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OPTIMIZING STUDENTS' PROBLEM-SOLVING ABILITY AND LEARNING INTEREST THROUGH THE EDUCATIONAL GAME "ALGEBRA EXPLORER: THE SPLDV SAGA"

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Abstract

This study aimed to develop the educational game "Algebra Explorer: The SPLDV Saga" and to examine its effectiveness in improving junior high school students' problem-solving ability and learning interest. The study employed the Research and Development (R&D) method following the Borg and Gall model, comprising seven stages: identification of potential and problems, data collection, product design, design validation, product revision, product trial, and evaluation. The subjects were 28 eighth-grade students. The instruments consisted of a problem-solving ability test, a learning interest questionnaire, and a student response questionnaire. Validation results from subject-matter experts (87.47%) and media experts (90.91%) indicated that the product was highly valid and suitable for use. The mean problem-solving score increased from 63.57 to 82.38, and the paired samples t-test yielded a Sig. (2-tailed) value of 0.000 < 0.05, indicating a significant difference between pretest and posttest scores. The N-Gain value of 0.52 (moderate category) demonstrated that the game was effective in improving students' mathematical problem-solving ability, while student responses reached an average of 85.71% (very good category). Therefore, the educational game "Algebra Explorer: The SPLDV Saga" is effective in enhancing students' problem-solving ability and learning interest, and it received highly positive feedback.

Keywords: educational game, system of linear equations in two variables, problem-solving, learning interest.

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INTRODUCTION

Technological advancement in the twenty-first century plays a vital role in education. The integration of technology into learning has a positive impact on the development of skills required in this era (Yılmaz, 2021). Technology, with its various innovations, offers solutions to the challenges encountered in the learning process (Al Aslamiyah et al., 2019). Teachers therefore hold a crucial role in integrating technology into instruction through the use of technology-based learning media.

Technology-based learning media can facilitate students' learning processes in achieving learning targets (Dwi Septiani & Okmarisa, 2023) and contribute to improving students' achievement

and interest in mathematics (Egara & Mosimege, 2024). In practice, however, learning activities often rely heavily on textbooks, resulting in low student participation. This condition potentially reduces students' learning interest and, in turn, affects their ability to solve mathematical problems.

Several factors contribute to low interest and low problem-solving ability in mathematics, including teaching methods that lack variety and appeal, as well as material that is perceived as abstract and difficult to understand. These conditions diminish students' enthusiasm for learning, which is known to influence academic achievement (Maryana et al., 2018). This phenomenon was also observed at SMP Negeri 19 Pontianak, where teachers had not yet implemented technology-based learning media. Previous research has shown that students who lack learning interest tend to have low problem-solving ability, with approximately 60% of students experiencing difficulty in solving problem-solving tasks (Hermawati et al., 2024).

Learning interest and problem-solving ability are closely related. Learning interest is defined as an individual's attraction to being actively involved in learning by devoting full thought and attention to acquiring the required knowledge without coercion (Awaliyah & Fitrianna, 2018). Learning interest is an important factor influencing students' mastery of mathematical concepts and their ability to solve problems (Holidun et al., 2018). Without strong interest, students find it difficult to develop the desire to learn and to make an effort (Mayasari, 2019), because interest encourages students to explore various strategies and generate creative ideas in solving mathematical problems (Partayasa et al., 2020). Improving interest in learning mathematics requires innovations that are relevant and appealing to students. One effective approach is the use of educational games, which can make learning more enjoyable and interactive.

Educational games are digital multimedia learning tools that facilitate the learning process (Rudini & Saputra, 2022) and stimulate thinking, including the ability to concentrate and to solve problems (Wati & Istiqomah, 2019). They also provide interactive and enjoyable learning experiences that can increase students' interest and enthusiasm for learning mathematics (Yunus et al., 2015). With educational games, the learning environment becomes more engaging, allowing students to have enjoyable learning experiences so that the material is easier to remember and understand.

The game developed in this study presents challenges designed to stimulate students' motivation to learn. It adopts an adventure theme entitled "Algebra Explorer: The SPLDV Saga". In this game, players explore various islands and complete challenges on systems of linear equations in two variables (SPLDV) to obtain clues. Players must use the elimination, substitution, or graphical method to solve mysteries and find the key to the next level. The game design emphasizes challenges that players must overcome, thereby attracting students' interest in learning. Accordingly, this educational game serves as an effective means of improving problem-solving ability and fostering students' learning interest.

METHOD

This study employed the Research and Development (R&D) method following the Borg and Gall model with seven stages: identification of potential and problems, data collection, product design, design validation, product revision, product trial, and evaluation. The study was conducted at SMP Negeri 19 Pontianak. The subjects were one class of eighth-grade students. The research flowchart is presented in Figure 1.

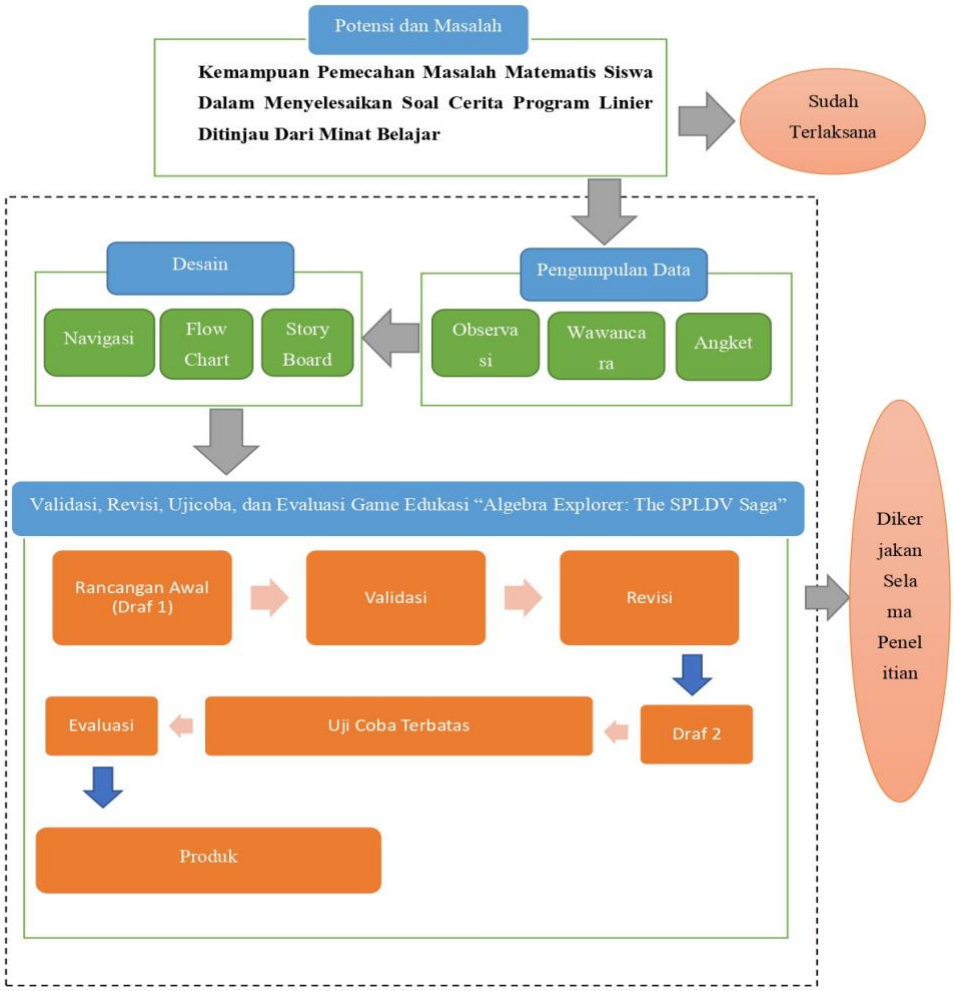

Figure 1. Research Flowchart

The research procedures were as follows.

1. Potential and Problem Identification Stage
   Prior to the study, an analysis of students' problem-solving ability and learning interest was conducted. At this stage, problems related to SPLDV material were explored, including the causes of students' low problem-solving ability and learning interest, as well as students' needs in addressing these problems in accordance with their characteristics.
2. Data Collection Stage
   At this stage, classroom observations were conducted to examine students' learning activities, interviews were carried out to identify students' characteristics and needs, and questionnaires were distributed to students.
3. Product Design Stage
   At this stage, the educational game "Algebra Explorer: The SPLDV Saga" was developed based on students' characteristics and learning needs. The objective of the game is for players to explore various islands and complete SPLDV challenges to obtain clues. Players must use the elimination, substitution, or graphical method to solve mysteries and find the key to the next level. The game consists of five levels, each with a different degree of difficulty, following the basic concept of gameplay governed by established rules involving winning and losing as an element of entertainment.
4. Validation Stage

At this stage, the product was validated by experts, namely three media experts, three subject-matter experts, and three language experts. The product was validated to ensure that the game was ready for use. During validation, the experts assessed the product using a validation sheet based on a four-point Likert scale, along with an open-ended questionnaire to obtain criticism and suggestions. The validity criteria (Hamzah & Widodo, 2021) are presented in Table 1.

Table 1. Product Validity Criteria

Percentage	Criteria
0%–20%	Very Poor
21%–40%	Poor
41%–60%	Fair
61%–80%	Valid/Feasible
81%–100%	Highly Valid/Feasible

5. Product Revision Stage
   At this stage, the product was revised based on the experts' input during validation. Revisions were made until the product was declared feasible by the experts.
6. Product Trial Stage
   A limited trial was conducted with one class of eighth-grade students at SMP Negeri 19 Pontianak. The subjects were selected using cluster random sampling. Prior to sample selection, a homogeneity test using Bartlett's test was performed on the mathematics scores of the seven eighth-grade classes (VIII A–VIII G) to determine whether the variances of the seven classes were relatively equal, so that each class had an equal chance of being selected as the research sample. Bartlett's test yielded χ^2-calculated = 5.41, whereas χ^2-table = 12.592 at the 5% significance level with 6 degrees of freedom. Since χ^2-calculated < χ^2-table (5.41 < 12.592), H_0 was accepted, and the variances of the seven classes were concluded to be homogeneous. A random draw using cluster random sampling then selected class VIII C as the research sample, so all students in class VIII C served as the research subjects. During the product trial, instruction was delivered by the teacher using the developed educational game. Before the trial, students were given a problem-solving ability test consisting of five essay questions and a learning interest questionnaire to determine their conditions prior to the use of the educational game. After the trial, students were again given a problem-solving ability test of five essay questions and a learning interest questionnaire to determine their responses after using the game. The learning interest questionnaire was a closed questionnaire consisting of statements, each with five response alternatives based on a Likert scale, along with an open-ended questionnaire to obtain criticism and suggestions from students. Test data were analyzed using inferential statistics, namely the paired samples t-test in SPSS, to examine the improvement from pretest to posttest; the product was considered effective if an improvement was found. An N-Gain calculation was then performed to determine the magnitude of the improvement. The N-Gain categories are presented in Table 2.

Table 2. N-Gain Categories

N-Gain Value	Effectiveness Category
N-Gain ≥ 0.70	High
0.30 ≤ N-Gain < 0.70	Moderate
N-Gain < 0.30	Low

(Sundayana, 2015)

7. Product Evaluation Stage
   At this stage, improvements and refinements were made based on the results of the product trial to obtain a better final product.

RESULTS AND DISCUSSION

This study was conducted using the Borg and Gall development model with seven stages: identification of potential and problems, data collection, product design, design validation, product revision, product trial, and evaluation, resulting in the educational game "Algebra Explorer: The SPLDV Saga". The initial stages, potential and problem identification and data collection, were carried out before product development. Mathematics learning plays an important role in training logical, analytical, and problem-solving thinking. One essential topic at the junior high school level is the system of linear equations in two variables (SPLDV). This topic not only serves as a basic competency that must be mastered but also forms the foundation for learning more complex algebraic concepts at subsequent levels. However, field observations indicated that students' mastery of SPLDV was not yet optimal. Based on preliminary observations and teacher interviews, many students experienced difficulty in: 1) understanding the intent of word problems related to SPLDV, 2) formulating mathematical models from everyday problems, and 3) solving systems of equations using various methods (substitution, elimination, and graphing). On the other hand, junior high school students are digital natives who are familiar with technology and digital games, a potential that can be harnessed through the development of educational games. According to Prensky (2001), the digital generation is more easily motivated when learning is combined with interactive game-based media. Integrating educational games into mathematics learning therefore holds considerable promise for increasing student engagement.

Preliminary observations and teacher interviews identified three main problems. First, the average attainment of students' problem-solving ability was only 50.9% of the ideal score, indicating that most students were in the moderate category. This finding is consistent with the OECD (2019) report of the Programme for International Student Assessment (PISA), which states that Indonesian students' problem-solving ability remains low compared with the OECD average. Second, the initial questionnaire showed an average learning interest score of 72.7%, which falls in the high category but is not yet optimal. According to Schunk, Pintrich, and Meece (2014), high learning interest influences students' active engagement in learning, whereas low interest makes students tend to be passive. Third, mathematics instruction at the school was still dominated by lectures and conventional exercises. This condition is in line with Sari and Surya (2017), who found that traditional mathematics instruction often bores students because it rarely creates a challenging and enjoyable learning atmosphere, whereas Arsyad (2019) emphasizes that technology-based learning media can improve the quality of learning interaction, provide new experiences, and strengthen conceptual understanding. The lack of media innovation caused students to be less motivated to explore the material independently. Based on this analysis, the problems of low problem-solving ability and learning interest can be addressed through the development of an educational game. According to Hamzah (2019), gamification in mathematics learning can increase students' intrinsic motivation through elements of competition, challenge, and reward. Moreover, Kurniawan et al. (2021) demonstrated that adventure-based educational games can significantly improve students' learning outcomes and interest. Accordingly, the development of "Algebra Explorer: The SPLDV Saga" is a relevant alternative solution for optimizing SPLDV learning. The game was designed to integrate problem-solving challenges within an adventure storyline so that students become more active, motivated, and challenged in solving problems.

After identifying the potential and problems and collecting data, the next step was product design. The design began with planning the content of the educational game to be developed. The product is an adventure-based educational game entitled "Algebra Explorer: The SPLDV Saga", developed with the Unity engine. The game was designed to help students understand SPLDV material through interactive challenges packaged as missions. It adopts a gamification model that combines entertainment elements (storyline, characters, levels) with educational elements (problems, hints, feedback). According to Deterding et al. (2011), gamification is the use of game design

elements in non-game contexts to increase user motivation and engagement. The storyline follows an explorer who travels to solve mysteries in an ancient city, where each mystery can only be solved by completing an SPLDV problem; each completed mission unlocks a new level. The use of a narrative structure is consistent with the Cognitive-Affective Theory of Learning with Media (Moreno & Mayer, 2007), which explains that narratives in learning media can increase students' emotional engagement so that they become more focused and motivated. Players must apply the elimination, substitution, or graphical method to solve the mysteries and find the key to the next level. The game consists of five levels of increasing difficulty. According to Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD), effective learning occurs when challenges are presented gradually from simple to complex, encouraging students to master new skills without frustration. The initial design of the game is shown in Figure 2.

Figure 2. Design of the Educational Game "Algebra Explorer: The SPLDV Saga"

Validation was carried out by the validators to determine the validity of the developed game. The validation results were used to revise and improve the game before the trial. Validation sheets were given to the validators to assess the game, and revisions were made based on their suggestions and input. After the revisions, the game was re-validated to confirm the appropriateness of the improvements.

The validity of the game was obtained from the assessments of the three validators, as presented in Table 3.

Table 3. Validation Results

Experts	Validator I (%)	Validator II (%)	Validator III (%)	Mean (%)	Criteria
Media Experts	92.73	90.91	89.09	90.91	Highly Valid
Subject-Matter Experts	86.4	90.4	85.6	87.47	Highly Valid

Table 3 shows that the mean media expert validation score across the three validators was 90.91% (highly valid), while the mean subject-matter expert validation score was 87.47% (highly valid). The overall validation results indicated that the educational game "Algebra Explorer: The SPLDV Saga" met the highly valid criteria and was therefore feasible for trial.

The validation also produced comments and suggestions from the three validators, which were used to revise and improve the game. The comments, suggestions, and corresponding improvements are presented in Table 4.

Table 4. Validators' Comments and Suggestions

No	Validator	Subject-Matter Expert Comments	Media Expert Comments	Improvements
1	Validator I	The SPLDV material is aligned with the junior high school curriculum. However, word problems should draw more on students' everyday contexts, such as buying and selling in the canteen or dividing study groups, to be closer to students' experiences.	The visual design is very attractive and appropriate for junior high school students. Colors and illustrations are adequate. However, game instructions would be easier to understand if presented as short animations.	The game now presents more word problems relevant to students' daily lives and includes answer guides to help students respond to the problems more easily.
2	Validator II	The problems are accurately presented with clear solution steps. The game has strong potential for training problem-solving ability. It is recommended that problem difficulty be graded from simple to complex.	Interactivity is good; the game is responsive and user friendly. It would be more engaging with reward elements such as points, badges, or appreciation sounds for correct answers.	The problems at each level are now graded in difficulty, and sound effects are provided when students answer correctly.
3	Validator III	Overall good, but the narratives in the problems need to be simpler so that lower-achieving students can understand them. Mathematical terms should be accompanied by examples.	Navigation is fairly clear, but some menus need adjustment to be more concise. It is suggested to use icons familiar to junior high school students to avoid confusion.	Answering in the game is now guided with fill-in responses, and icons that students commonly recognize are used.

After the game was validated and revised, a limited product trial was conducted with one eighth-grade class at SMP Negeri 19 Pontianak. The trial aimed to examine students' problem-solving ability, learning interest, and responses after using the game. Learning interest and student responses were measured with questionnaires, while problem-solving ability was measured through pretest and posttest results.

In the trial, students first completed a problem-solving ability test before using the game to measure their initial ability. Learning then proceeded with the eighth-grade mathematics teacher introducing the SPLDV material, followed by the use of the game in groups, allowing students to discuss and answer the problem-solving tasks embedded in each level. Afterwards, the teacher administered a final test. The results of the problem-solving ability test are presented in Table 5.

Table 5. Problem-Solving Ability Test Results

No	Statistic	*Pretest*	*Posttest*
1	Highest Score	93.33	100
2	Lowest Score	26.67	53.33
3	Mean	63.57	82.38
4	Mastery (≥ 75)	4 students (14.29%)	24 students (85.71%)

The trial results showed an improvement in students' problem-solving ability after using the game. A normality test was then performed on the pretest and posttest data. The Shapiro-Wilk test yielded significance values of 0.136 and 0.122, both greater than 0.05, so the data were normally distributed and the normality assumption for the t-test was satisfied. A hypothesis test was then conducted to determine whether there was an improvement from pretest to posttest. The results are presented in Table 6.

Table 6. Hypothesis Test Results

	Mean	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper	t	df	Sig. (2-tailed)
Pretest–Posttest	-18.809	10.781	2.037	-22.989	-14.628	-9.232	27	0

Table 6 shows that the paired samples t-test yielded a Sig. (2-tailed) value of 0.000, which is less than 0.05, indicating a significant difference between the pretest and posttest scores. Thus, the educational game "Algebra Explorer: The SPLDV Saga" is effective in improving students' mathematical problem-solving ability. The N-Gain calculation produced a value of 0.52, placing the effectiveness of the game in the moderate category. The balance-scale mechanic helped students understand SPLDV operations visually, making it easier for them to devise solution strategies. Qualitatively, the improvement was most evident in the elimination and substitution methods, particularly in understanding the equality of both sides of an equation. The visualization of a scale that must always remain balanced provides a concrete representation that any operation performed on one side of an equation must also be performed on the other. This representation helped students reduce errors in moving terms, changing signs, and determining the order of solution steps systematically. Furthermore, in contextual problems, students found it easier to model the problems into two linear equations before determining the values of the two variables. These findings indicate that the visualizations in the game not only improved learning outcomes but also strengthened students' conceptual understanding of SPLDV solution procedures.

These findings support Huang (2014), who reported that e-learning games on systems of linear equations can improve students' conceptual understanding and problem-solving ability. The results are also consistent with Hasanah (2022), who found that educational games can enhance higher-order thinking through interactive and challenging learning activities. The mean posttest score of 82.38 shows that the developed game effectively helped students practice mathematical problem-solving skills. This is in line with Hidayat and Sariningsih (2018), who stated that game-based learning media

can improve critical thinking and mathematical problem-solving because they provide more active, contextual, and meaningful learning experiences.

Students' learning interest in using the game was measured with a learning interest questionnaire, which was used to examine students' enthusiasm for learning with the game. The questionnaire yielded a score of 81.67%, in the very good category. Students reported feeling more motivated because the game presented challenges and a storyline relevant to everyday life. This is consistent with Hui (2023), who confirmed that game-based learning is effective in increasing students' motivation and engagement in mathematics, and with Hamzah (2019), who found that gamification in mathematics learning can increase students' intrinsic motivation.

At the end of the lesson, a student response questionnaire on the game was administered, yielding a score of 85.71%, in the very good category. Students felt that learning mathematics became more enjoyable and less monotonous. This response aligns with the literature stating that gamification and educational games can create more engaging learning experiences, and with Hasanah (2022), who found that educational games make students more active and interested in learning mathematics. The very good responses indicate that the game succeeded in creating an enjoyable learning atmosphere, consistent with Kurniawan et al. (2021), who reported that game-based media receive positive responses because they suit the learning styles of the digital generation.

CONCLUSION

Based on the results and discussion, the following conclusions can be drawn. 1) The educational game "Algebra Explorer: The SPLDV Saga" was developed using the Borg and Gall R&D model through the stages of potential and problem identification, data collection, product design, validation, revision, trial, and evaluation. Validation results from subject-matter experts (87.47%) and media experts (90.91%) placed the product in the highly feasible category for use as a mathematics learning medium. 2) The mean problem-solving score increased from 63.57 to 82.38 after using the game. The paired samples t-test yielded a Sig. (2-tailed) value of 0.000 < 0.05, indicating a significant improvement from pretest to posttest, so the game is effective in improving students' mathematical problem-solving ability, with an N-Gain of 0.52 in the moderate category. The game was also able to foster students' learning interest in SPLDV, a topic often perceived as difficult, with an interest score of 81.67% in the very good category. 3) Student responses to the game were very good, with an average of 85.71%, demonstrating that the educational game can create an enjoyable, relevant, and meaningful learning atmosphere.

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REFERENCES

Al Aslamiyah, T., Setyosari, P., & Praherdhiono, H. (2019). Blended learning dan kemandirian belajar mahasiswa teknologi pendidikan. *Kajian Teknologi Pendidikan, 2*(2), 109–114.

Arsyad, A. (2019). *Media pembelajaran*. Jakarta: Rajawali Pers.

Awaliyah, W., & Fitrianna, A. Y. (2018). Hubungan minat belajar terhadap kemampuan penalaran matematik siswa SMP pada materi lingkaran. *JPMI (Jurnal Pembelajaran Matematika Inovatif), 1*(2), 93.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). Gamification: Using game design elements in non-game contexts. In *Proceedings of the CHI 2011 Extended Abstracts on Human Factors in Computing Systems* (pp. 2425–2428).

Dwi Septiani, B., & Okmarisa, H. (2023). Pengembangan media pembelajaran menggunakan Construct 2 dengan pendekatan scaffolding pada materi laju reaksi. *Jurnal Research in Education Chemistry, 5*(1), 12.

Egara, F. O., & Mosimege, M. (2024). Effect of flipped classroom learning approach on mathematics achievement and interest among secondary school students. *Education and Information Technologies, 29*(7), 8131–8150.

Hamzah, A. N., & Widodo, D. W. (2021). Game edukasi matematika untuk meningkatkan kemampuan berhitung dengan metode Naïve Bayes. *Jurnal Seminar Nasional Inovasi Teknologi*, 7–14.

Hamzah, B. (2019). *Pembelajaran matematika dengan gamifikasi*. Jakarta: Prenadamedia Group.

Hasanah, N. (2022). Pengaruh game edukasi terhadap kemampuan berpikir tingkat tinggi siswa. *Jurnal Pendidikan Matematika dan Sains, 10*(1), 55–63.

Hermawati, W., Ardiawan, Y., & Irvandi, W. (2024). Kemampuan pemecahan masalah matematis siswa dalam menyelesaikan soal cerita program linier ditinjau dari minat belajar di kelas XI SMA Negeri 01 Menjalin. *Indo-MathEdu Intellectuals Journal, 5*(4), 4645–4658.

Hidayat, R., & Sariningsih, R. (2018). Meningkatkan kemampuan berpikir kritis matematis melalui media berbasis permainan. *Jurnal Pembelajaran Matematika Inovatif, 1*(2), 45–52.

Holidun, H., Masykur, R., Suherman, S., & Putra, F. G. (2018). Kemampuan pemecahan masalah matematis kelompok matematika ilmu alam dan ilmu-ilmu sosial. *Desimal: Jurnal Matematika, 1*(1), 29.

Huang, R. (2014). The impact of e-learning games on students' learning outcomes in mathematics: A study on linear equations. *International Journal of Emerging Technologies in Learning, 9*(3), 23–29.

Hui, L. (2023). Game-based learning in mathematics: A systematic review. *Journal of Educational Technology Development and Exchange, 16*(1), 1–20.

Kurniawan, A., Putra, D. F., & Santoso, R. (2021). Pengembangan game edukasi berbasis petualangan untuk meningkatkan hasil belajar siswa. *Jurnal Pendidikan Matematika Indonesia, 6*(2), 101–110.

Maryana, I. M. S., Candiasa, I. M., & Waluyo, D. (2018). Pengembangan game edukasi sebagai media pembelajaran deret bilangan di sekolah menengah atas. *Jurnal Pendidikan Matematika Undiksha, 9*(2), 19–30.

Mayasari, D. (2019). Penggunaan matematika realistik melalui media autograph untuk meningkatkan minat dan pemecahan masalah matematis. *Musamus Journal of Mathematics Education, 2*(1), 12–21.

Moreno, R., & Mayer, R. E. (2007). Interactive multimodal learning environments. *Educational Psychology Review, 19*(3), 309–326.

OECD. (2019). *PISA 2018 results (Volume I): What students know and can do*. Paris: OECD Publishing.

Partayasa, W., Suharta, I. G. P., & Suparta, I. N. (2020). Pengaruh model pembelajaran creative problem solving (CPS) berbantuan video pembelajaran terhadap kemampuan pemecahan masalah ditinjau dari minat. *Jurnal Nasional Pendidikan Matematika (JNPM), 4*(1), 168–179.

Prensky, M. (2001). *Digital game-based learning*. New York: McGraw-Hill.

Rudini, M., & Saputra, A. (2022). Kompetensi pedagogik guru dalam memanfaatkan media pembelajaran berbasis TIK masa pandemi Covid-19. *Aksara: Jurnal Ilmu Pendidikan Nonformal, 8*(2), 841.

Sari, R. P., & Surya, E. (2017). Analisis kesulitan belajar matematika siswa SMP pada materi SPLDV ditinjau dari minat belajar. *Jurnal Pendidikan Matematika, 11*(1), 45–56.

Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2014). *Motivation in education: Theory, research, and practice* (4th ed.). Boston: Pearson Higher Education.

Sundayana, R. (2015). *Statistik penelitian pendidikan*. Bandung: Alfabeta.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wati, W., & Istiqomah, H. (2019). Game edukasi fisika berbasis smartphone Android sebagai media pembelajaran fisika. *Indonesian Journal of Science and Mathematics Education, 2*(2), 162–167.

Yılmaz, A. (2021). The effect of technology integration in education on prospective teachers' critical and creative thinking, multidimensional 21st century skills and academic achievements. *Participatory Educational Research, 8*(2), 163–199.

Yunus, M., Astuti, I. F., & Khairina, D. M. (2015). Game edukasi matematika untuk sekolah dasar. *Informatika Mulawarman: Jurnal Ilmiah Ilmu Komputer, 10*(2), 59.