of concepts and arithmetic operations of fractions.

Method: An experimental design with non-equivalent control group design was employed. This research was conducted on an experimental class and a control class, both consisting of 52 students. Multiple-choice and essay were the tests to collect data that subsequently analyzed in independent sample t-test, MANOVA respectively.

Findings: The average conceptual understanding of the experimental class was obtained at 87.31, while that of the control class was 58.08 so as to produce a significance value of 0.000; thus, H0 is rejected and Ha is accepted. The ability to operate fractions was also better in the experimental class with an average of 80.96 compared to the control class at 51.15, with a significance value of 0.000. The MANOVA test results showed a significance value of 0.000, which indicated a simultaneous effect. These findings indicate that bingo media is effective in increasing student engagement, strengthening conceptual understanding, and practicing procedural skills in fraction material.

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INTRODUCTION

National education aims to foster individuals' skills while cultivating the character and culture of a respected nation, thereby educating the community (Yuliani et al., 2025). This goal centers on nurturing students who have faith in God Almighty, exhibit high moral values, maintain good health, are knowledgeable, skillful, creative, self-reliant, democratic, and responsible citizens, as outlined in Law Number 20 of 2003 concerning the National Education System. Hence, education should not solely focus on enhancing academic

performance but also on reinforcing students' character and national principles (Yuliandari et al., 2024). Nevertheless, the practical execution of character education and academic growth in educational institutions continues to face numerous hurdles, especially in developing students' grasp of crucial mathematical principles (Zhang et al., 2023).

Elementary education is the key phase in nurturing students' intellectual skills, attitudes, abilities, and character (Enong Holilah, 2025). During this stage, learners are familiarized with a variety of fundamental subjects, including Mathematics, which is vital for cultivating logical, analytical, critical, and systematic thinking abilities (Nicoloro-SantaBarbara et al., 2022). A significant concept in early mathematics instruction is fractions and their arithmetic operations. A conceptual grasp of fractions signifies students' capability to view fractions as segments of a whole, compare and depict fractions, and use fractional ideas suitably in different mathematical contexts. At the same time, operations with fractions like addition, subtraction, multiplication, and division necessitate that students comprehend both the steps involved and the fundamental mathematical ideas.

Grasping the concepts of fractions and their arithmetic operations is essential since these skills form the base for studying more complex mathematical topics, including ratios, algebra, percentages, and solving real-life problems. Pupils with a weak foundational understanding of fractions often find it challenging to execute arithmetic operations correctly and address context-based mathematical issues. However, numerous elementary school students still view mathematics as challenging, abstract, and less exciting, leading to diminished interest in learning and inadequate mathematical comprehension, especially concerning fraction topics (Arintasari et al., 2019). As a result, students frequently make mistakes in interpreting the values of fractions, utilizing arithmetic processes, and tackling story problems associated with fractions.

This phenomenon also occurs in sixth-grade students at UPTD SDN Dlambah Laok 2. From early observations, 10 out of 26 students met the minimum completion criteria and the other 16 did not cat up to the established standards. This condition shows students' low conceptual mastery of fractions which is the main cause of students getting difficulties in solving arithmetic operations with fractions (Ulfa et al., 2021). This problem is allegedly due to the learning process at SMAN 2 Tanjungtiram which isstill more dominated by conventional methods and not use of mediaLearn that can explain abstract concepts concretely. As a domino effect, this condition does not only contribute to the low learning that students obtain but also their lack of confidence, motivation and ability in critical thinking when tackling mathematical problems (Ayu & Syariffuddin, 2021).

In theory, conceptual understanding is at the heart of learning mathematics. Students with conceptual understanding well do explain, compare and apply concepts in different circumstances (Wiseza & Ibermarza, 2025). Additionally, as previously mentioned when

performing fraction arithmetic operations it is also necessary to understand a sequential procedural reasoning. So that the learning process is designed interactively so that students do not only receive information, but also actively build knowledge through meaningful learning experiences. Utilization of learning media is one of the ways that can be use to meet, and connect these needs (Ndiung & Iprati, 2023).

Numerous investigations have revealed that learning through interactive and game-oriented methods can enhance students' enthusiasm, involvement, and outcomes in mathematics (Mariati, 2024; Meylani, 2025). In the realm of elementary mathematics instruction, visual and educational gaming tools are deemed effective for assisting learners in grasping abstract ideas due to their ability to offer a more tangible, enjoyable, and engaging learning atmosphere. Particularly, game-based education has been noted to bolster students' comprehension of concepts and boost their active participation in mathematics lessons, especially with fractions, which are frequently viewed as challenging by primary school pupils (Rasvani & Wulandari, 2021).

Investigation into educational games based on bingo has also indicated beneficial effects on learning in classrooms. Bingo tools can foster engaging learning environments, promote teamwork among students, and enhance their focus and involvement during teaching sessions (Khairuni & Wandini, 2023). Additionally, the use of educational gaming tools has proven to enhance students' math skills and academic performance through enjoyable and repetitive practice activities (Mulyati, 2016). Further research has shown that learning through games can assist students in developing their mathematical communication and problem-solving abilities by boosting their motivation and alleviating anxiety related to math (Ayu & Syariffuddin, 2021).

While earlier studies have yielded significant insights about game-based learning and educational tools, many have concentrated on the general use of games in math education without specifically looking at how bingo-based tools are applied in teaching fractions. Moreover, past research has often focused on either the development of conceptual knowledge or arithmetic competencies separately (Prasetiawati et al., 2025), while few studies have examined how both students' understanding of concepts and their fraction arithmetic skills can progress simultaneously through a single teaching intervention (Mailani et al., 2025). Thus, this research aims to address this shortfall by exploring the effectiveness of bingo-based learning resources in enhancing both conceptual insight and arithmetic skills regarding fractions among elementary students. The originality of this research resides in merging bingo-centric educational games with fraction learning tasks that prioritize both conceptual understanding and arithmetic skills within the context of elementary mathematics learning.

Furthermore, the novelty of this study should be articulated more academically by emphasizing the distinct contribution of bingo learning media compared to existing game-based learning approaches. In this research, bingo media is not merely utilized as a tool for content delivery, but also as an instructional strategy designed to encourage active student participation through play-based learning activities, collaborative discussions, and hands-on problem-solving experiences (Marleni et al., 2021).

Bingo learning media is a game-based instructional medium that utilizes cards containing numbers, symbols, or concept-related terms arranged vertically, horizontally, or diagonally (Marleni et al., 2021). In its implementation, students are required to answer questions related to fraction material and subsequently mark or color the corresponding answers on the bingo cards to form specific patterns. This learning activity encourages students to actively participate in discussions, express their reasoning processes, collaborate with peers, and provide explanations regarding problem-solving procedures. Previous studies indicate that bingo-based learning activities have the potential to enhance students' engagement and mathematical understanding, particularly in fraction learning (Nugroho et al., 2023).

Based on these considerations, this study specifically investigates whether the use of bingo learning media is effective in improving students' conceptual understanding and fraction arithmetic skills compared with conventional learning methods.

METHODS

This study employed a quantitative approach using a quasi-experimental design with a pretest–posttest control group format. The research population consisted of all students from grades I to VI at UPTD SDN Dlambah Laok 2, totaling 262 students. Saturated sampling was initially applied because all members of the population were included in the preliminary population mapping process. However, the implementation of the experimental study was limited to two sixth-grade classes, as the research focused specifically on students who had studied fraction materials relevant to the research objectives (Hwang et al., 2019). Class VI A, consisting of 26 students, was assigned as the experimental group, while Class VI B, consisting of 26 students, served as the control group (Ariesta et al., 2024).

The experimental group received instruction using bingo learning media, whereas the control group was taught using conventional learning methods. The treatment was conducted during the fraction learning unit over several instructional meetings. Before and after the treatment, both groups were administered pretests and posttests to measure changes in learning outcomes related to fraction concepts and arithmetic operations.

Data collection was carried out using two research instruments. The first instrument was a multiple-choice test designed to assess students' conceptual understanding of

fractions. The second instrument was a descriptive test intended to evaluate students' ability to solve fraction arithmetic problems systematically (Ching et al., 2024; Schadl & Ufer, 2023). The instruments were developed based on indicators of conceptual understanding and fraction operation skills, including identifying fraction representations, comparing fractions, performing arithmetic operations, and explaining solution procedures (Lenz et al., 2020). The multiple-choice test consisted of objective items scored using a dichotomous system, while the descriptive test employed an analytical scoring rubric to assess the accuracy and completeness of students' responses (Chin et al., 2021). Prior to implementation, the instruments were examined for content validity through expert judgment and tested for reliability to ensure consistency and accuracy in measuring students' abilities.

The collected data were analyzed using inferential statistical techniques to determine the effectiveness of bingo learning media on students' mathematics learning outcomes. An independent sample t-test was conducted to identify differences in mean posttest scores between the experimental and control groups. In addition, Multivariate Analysis of Variance (MANOVA) was employed to examine the simultaneous effect of the learning media on two dependent variables, namely conceptual understanding and fraction arithmetic operation skills (Arintasari et al., 2019; Lestari & Jusra, 2022). The use of MANOVA was considered appropriate because the study investigated multiple related dependent variables within the same experimental treatment.

RESULT AND DISCUSSION

Result

The participants in this study consisted of 52 sixth-grade students from UPTD SDN Dlambah Laok 2. The students were divided into two groups, namely the experimental class and the control class, with each class consisting of 26 students. The experimental class received instruction using bingo learning media, whereas the control class was taught through conventional learning methods. The participant distribution was determined based on the existing class structure in the school.

Descriptive and inferential statistical analyses were conducted to examine the effect of bingo learning media on students' conceptual understanding and fraction arithmetic operation skills (Suluh & Bitu, 2021). The analysis began with descriptive statistics, followed by prerequisite tests, hypothesis testing using the independent sample t-test, and multivariate testing using MANOVA.

Table 1 presents the descriptive statistics of students' conceptual understanding scores in both groups.

Tabel 1.

Descriptive Statistics of Fraction Concept Understanding

Group	N	Mean	Std. Deviation
Conventional Learning	26	58.08	9.39
Bingo Learning Media	26	87.31	12.51

The data in Table 1 indicate that the experimental class achieved a higher mean score than the control class. Students who learned through bingo media demonstrated better conceptual understanding of fractions compared with students who received conventional instruction.

Prior to hypothesis testing, normality and homogeneity tests were conducted to ensure that the data met the assumptions required for parametric analysis. The results are presented in Table 2.

Tabel 2.

Normality and Homogeneity Test of Concept Understanding

Variable	Group	Sig. (Shapiro-Wilk)	Sig. Levene
Fraction Concept Understanding	Konvensional	>0.05	>0.05
	Media Bingo	0>.05	

The results showed that the significance values of the Shapiro–Wilk and Levene tests were greater than 0.05, indicating that the data were normally distributed and homogeneous. Therefore, the data fulfilled the assumptions for further parametric testing.

The independent sample t-test results are presented in Table 3.

Tabel 3.

Concept Understanding t-Test Results

Information	df	Sig. (2-tailed)	Mean Difference
Equal Variances Assumed	50	0.000	-29.23
Equal Variances Not Assumed	46,383	0.000	-29.23

The significance value of 0.000 (< 0.05) indicates a statistically significant difference between the experimental and control groups. This finding demonstrates that the use of bingo learning media significantly improved students' conceptual understanding of fractions.

The descriptive statistics for students' fraction arithmetic operation skills are presented in Table 4.

Tabel 4.

Descriptive Statistics of Fraction Arithmetic Operation Ability

Group	N	Mean	Std. Deviation
Conventional Learning	26	51.15	11.07
Bingo Learning Media	26	80.96	8.25

Table 4 shows that students in the experimental class obtained higher arithmetic operation scores than those in the control class. This result indicates that bingo learning media contributed positively to the development of students' procedural skills in solving fraction problems.

The prerequisite test results for this variable are shown in Table 5.

Tabel 5.

Normality and Homogeneity Test of Arithmetic Operation Ability

Variable	Group	Sig. (Shapiro-Wilk)	Sig. Levene
Fraction Arithmetic Operations	Konvensional	>0.05	>0.05
	Media Bingo	0>0.5	

The significance values greater than 0.05 indicate that the data satisfied the assumptions of normality and homogeneity. Consequently, the data were appropriate for parametric analysis.

The results of the independent sample t-test are presented in Table 6.

Tabel 6.

Results of the t-Test for Arithmetic Operation Ability

Information	df	Sig. (2-tailed)	Mean Difference
Equal Variances Assumed	50	0.000	-29.81
Equal Variances Not Assumed	46,213	0.000	-29.81

The significance value of 0.000 (< 0.05) demonstrates a significant difference between the two groups. Therefore, bingo learning media had a significant effect on students' fraction arithmetic operation skills.

To examine the simultaneous effect of bingo learning media on both dependent variables, a MANOVA test was conducted. The results are presented in Table 7.

Tabel 7.

MANOVA Test Results

Source of Variation	Dependent Variable	Sig.	Observed Power
Learning Media	Concept Understanding	0.000	1.000
Learning Media	Fraction Arithmetic Operations	0.000	1.000

The MANOVA results indicate significance values below 0.05 for both dependent variables. This finding demonstrates that bingo learning media simultaneously influenced students' conceptual understanding and fraction arithmetic operation skills.

Discussion

The findings of this study demonstrate that bingo learning media significantly improved students' conceptual understanding and fraction arithmetic operation skills compared with conventional learning methods. The higher mean scores achieved by the

experimental class indicate that game-based learning activities can create a more engaging and meaningful learning environment for elementary school students.

The effectiveness of bingo learning media may be explained through its interactive learning characteristics. During the learning process, students were not only required to identify correct answers but also encouraged to discuss, analyze, and justify their reasoning collaboratively. Such activities support active learning processes that enable students to connect prior knowledge with newly acquired concepts. This finding is consistent with constructivist learning theory, which emphasizes that knowledge is developed actively through interaction, discussion, and problem-solving experiences.

In the context of fraction learning, bingo media also helped students visualize and organize abstract mathematical concepts more concretely (Nasir, F., et al., 2025). Fractions are commonly regarded as difficult material for elementary school students because they involve both conceptual and procedural understanding simultaneously (Salim Nahdi & Gilar Jatisunda, 2020). Through bingo activities, students repeatedly practiced identifying equivalent fractions, performing arithmetic operations, and matching answers within a structured game format. This repetitive yet enjoyable process may strengthen both conceptual comprehension and procedural fluency.

The results of this study are in line with previous findings indicating that game-based learning media can improve students' motivation, engagement, and mathematics achievement (Hui & Mahmud, 2023). However, this study contributes additional evidence by simultaneously examining conceptual understanding and arithmetic operation skills using MANOVA analysis. The findings suggest that both competencies are interconnected and can develop concurrently when students engage in interactive and collaborative learning experiences.

From a pedagogical perspective, the findings imply that elementary mathematics instruction should incorporate more student-centered and interactive learning media to reduce students' difficulties in understanding fractions. Bingo learning media may serve as an alternative instructional strategy that promotes active participation, collaborative learning, and meaningful mathematical understanding. Furthermore, the study strengthens the argument that learning media integrating game elements can enhance not only students' motivation but also their cognitive achievement in mathematics learning contexts.

CONCLUSION

Based on the results of the study, it can be concluded that the use of bingo learning media had a significant positive effect on students' conceptual understanding and fraction arithmetic operation skills among sixth-grade students at UPTD SDN Dlambah Laok 2. Students who learned through bingo learning media achieved higher learning outcomes

compared with students who received conventional instruction. These findings indicate that bingo learning media is effective in supporting students' understanding of fraction concepts as well as improving their procedural abilities in solving fraction arithmetic problems.

The effectiveness of bingo learning media demonstrates that interactive and game-based learning approaches can create more meaningful mathematics learning experiences for elementary school students. Theoretically, this study strengthens the constructivist perspective that active participation, collaboration, and interactive learning activities contribute to the development of conceptual and procedural mathematical understanding. Practically, the findings suggest that teachers may utilize bingo learning media as an alternative instructional strategy to increase students' engagement, motivation, and achievement in fraction learning.

Despite these positive findings, this study was limited to a relatively small sample and focused only on one school context. Therefore, future studies are recommended to involve larger and more diverse samples, apply longer treatment durations, and examine the effectiveness of bingo learning media in other mathematical topics or educational levels. Further research may also explore the integration of digital or technology-based bingo learning media to enhance students' learning experiences and mathematical competencies more comprehensively.

DECLARATIONS

Author Contribution

Mulyadi, A., conceptualized the research through idea formulation tasks, goal setting and designing of concepts. He also wrote the first draft of the manuscript, wrote all major sections and visually presented, interpreted data; **Muhajir, M.,** contributed to developing methodology including experimental design for this work as well as including methods used to collect data and analyze it. Hifz D conducted formal analysis using statistical software, and reviewed and edited the manuscript to improve accuracy and quality of content; **Huda, N.,** validated data for accuracy and alignment of analysis results with established procedures. She also acted as a kind of supervisor, guiding him through the research and checking that it was carried out correctly at every step.

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Conflict of Interest

The authors declare no conflict of interest.

Declaration of AI Use

No generative AI tools were used in the preparation of this manuscript.

Additional Information

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REFERENCES

Ariesta, F. W., Maftuh, B., Sapriya, & Syaodih, E. (2024). The Effectiveness of Virtual Tour Museums on Student Engagement in Social Studies Learning in Elementary Schools. *Jurnal Ilmiah Sekolah Dasar*, *8*(1), 45–53. https://doi.org/10.23887/jisd.v8i1.67726

Arintasari, I. Z., Rahmawati, I., & Sukamto, S. (2019). Keefektifan Media Roda Pecahan Berbantu Model Realistic Mathematic Education (RME) pada Mata Pelajaran Matematika. *International Journal of Elementary Education*, *3*(4), 366. https://doi.org/10.23887/ijee.v3i4.21308

Ayu, F., & Syariffuddin, H. (2021). Pengembangan Bahan Ajar Local Instructional Theory Kelas V Sekolah Dasar Topik Perkalian Pecahan Berbasis Realistic Mathematics Education (RME). *Jurnal Basicedu*, *5*(6), 6339–6348. https://doi.org/10.31004/basicedu.v5i6.1725

Chin, H., Chew, C. M., & Lim, H. L. (2021). Development and validation of online cognitive diagnostic assessment with ordered multiple-choice items for 'Multiplication of Time.' *Journal of Computers in Education*, *8*(2), 289–316. https://doi.org/10.1007/s40692-020-00180-7

Ching, B. H., Li, X. Y., & Chen, T. T. (2024). <scp>Cross-notation</scp> knowledge of rational numbers predicts fraction arithmetic. *British Journal of Educational Psychology*, *94*(3), 717–737. https://doi.org/10.1111/bjep.12674

Enong Holilah, R. H. S. H. (2025). Pendidikan Dasar Sebagai Fondasi Sosial: Analisis Komparatif Sistem Pendidikan Indonesia Dan Kuba Dalam Mewujudkan Pemerataan Dan Kualitas. *Jurnal Ilmiah Pendidikan Dasar*, *10*.

Hui, H. B., & Mahmud, M. S. (2023). Influence of game-based learning in mathematics education on the students' cognitive and affective domain: A systematic review. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1105806

Hwang, J., Riccomini, P. J., Hwang, S. Y., & Morano, S. (2019). A Systematic Analysis of Experimental Studies Targeting Fractions for Students with Mathematics Difficulties. *Learning Disabilities Research & Practice*, *34*(1), 47–61. https://doi.org/10.1111/ldrp.12187

Khairuni, K., & Wandini, R. R. (2023). Strategi Butterfly dan Pemecahan Masalah Matematika Siswa. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *7*(3), 3771–3780. https://doi.org/10.31004/obsesi.v7i3.4577

Lenz, K., Dreher, A., Holzäpfel, L., & Wittmann, G. (2020). Are conceptual knowledge and procedural knowledge empirically separable? The case of fractions. *British Journal of Educational Psychology*, *90*(3), 809–829. https://doi.org/10.1111/bjep.12333

Lestari, P. D. A., & Jusra, H. (2022). Pengembangan worksheets interaktif berbasis web dengan video pada materi pecahan. *Jurnal Inovasi Teknologi Pendidikan*, *9*(2), 194–203. https://doi.org/10.21831/jitp.v9i2.51318

Mailani, E., Rarastika, N., Parista, I., Syakura Harahap, W., Azzahra, M. F., & Aprilia, I. (2025). Strategi Pembelajaran Matematika untuk Mengatasi Kesulitan Pemahaman Konsep Pecahan pada Siswa Sekolah Dasar. *Jurnal Pendidikan Sains Dan Teknologi Terapan*, *02*(02), 131–135.

Mariati, S. L. (2024). The Influence of Interactive Learning Media on Students' Learning Interest in Biology Subjects in Junior High Schools. *International Journal of Curriculum Development, Teaching and Learning Innovation*, *2*(3), 127–135. https://doi.org/10.35335/curriculum.v2i3.189

Marleni, A. J., Friansah, D., & Satria, T. G. (2021). Pengembangan Media Pembelajaran Math Bingo Pada Mata Pelajaran Matematika Materi Pecahan Kelas IV SD. *AULADUNA: Jurnal Pendidikan Dasar Islam*, *8*(2), 160. https://doi.org/10.24252/auladuna.v8i2a4.2021

Meylani, R. (2025). Gamification and Game-Based Learning in Mathematics Education for Advancing SDG 4: a Systematic Review and Qualitative Synthesis of Contemporary Research Literature. *Journal of Lifestyle and SDGs Review*, *5*(2), e04567. https://doi.org/10.47172/2965-730X.SDGsReview.v5.n02.pe04567

Mulyati, S. (2016). Upaya Meningkatkan Hasil Belajar Matematika Melalui Metode Diskusi Berbantuan Media Bagan Pecahan Di Kelas III SDN Kalisari 1. *Jurnal Ilmiah Pendidikan Dasar*, *3*(1), 13. https://doi.org/10.30659/pendas.3.1.13-19

Nasir, F., Nurhidayah, S., Anindiyah, S., Elwanda, Y. I. P. P., Khodari, R., & Sundawan, M. D. Students' mathematical representation ability in Learning fractions through a concrete-representational-abstract approach with a joyful learning nuance. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, *14*(5), 643-658. https://doi.org/10.33578/jpfkip.v14i5.p643-658

Ndiung, S., & Iprati, F. A. (2023). Penggunaan Kertas Lipat Untuk Mendukung Pemahaman Siswa Pada Pembagian Pecahan. *Elementary School Journal Pgsd Fip Unimed*, *13*(3), 310–320. https://doi.org/10.24114/esjpgsd.v13i3.43806

Nicoloro-SantaBarbara, J. M., Carroll, J. E., Minissian, M., Kilpatrick, S. J., Cole, S., Merz, C. N. B., & Accortt, E. E. (2022). Immune transcriptional profiles in mothers with clinically elevated depression and anxiety symptoms several years post-delivery.

American Journal of Reproductive Immunology, *88*(5). https://doi.org/10.1111/aji.13619

Nugroho, I. A., Purbasari, I., & Bakhruddin, A. (2023). Analisis Pola Kesulitan Belajar Matematika Dalam Menyelesaikan Soal Operasi Hitung Pecahan Pada Siswa Sekolah Dasar. *Prismatika: Jurnal Pendidikan Dan Riset Matematika*, *6*(1), 182–197. https://doi.org/10.33503/prismatika.v6i1.3431

Prasetiawati, C., Fatmawati, S., & Afandi, M. (2025). Sinergi Penalaran Matematis dan Literasi Finansial: Pengembangan Media Etnomatematika dalam Konteks Aritmatika Sosial Sekolah Dasar. *Teorema: Teori Dan Riset Matematika*, *10*(1), 153. https://doi.org/10.25157/teorema.v10i1.23579

Rasvani, N. L., & Wulandari, I. G. A. (2021). Pengembangan Media Pembelajaran Aplikasi MaCa Materi Pecahan Berorientasi Teori Belajar Ausubel Muatan Matematika. *MIMBAR PGSD Undiksha*, *9*(1), 74. https://doi.org/10.23887/jjpgsd.v9i1.32032

Salim Nahdi, D., & Gilar Jatisunda, M. (2020). Conceptual Understanding And Procedural Knowledge: A Case Study on Learning Mathematics of Fractional Material in Elementary School. *Journal of Physics: Conference Series*, *1477*(4), 042037. https://doi.org/10.1088/1742-6596/1477/4/042037

Schadl, C., & Ufer, S. (2023). Mathematical knowledge and skills as longitudinal predictors of fraction learning among sixth-grade students. *Journal of Educational Psychology*, *115*(7), 985–1003. https://doi.org/10.1037/edu0000808

Suluh, M., & Bitu, Y. S. (2021). Peningkatan Keterampilan Analisis Data Deskriptif dan Inferensial melalui Pelatihan Microsoft Excel dan Aplikasi SPSS. *Jurnal Pengabdian Magister Pendidikan IPA*, *4*(4), 461–465. https://doi.org/10.29303/jpmpi.v4i4.934

Ulfa, N., Jupri, A., & Turmudi, T. (2021). Analisis Hambatan Belajar Pada Materi Pecahan. *Research and Development Journal of Education*, *7*(2), 226. https://doi.org/10.30998/rdje.v7i2.8509

Wiseza, F. C., & Ibermarza, I. (2025). Peningkatan Pemahaman Konseptual Siswa melalui Strategi Pembelajaran Deep Learning. *Edu Happiness: Jurnal Ilmiah Perkembangan Anak Usia Dini*, *4*(2), 327–337. https://doi.org/10.62515/eduhappiness.v4i2.1214

Yuliandari, R. N., Anggraini, D. M., Rahmah, U. N., Zahroo, F., & Fatmawati, F. (2024). Peningkatan Pemahaman Konsep Pecahan Siswa Sekolah Dasar dengan Media Kertas Lipat. *Dawuh Guru: Jurnal Pendidikan MI/SD*, *4*(1), 93–102. https://doi.org/10.35878/guru.v4i1.1085

Yuliani, B., Ju'subaidi, J., & Fadila Nur Asfari, Much. (2025). Penguatan Nilai Moral Melalui Pendidikan Karakter Di Sekolah (Kajian Peran Pendidikan Karakter Dalam Mewujudkan Tujuan Pendidikan Nasional Indonesia). *Ibriez Jurnal Kependidikan*

Dasar Islam Berbasis Sains, *10*(2), 161–180. https://doi.org/10.21154/ibriez.v10i2.827

Zhang, X., Pan, J., Zhu, L., Ye, Y., Fan, Z., Chen, X., Wang, H., Wei, G., & Zhang, L. (2023). Less Invasive Surfactant Administration for the Treatment of Neonatal Respiratory Distress Syndrome Combined With Noninvasive Ventilation in Anhui Province, China: A Retrospective Cohort Study. *Clinical Pediatrics*, *62*(9), 1109–1117. https://doi.org/10.1177/00099228231152859