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Article

Effectiveness of Simulation-Based *Serious Games* on Numeracy Problem Solving Abilities in Elementary Schools

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ABSTRACT

This research aims to determine the effectiveness of simulation-based serious games on the numeracy problem solving abilities of fifth grade elementary school students. The research method used was quasi-experimental pretest-posttest non-equivalent control group design. The research subjects consisted of 38 fifth grade elementary school students who were divided into two groups, namely experimental (19 students) and control (19 students). Data collection techniques use tests and observations. Data were analyzed using the IBM SPSS Statistics Version 29 application. Data validity tests included normality and homogeneity tests. The results of the research showed that the mean gain score for experimental students was 40.52 and the control group was 28.94. In the Shapiro-Wilk column The gain score in the experimental group had a sig value of 0.638 and the gain score in the control group had a sig value of 0.642. The hypothesis results obtained a sig value of 0.037, which means it is smaller than 0.05, so it can be concluded that there is a difference in the average between students in the experimental group and the control group, so that there is effectiveness in learning using simulation-based *serious games* in solving numeracy problems, understanding

numeracy questions, as well as performing mathematical operations.

1. Introduction

Many students in Indonesia are less interested in mathematics because they think that the subject is difficult and not relevant to everyday life (Nurajijah et al., 2023; Sari et al., 2021; Zahari & Razali, 2022). This is also because learning activities in class are still too abstract for students, so it is necessary to present more contextual learning in everyday life. To create a learning environment that supports and encourages the development of mathematical skills, in this case numeracy skills in Indonesia, learning methods that are not monotonous and interesting are needed. One of the learning activities that can improve numeracy skills is learning outside the classroom with the concept of learning while play through direct buying and selling, such as choosing the market as the object of activity (Ismafitri et al., 2024; Motimona & Maryatun, 2023; Wulandari, 2021). Buying and selling allow students to interact directly with sellers and buyers, so that students can practice directly carrying out mathematical operations such as addition, subtraction, division and multiplication when buying and selling (Andriyani et al., 2023). The use of money itself not only functions as a measuring tool, but also aims to measure student learning outcomes by understanding the principles and concepts of money (Faidah et al., 2018). Even though they are carrying out the learning process and gaining new experiences through buying and selling, students are said to be more active, interested and happy because it is done in a relaxed but serious manner.

According to Hasanah, (2018) the main strategy in student learning, namely playing. For adults, playing is still often interpreted as an activity that wastes time, Rahmawati & Nazarullail, (2020) adding that learning for students should include activities that students carry out directly because this will have a direct impact on student development. *Serious games* are designed not only for entertainment, but also for educational, training, or problem-solving purposes. Authentic simulation-based *Serious Games* allow students to apply learned concepts to real-world and realistic situations. This helps students understand the relevance and usefulness of what they have learned in solving numeracy problems, understanding numeracy problems, and carrying out mathematical operations. In addition, this method provides a deeper learning experience than conventional learning methods (Anugrahana & Hasthiolivia, 2023). These experiences directly or indirectly influence students' subsequent development. *Mathematical Literacy* and numeracy are terms used by the Ministry of Education, Culture, Research and Technology on the ability to use mathematical knowledge in everyday life to explain events, solve problems, and make decisions (Setiawan, 2019). Numeracy refers to the ability to apply numerical concepts and mathematical operations in everyday life. All students should have good numeracy skills because good numeracy skills will make it easier

for students to overcome and solve problems in everyday life (N. Ayuningtyas & Sukriyah, 2020).

Based on the data obtained , many students' numeracy problem solving abilities are still lacking, so new alternatives are needed to effectively solve students' numeracy problems, one of which is innovating games in learning such as *serious games*. *Serious Games* are serious games, a learning model or approach to get good learning results by using educational games (Kusuma, 2022). In this case, games educate students so that learning activities are more enjoyable (Aprilianto & Mariana, 2018; Hidayatulloh et al., 2020). This research is novel in the use of simulation-based *serious games* to improve the numeracy problem solving abilities of fifth grade elementary school students, which has not been explored much in previous research. Some relevant previous research such as Sukasmi et al., (2022) that 86.7% of students have smartphones which are used to play games (76.7%), using smartphones more than 5 hours a day (63.3%) this is certainly an opportunity for the emergence of innovative learning media with a game format (*game-based learning*). Learning media innovation with game-based learning has a huge opportunity to be used by teachers to support the learning process.

Meanwhile research Untari, (2022) The use of *game-based* learning models as innovative learning models for the 21st century plays a big role in increasing student learning activity. The potential for using games that can be integrated into the learning process is very large. Students' active learning using the *game-based learning model* applied in the classroom can be seen from students' active involvement in the game, courage to answer questions, express opinions, and meet game challenges by collaborating with their group team, being involved in problem-solving activities both individually and in groups, construct understanding independently, and reflect on learning activities that have been carried out.

This is different from research by Kusumasari et al., (2024) that based on validity test analysis shows that the overall validation average is 3.85 which is in the very valid category. The results of the practicality data analysis show that the average teacher assessment of the product is 3.81 and the student assessment is 3.57 and is in the very practical category. The results of the effectiveness test show that the Sig (*2-tailed*) value is less than 0.05, so there is a difference in students' interest in learning science before and after using educational game media based on differentiated learning in class V elementary school.

Then research shows Adrillian et al., (2024) that the characteristics of students today are that they like games, so the appropriate learning media is educational games. From the development of educational games, from 20 articles, 18 articles obtained educational games that were valid (average validity 89.52%), practical (average practicality 88.56%), and effective for use in mathematics learning. This research is unique in utilizing a simulation of buying and selling in the market to help students understand the concept of numeracy better. In addition, this research uses in-depth data analysis with the IBM SPSS *Statistics Version 29 application* , providing strong validity to the results and showing that numeracy learning can be

made more interesting and contextual, thereby increasing student interest and engagement. Thus, this research is expected to make a significant contribution to the development of innovative and effective mathematics learning methods at the elementary school level. Based on the description above, this research aims to determine the effectiveness of simulation-based *serious games* on numeracy problem solving abilities in elementary schools (SD).

2. Method

This research uses *a quasi-experimental pretest-posttest non-equivalent control group design* to analyze the effectiveness of a simulation-based *serious game* on numeracy problem solving abilities in elementary school. This design was chosen for a clear comparison between the learning outcomes of students who received the intervention and those who did not. The research sample consisted of 38 fifth grade elementary school students who were divided into two groups, namely 19 students for the experimental group and 19 students for the control group. In this study, the experimental group received simulation-based *serious game intervention* , and the control group continued with conventional learning methods. The sampling technique used was *nonprobability sampling* with the *convenience sampling method*. The selection of this relatively small sample was due to the limited number of students in the school and to ensure that data collection could be carried out in depth and in a controlled manner. It is hoped that this sample size will be able to provide an adequate picture of the effectiveness of the learning intervention implemented (T. Y. Ayuningtyas & Wijayaningsih, 2020; Elpin & Karolina, 2024; Hidayat et al., 2020; Saputra, 2024). Determining the research location was carried out at one of the elementary schools in Wuluhan, Jember. This school was chosen because it has characteristics that suit the research needs, namely fifth grade elementary school students who are ready to participate in this learning intervention. Apart from that, this location was also chosen because of affordability and good cooperation from the school. The school selection aims to ensure that the research results can be well represented in the educational context in Indonesia.

Data was collected in two stages, namely *pretest* before intervention and *posttest* after intervention. *Pretest* and *posttest* tests were used to measure students' numeracy problem solving abilities before and after learning with simulation-based *serious games*. Additionally, observations are used to observe how students interact with the game and apply learning in real-world contexts. The instruments used in this research include a pretest *and* posttest *of* level 2 numeracy problem solving ability, which consists of 20 questions. (Irawan et al., 2023) This test is given before and after the intervention to measure improvements in students' numeracy skills. Apart from that, observation techniques are also used to observe the learning process. Observations were carried out to see student interactions and the application of numeracy concepts through simulation-based *serious games* on the market, which are expected to provide additional qualitative data regarding learning effectiveness.

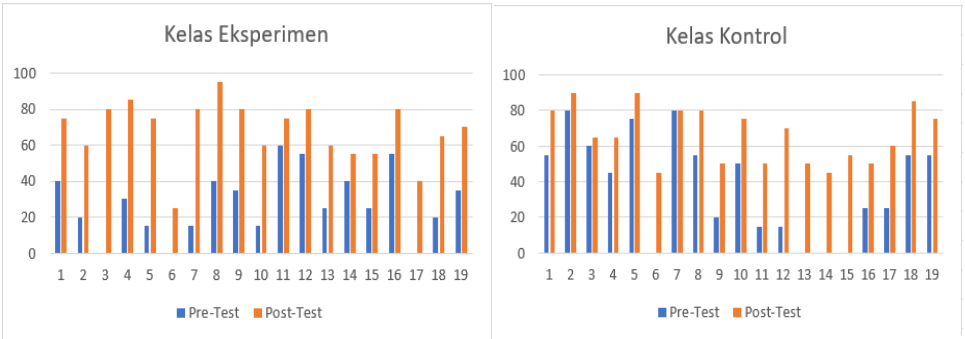
The data obtained was analyzed using the IBM SPSS *Statistics Version 29 application*. Data analysis includes a normality test using *Shapiro-Wilk* to ensure that the data is normally distributed, and a homogeneity test to ensure that the data variance between the two groups is not different. Hypothesis testing was carried out using *the independent sample T-test* to compare *the mean* between the experimental group and the control group.

3. Results and Discussion

Learning mathematics will be easier if it is based on students' interests, involves directly, is relevant and meaningful, such as buying and selling simulations. The use of simulation-based *serious games* in the Sunday market is the right solution to solve this problem because by designing learning that uses real world contexts, it can increase students' interest in learning and help them understand and apply numeracy concepts in everyday life.

Figure 1. Simulation-Based *Serious Game* Activities in the Market

In this research, whether or not a simulation-based *serious game is effective* can be seen from changes in *pretest* and *posttest* numeracy scores after learning outside the classroom with a simulation-based *serious game*. The following is a comparison diagram of *pretest* and *posttest* numeracy:



Pretest and *Posttest* Numeracy Bar Diagram

The figure shows a line graph comparing the *pretest* and *posttest* numeracy results of experimental and control class students. The X-axis shows the student's sequence number, while the Y-axis shows the numeracy value. The figure shows that students' numeracy abilities at the beginning of learning are still varied, with some students having high numeracy abilities and some students having low numeracy abilities, while the *posttest scores* show that the experimental class students' numeracy abilities have increased significantly after receiving the intervention. *serious* simulation based game. It can be inferred that numeracy learning carried out in the experimental class is effective in improving students' numeracy skills. The numeracy learning carried out in the control class is also effective in improving students' numeracy skills. This is proven by the significant increase in students' numeracy scores after taking part in the learning. The quantitative data was then analyzed using the IBM SPSS *Statistics* Version application 29, to compare *the means of* the two groups, researchers used descriptive statistics with the following results:

Group Statistics

	Kelompok	N	Mean	Std. Deviation	Std. Error Mean
Gainscore Numerasi	Eksperimen	19	40,5263	17,06969	3,91606
	Kontrol	19	28,9474	15,94948	3,65906

Figure 3. Descriptive *Statistics* SPSS *Output*

Based on the results of descriptive statistics, the mean score or *mean gains score* for experimental students = 40.52 and for the control group = 28.94. This shows that numeracy learning carried out in the experimental class is more effective than numeracy learning carried out in the control class.

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelompok	Statistic	df	Sig.	Statistic	df	Sig.
Kemampuan Pemecahan Masalah Numerasi	Kelompok Eksperimen	,133	19	,200*	,963	19	,638
	kelompok Kontrol	,124	19	,200*	,963	19	,642

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

a. Lilliefors Significance Correction

Figure 4. SPSS Normality Test *Output*

To test the normality of the data, normality testing is carried out by looking at the significance value in the *Shapiro-Wilk column* in the *Test of Normality table* above with the criterion if Sig. ≥ 0.05, and it was found that *the gain score* in the experimental group had a value of sig = 0.638 and *the gain score* in the control group had a value of sig = 0.642, which means that both were greater than α 0.05, so they

could be declared to be normally distributed so they needed to be tested for homogeneity. Homogeneity tests were carried out on *the Pretest* and *Posttest results* in both groups to find out whether the two classes had the same variance or not.

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Kemampuan Pemecahan Masalah Numerasi	Based on Mean	,043	1	36	,836
	Based on Median	,054	1	36	,817
	Based on Median and with adjusted df	,054	1	36,000	,817
	Based on trimmed mean	,033	1	36	,856

Figure 5. SPSS Homogeneity Test *Output*

Based on the Ho that was tested, it was found that the distribution of numerical problem solving ability data between the experimental group and the control group was not different from the test criteria if the Sig. > α 0.05 → Ho is accepted → The data variance between the two groups is not different → homogeneous. It's different if the Sig value. < α 0.05 → Ho is rejected → The data variance between the two groups is different → not homogeneous. Based on the results of the normality and homogeneity tests, it is known that the data is normally and homogeneously distributed so that hypothesis testing can be carried out. Where the hypothesis test in this research is in the form of an *independent sample T test* to analyze research data. *The output* is described as follows:

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance		Mean	Std. Error	95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Difference	Difference	Lower	Upper
Gainscore Numerasi	Equal variances assumed	,043	,836	2,160	36	,019	,037	11,57895	5,35950	,70938	22,44851
	Equal variances not assumed			2,160	35,835	,019	,038	11,57895	5,35950	,70765	22,45025

Figure 6. SPSS *Independent Sample T Test Output*

Based on the results of the T test hypothesis, the value obtained is sig = 0.037, which means it is smaller than α 0.05. Thus, Ho is rejected and Ha is accepted. So it can be concluded that there is a difference in average between the experimental group and control group students, so that there is effectiveness in learning using simulation-based *serious games* in solving numeracy problems, understanding numeracy questions, and carrying out mathematical operations.

This research aims to measure the effectiveness of simulation-based *serious games* on the numeracy problem-solving abilities of fifth grade elementary school students. The results showed that there was a significant increase in the *pretest* and *posttest* numeracy scores of experimental group students compared to the control

group. These findings are consistent with the research objective which is to find out whether the use of simulation-based *serious games* is effective in improving students' numeracy skills. The use of simulation-based *serious games* has proven effective in improving students' numeracy skills. Data shows that students who use simulation-based *serious games* experience significant improvements in *pretest* and *posttest results*. This improvement can be attributed to more interactive and contextual learning methods, which help students understand numeracy concepts in a more interesting and relevant way.

The findings of this study are in line with research (Kinanti & Zulkarnaen, 2024; Rachmawati & Watini, 2023; Ulandari et al., 2024), which highlights the importance of interesting learning methods to increase students' interest in mathematics. Additionally, research Ameilia et al., (2024) said that one of the effective media is through fun games and using learning media that can make students enthusiastic and active. Educational games can arouse student learning participation and motivation, and can improve learning outcomes. With effective mathematics learning, students will have a pleasant learning experience, improve their skills and understand concepts as well as the ability to solve problems effectively.

Meanwhile, research by Dafrinawati et al., (2023) into one of the games as a learning aid that can be used to stimulate students' love of learning mathematics is domino cards. Learning to play dominoes aims to provide students with the opportunity to form opinions after listening to the views and thoughts of other students in their group. Domino cards have been modified by filling in multiplication questions that are appropriate to the theme being studied. Good understanding of mathematics can also help students be more creative in solving mathematical problems. Thus, mathematical understanding can help students think critically and creatively (Destyaningrum & Arini, 2023). Therefore, a good understanding of mathematics is very important in learning mathematics in elementary school. Teachers can use appropriate approaches and strategies to help students understand mathematical concepts better.

The existence of good learning media and learning models makes learning feel real and trains students to be active. Apart from that, teachers can use smart board games in learning mathematics such as multiplication and division (Faizah, 2024; Sukiyati et al., 2023; Yulia & Aeni, 2024). With the smart board learning media, students practice multiplication and division directly using the media, making students' understanding of the multiplication and division material more real and meaningful. From these various studies, there are differences in the approach using a simulation of buying and selling in the market, which provides real-world context to students. Harahap & Eliza, (2022) also found that contextual approaches, such as *computational thinking* on the uses of money, were effective in mathematics learning, supporting the finding that real-world contexts improve students' understanding.

This research strengthens the theory that learning based on real-world and interactive contexts can improve student learning outcomes, especially in numeracy. Simulation-based *serious games*, such as those used in this study, add a new dimension to this theory by showing that simulations can be a highly effective tool in mathematics learning. This modifies the previous theory by adding interactive and contextual elements as the key to successful learning. The novelty of this research lies in the use of simulation-based *serious games* for numeracy learning in elementary schools, which has not been widely explored in previous research. This research shows that this method not only improves student learning outcomes but also makes learning more interesting and relevant to students' daily lives. Thus, this research makes a significant contribution to the development of innovative and effective mathematics learning methods at the elementary school level.

Based on the research results, it can be concluded that simulation-based *serious games* are an effective learning method for improving students' numeracy problem-solving abilities. It is hoped that using this method can help teachers implement learning that is more interesting and relevant for students. Apart from that, future researchers need to study more deeply the application of *serious games* in other aspects of abilities such as critical and analytical thinking. This research provides a strong foundation for the development of interactive learning theory and practice in the field of basic education, which can be widely applied to improve the quality of education.

4. Conclusions and Suggestions

Designing learning using real world contexts is an interesting and effective alternative learning method and helps understand and utilize numeracy concepts in a fun way. Applying the concept of numeracy in everyday life through simulation-based *serious games*, apart from being fun, also helps influence the quality of education, so that simulation-based *serious games* on the market are the right solution for solving numeracy problems, understanding numeracy questions, and carrying out mathematical operations. Based on the results of descriptive statistics, the mean score or *mean gains score* for experimental students = 40.52 and for the control group = 28.94. In the *Shapiro-Wilk column* in the *Test of Normality table* with the criterion if Sig. $\geq$ 0.05, and it was found that *the gain score* in the experimental group had a value of sig = 0.638 and *the gain score* in the control group had a value of sig = 0.642, which means that both were greater than α 0.05, so they could be declared to be normally distributed. The results of the T test hypothesis obtained a value of sig = 0.037, which means it is smaller than α 0.05. Thus, Ho is rejected and Ha is accepted. So it can be concluded that there is a difference in average between the experimental group and control group students, so that there is an influence and effectiveness in learning using simulation-based *serious games* in solving numeracy problems, understanding numeracy questions, and carrying out mathematical operations. Through this research, it is hoped that elementary school

teachers can make it easier to implement simulation-based *serious games*, besides that *serious games* can be applied to other appropriate material so that students are familiar with the learning context which encourages students to understand the mathematical concepts being studied. For future researchers, it is necessary to study more deeply to implement *serious games* in other aspects such as critical and analytical thinking skills, logical and systematic thinking skills and understanding of problem meaning.

5. Author Contribution

AM collected data, and wrote the article; PCC collects references, analyzes data and checks articles; EG provides advice and motivation as well as support.

6. Bibliography

Adrillian, H., Mariani, S., Prabowo, A., Zaenuri, Z., & Walid, W. (2024). Media Pembelajaran Berbasis Game Edukasi Matematika Untuk Meningkatkan Motivasi Dan Hasil Belajar Peserta Didik: Systematic Literature Review. *Jurnal Riset Dan Inovasi Pembelajaran*, *4*(2), 751–767. https://doi.org/10.51574/jrip.v4i2.1444

Ameilia, D., Purwanto, S. E., & Irdalisa, I. (2024). Pengembangan Media Belajar Kartu Hitung Untuk Meningkatkan Keterampilan Berhitung Pembagian Pada Siswa Kelas IV Sekolah Dasar. *Jurnal Darma Agung*, *32*(1), 550–563. http://dx.doi.org/10.46930/ojsuda.v32i2.4314

Andriyani, A. C., Ulya, H., & Kuryanto, M. S. (2023). Pengaruh Model Role Playing Dengan Permainan Tradisional Pasaran Terhadap Kemampuan Numerik Siswa. *Manazim*, *5*(1), 323–334. https://doi.org/10.36088/manazhim.v5i1.2938

Anugrahana, A., & Hasthiolivia, C. (2023). Pembelajaran PPR Untuk Meningkatkan Literasi Numerasi Pada Konsep Bilangan Mahasiswa. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *13*(2), 168–175. https://doi.org/10.24246/j.js.2023.v13.i2.p168-175

Aprilianto, A., & Mariana, W. (2018). Permainan Edukasi (Game) Sebagai Strategi Pendidikan Karakter. *Nazhruna: Jurnal Pendidikan Islam*, *1*(1), 139–158. https://doi.org/10.31538/nzh.v1i1.47

Ayuningtyas, N., & Sukriyah, D. (2020). Analisis pengetahuan numerasi mahasiswa matematika calon guru. *Delta-Pi: Jurnal Matematika Dan Pendidikan Matematika*, *9*(2), 237–247. https://doi.org/10.33387/dpi.v9i2.2299

Ayuningtyas, T. Y., & Wijayaningsih, L. (2020). Efektivitas Permainan Detumbar (Dengarkan, Temukan gambar) terhadap Minat Belajar Anak Usia Dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *5*(1), 814–822. https://doi.org/10.31004/obsesi.v5i1.724

Dafrinawati, D., Rasidi, R., Rahmawati, P., & Christi, A. M. (2023). Meningkatkan Kemampuan Berhitung Perkalian Melalui Model Pembelajaran Take and Give Berbantu Kartu Hitung pada Kelas III B SD Negeri Percobaan 2 Depok. *Jurnal Dimensi Pendidikan Dan Pembelajaran*, *11*(1), 139–147. http://dx.doi.org/10.24269/dpp.v11i1.8214

Destyaningrum, M., & Arini, N. W. (2023). Pengembangan media LAUT (Lompat Aksi Ular Tangga) pada pembelajaran matematika materi pengukuran waktu, dan panjang kelas 4 di sekolah dasar. *Jurnal Elementaria Edukasia*, *6*(3), 1187–1200. https://doi.org/10.31949/jee.v6i3.6268

Elpin, A., & Karolina, V. (2024). Efektivitas Pembelajaran Materi Pembangkit Listrik di Kelas VI SD: Perbandingan Antara Pembelajaran Melalui Membaca dan Menyimak Video. *Jurnal Pendidikan Dasar Perkhasa: Jurnal Penelitian Pendidikan Dasar*, *10*(1), 383–396. https://doi.org/10.31932/jpdp.v10i1.2967

Faidah, N., Harti, H., & Subroto, W. T. (2018). Pengaruh Pengalaman Ekonomi, Kontrol Diri Serta Pendapatan Siswa Terhadap Perilaku Ekonomi Siswa Sma Di Kecamatan Pasir Belengkong Kabupaten Paser. *Jurnal Ekonomi Pendidikan Dan Kewirausahaan*, *6*(1), 59–82. https://doi.org/10.26740/jepk.v6n1.p59-82

Faizah, S. N. (2024). Pengaruh Model The Power Of Two Berbantuan Media Papan Pintar Terhadap Hasil Belajar Matematika. *Jurnal Silogisme: Kajian Ilmu Matematika Dan Pembelajarannya*, *9*(1), 20–26. http://dx.doi.org/10.24269/silogisme.v9i1.8781

Harahap, M., & Eliza, D. (2022). E-modul pembelajaran coding berbasis pengenalan budaya Indonesia untuk meningkatkan computational thinking. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *6*(4), 3063–3077. https://doi.org/10.31004/obsesi.v6i4.2323

Hasanah, U. (2018). Strategi pembelajaran aktif untuk anak usia dini. *Insania: Jurnal Pemikiran Alternatif Kependidikan*, *23*(2), 204–222. https://doi.org/10.24090/insania.v23i2.2291

Hidayat, E. I. F., Yandhari, I. A. V., & Alamsyah, T. P. (2020). Efektivitas Pendekatan Realistic Mathematics Education (RME) untuk meningkatkan kemampuan pemahaman konsep matematika siswa kelas V. *Jurnal Ilmiah Sekolah Dasar*, *4*(1), 106–113. https://doi.org/10.23887/jisd.v4i1.21103

Hidayatulloh, S., Praherdhiono, H., & Wedi, A. (2020). Pengaruh game pembelajaran terhadap peningkatan hasil belajar pemahaman ilmu pengetahuan alam. *JKTP J. Kaji. Teknol. Pendidik*, *3*(2), 199–206. http://dx.doi.org/10.17977/um038v3i22020p199

Irawan, Y., Sa'adah, R., Thoyibah, A., Sari, M., Muslimah, M., & A'isyah, S. (2023). Analisis Pengembangan Butir Soal Perbandingan Bertingkat untuk Meningkatkan Kemampuan Pemecahan Masalah Peserta Didik. *Indiktika: Jurnal Inovasi Pendidikan Matematika*, *5*(2), 222–232. https://doi.org/10.31851/indiktika.v5i2.11592

Ismafitri, R., Muksar, M., Hadi, S., & Haryadi, H. (2024). Problematika Penerapan Soal Berbasis Numerasi Pada Pembelajaran Matematika Kelas V Sekolah Dasar di Kabupaten Lombok Barat. *Muallimuna: Jurnal Madrasah Ibtidaiyah*, *9*(2), 1–11. http://dx.doi.org/10.31602/muallimuna.v9i2.13144

Kinanti, N. A., & Zulkarnaen, Z. (2024). Optimalisasi Pembelajaran Baca Tulis melalui Sentra Persiapan pada Anak Usia 4-5 Tahun. *Murhum: Jurnal Pendidikan Anak Usia Dini*, *5*(1), 74–86. https://doi.org/10.37985/murhum.v5i1.474

Kusuma, M. A. (2022). Alternatif Pembelajaran Aktif di Era Pandemi melalui Metode Pembelajaran Game Based Learning. *Edcomtech: Jurnal Kajian Teknologi Pendidikan*, *7*(1), 28–37. http://dx.doi.org/10.17977/um039v7i12022p028

Kusumasari, P. R., Margunayasa, I. G., & Lasmawan, I. W. (2024). Game Edukasi Berbasis Pembelajaran Berdiferensiasi Pada Materi Sistem Pencernaan Manusia Kelas V SD. *Jurnal Ilmiah Pendidikan Profesi Guru*, *7*(1). https://doi.org/10.23887/jippg.v7i1.73061

Motimona, P. D., & Maryatun, I. B. (2023). Implementasi metode pembelajaran STEAM pada kurikulum merdeka untuk PAUD. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *7*(6), 6493–6504. https://doi.org/10.31004/obsesi.v7i6.4682

Nurajijah, M., Khaerunnisa, E., & FS, C. A. H. (2023). Kemampuan pemahaman konsep matematis siswa berdasarkan teori apos pada materi program linear. *Jurnal Educatio FKIP UNMA*, *9*(2), 785–797. https://doi.org/10.31949/educatio.v9i2.4800

Rachmawati, R. D., & Watini, S. (2023). Implementasi Model ATIK Dalam Peningkatan Kemampuan Calistung Pada Pelajar PAUD (Pendidikan Anak Usia Dini) Di Jakarta Barat. *Journal of Education Research*, *4*(3), 1334–1340. https://doi.org/10.37985/jer.v4i3.376

Rahmawati, R. L., & Nazarullail, F. (2020). Strategi pembelajaran outing class guna meningkatkan aspek perkembangan anak usia dini. *Jurnal PG-PAUD Trunojoyo: Jurnal Pendidikan Dan Pembelajaran Anak Usia Dini*, *7*(2), 9–22. https://doi.org/10.21107/pgpaudtrunojoyo.v7i2.8839

Saputra, I. G. P. E. (2024). Efektivitas Discovery Learning Terintegrasi Kearifan Lokal Terhadap Pemahaman Konsep Fisika di Era Kurikulum Merdeka. *Jurnal Pendidikan Fisika Undiksha*, *14*(1), 469–479. https://doi.org/10.23887/jjpf.v14i1.77212

Sari, D. R., Lukman, E. N., & Muharram, M. R. W. (2021). Analisis Kemampuan Siswa dalam Menyelesaikan Soal Geometri pada Asesmen Kompetensi Minimum-Numerasi Sekolah Dasar. *Fondatia*, *5*(2), 153–162. https://doi.org/10.36088/fondatia.v5i2.1387

Setiawan, E. P. (2019). Analisis muatan literasi statistika dalam buku teks matematika Kurikulum 2013. *Pythagoras: Jurnal Pendidikan Matematika*, *14*(2). http://dx.doi.org/10.21831/pg.v14i2.28558

Sukasmi, S., Asrowi, A., & Drajati, N. A. (2022). Optimizing the Utilization of Game-Based Learning Application for Elementary Students First Phase. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *6*(6), 5873–5885. https://doi.org/10.31004/obsesi.v6i6.3238

Sukiyati, N., Yudiana, K., & Ujianti, P. R. (2023). Media Papan Pintar berbasis Profil Pelajar Pancasila untuk Siswa Kelas II SD. *Jurnal Media Dan Teknologi Pendidikan*, *3*(2). https://doi.org/10.23887/jmt.v3i2.64312

Ulandari, S., Pranata, O. D., & Kencanawati, I. (2024). Analisis Minat Siswa dalam Konteks Integratif: Studi Deskriptif dan Komparatif dalam Pembelajaran Biologi. *Jurnal Pendidikan MIPA*, *14*(1), 131–138. https://doi.org/10.37630/jpm.v14i1.1486

Untari, A. D. (2022). Game Based Learning: Alternative 21st Century Innovative Learning Models in Improving Student Learning Activeness. *Edueksos Jurnal Pendidikan Sosial & Ekonomi*, *11*(2). http://dx.doi.org/10.24235/edueksos.v11i2.11919

Wulandari, M. D. (2021). Pengelolaan pembelajaran berorientasi literasi numerasi di Sekolah Dasar dalam kegiatan kurikuler dan ekstrakurikuler. *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar (JP2SD)*, *9*(2), 116–131. https://doi.org/10.22219/jp2sd.v9i2.17906

Yulia, R., & Aeni, A. N. (2024). Pengembangan Katarian Sebagai Media Edutainment Untuk Meningkatkan Kemampuan Berhitung Perkalian Siswa Kelas 3 Sekolah Dasar. *Jurnal Elementaria Edukasia*, *7*(1), 2303–2319. https://doi.org/10.31949/jee.v7i1.8263

Zahari, C. L., & Razali, M. (2022). Penjumlahan dan Pengurangan Penanaman Konsep Bilangan Bulat dengan Pendekatan Pembelajaran Matematika Realistik. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *6*(2), 2040–2047. https://doi.org/10.31004/cendekia.v6i2.1377