

IMPLEMENTATION OF EDUCATIONAL SNAKE AND LADDER GAMES IN IMPROVING THE UNDERSTANDING OF INTEGER OPERATIONS IN ANMOK LEARNING GROUPS

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Abstract. This community service project aims to describe the application of educational snakes and ladders games in enhancing children's understanding of integer operations within the Anmok Learning Group in Rewarangga Village. Using a qualitative descriptive approach with 20 elementary school students who are members of the Anmok Learning Group, data were collected through observation, interviews, tests, and documentation. The results show that the educational snakes and ladders game effectively improves understanding of integer concepts, learning motivation, and social values such as cooperation and sportsmanship. Therefore, this game serves as a fun and engaging learning medium that also supports the development of children's numeracy literacy in non-formal learning environments. The use of educational snakes and ladders games can be positioned as one of the innovative learning strategies relevant to non-formal education contexts. This medium serves as an engaging learning tool that aligns instructional goals while supporting efforts to enhance children's numeracy literacy within the community. These findings recommend that educators and non-formal learning facilitators incorporate educational games in a planned and systematic manner as an alternative learning approach adapted to the characteristics of learners.

Keywords: educational game, snakes and ladders, integers, numeracy literacy.

Abstrak. Pengabdian kepada masyarakat ini bertujuan mendeskripsikan penerapan permainan edukatif ular tangga dalam meningkatkan pemahaman operasi bilangan bulat pada anak-anak Kelompok Belajar Anmok di Kelurahan Rewarangga. Menggunakan pendekatan deskriptif kualitatif dengan 20 peserta didik sekolah dasar yang tergabung dalam kelompok belajar Anmok, data diperoleh melalui observasi, wawancara, tes, dan dokumentasi. Hasil menunjukkan bahwa permainan ular tangga edukatif efektif meningkatkan pemahaman konsep bilangan bulat, motivasi belajar, serta nilai-nilai sosial seperti kerja sama dan sportivitas. Dengan demikian, permainan ini menjadi media pembelajaran kontekstual yang menyenangkan sekaligus mendukung peningkatan literasi numerasi anak-anak di lingkungan belajar nonformal. Penggunaan permainan ular tangga edukatif dapat diposisikan sebagai salah satu strategi pembelajaran inovatif yang relevan dalam konteks pendidikan nonformal. Media ini berfungsi sebagai sarana pembelajaran yang menyenangkan namun tetap berorientasi pada tujuan instruksional, sekaligus mendukung upaya peningkatan literasi numerasi anak-anak di lingkungan masyarakat. Ini merekomendasikan agar pendidik dan fasilitator belajar nonformal mengintegrasikan permainan edukatif secara terencana dan sistematis sebagai alternatif pendekatan pembelajaran yang adaptif terhadap karakteristik peserta didik.

Kata Kunci: bilangan bulat, literasi numerasi, permainan edukatif, ular tangga

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INTRODUCTION

Mathematics is one of the subjects that plays an important role in shaping logical, systematic, and critical thinking skills from an early age. However, in practice, many elementary school students have difficulty understanding basic mathematical concepts, especially in the subject of integer operations (Pratiwi & Shodikin, 2022). This is due to the abstract nature of the material and the often-monotonous presentation of the lessons, which makes students less motivated to learn (Rahmawati & Rasyid, 2022). Therefore, more creative and interesting learning strategies are needed so that students can understand the material in a fun way (Bukit



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et al., 2023). One innovation that can be applied in mathematics learning is the use of educational games as a learning medium. Game-based media is considered capable of facilitating a more dynamic learning process because students are actively involved in activities that combine cognitive, affective, and social elements (Hui & Mahmud, 2023). According to Prasetyo (2021), game media can create an active, interactive, and enjoyable learning atmosphere, so that students not only receive material passively but also experience the learning process directly through play activities. In this situation, games serve as a bridge between abstract concepts and the concrete experiences of students, making it easier to construct and internalize mathematical concepts (Nurnberger-Haag et al., 2023).

Furthermore, educational games enable students to gradually develop thinking strategies, decision-making abilities, and problem-solving skills. Through the game rules, challenges, and feedback obtained during play, students are encouraged to reflect and correct any mistakes that arise (Hwang et al., 2025). In the context of learning integer operations, the use of game media such as educational snakes and ladders has proven effective in improving students' conceptual understanding and learning outcomes (Khairi, 2023). This is because the game integrates direct counting activities, such as addition and subtraction of integers, in accordance with the movement of the pawns in the game, so that students gain a more realistic and meaningful learning experience (Putri & Kurniawan, 2020). Thus, educational games not only serve as entertainment but also as a pedagogical strategy that supports constructive, enjoyable learning oriented towards improving numeracy literacy (Jamaludin & Tan, 2024).

The game of Snakes and Ladders is a simple medium that is very familiar to children, so it has great potential to be used in a learning context. This game basically relies on moving pawns from one square to the next based on the result of a dice roll, as well as challenges in the form of ladders and snakes that affect the player's position (Sorkin, 2023). When this traditional game is modified into an educational game, the structure of the squares can be adapted so that each step on the game board contains questions or tasks related to integer operations (McMullen et al., 2024). Before moving on to the next square, players are required to solve the problem correctly. This mechanism requires students to think quickly, apply calculation strategies, and relate the concept of integers to the game situation they are facing (Nurnberger-Haag et al., 2023).

In addition to providing conceptual training, educational snakes and ladders activities also contribute to the development of students' affective and social aspects (Asril et al., 2025). The process of interaction between players fosters a sense of enthusiasm, togetherness, and sportsmanship, as students learn to accept the results of the game, both victory and defeat, in a reasonable manner. They are also encouraged to help each other and discuss when faced with difficult questions, resulting in meaningful collaborative learning (Sari et al., 2021). Thus, educational snakes and ladders games not only serve as an alternative fun learning medium but also as an effective means of combining entertainment with targeted learning activities focused on improving understanding of integer operations (Pancasilawati et al., 2025).

The Community Empowerment Activity by Students in Rewarangga Village, through the application of educational snakes and ladders games to children who are members of the Anmok study group, is a form of learning innovation that is oriented towards improving community numeracy literacy. Through this activity, students play an active role in providing a contextual and enjoyable mathematics learning experience outside the formal school environment. In addition to helping children understand integer operations more easily, this activity also supports the realization of the vision of "Empowered Rewarangga Village" through improving the quality of human resources from an early age. With the implementation of the educational game of snakes and ladders in teaching integer operations, it is hoped that children will not only gain a better understanding of the concept but also develop a sustained interest in learning mathematics. This activity shows that creative and participatory education can be a strategic step in empowering the community, especially in the field of basic education.

METHOD

This Community Empowerment Activity by Students was carried out in Rewarangga Village, East Ende District, Ende Regency, for two months from September to October 2025. The main target of this activity is children who actively participate in learning activities and are members of the Anmok Study Group. There are 20 participants, consisting of elementary school students in grades III to VI. The location of the activity was chosen because the Anmok Study Group, also known as Teras Baca Anmok, is one of the community literacy centres that plays an important role in supporting the improvement of children's reading interest and numeracy skills in the neighbourhood. The implementation method consists of several interrelated stages.

The first stage is field observation and socialization, which aims to identify children's learning needs, difficulties in understanding integer operations, and the availability of facilities and infrastructure (Salvia et al., 2022; Acosta & Soliba, 2024). in the Anmok Learning Group.

The second stage is planning, which involves designing an educational snakes and ladders game using the Canva application, compiling integer operation questions tailored to their ability levels, and then printing them to create an attractive snakes and ladders banner (Fatmawati & Andriani, 2024).

The implementation stage was carried out by applying the educational snake and ladder game as a learning medium at the Reading Terrace (Fahrurnisah, 2025). The children were divided into two groups of ten, then played while completing integer operation questions and challenges found on each square of the game. Each step of the game was accompanied by simple math questions so that the children could understand the concept of integers more deeply through direct experience.

The final stage is the evaluation and reflection of the activity, which is done by observing the enthusiasm and participation of the children during the activity, as well as assessing their learning outcomes after participating in the educational game (Nadeem et al., 2023). This evaluation also serves as the basis for providing recommendations for the development of similar learning activities in the future, especially in non-formal environments such as the Anmok Learning Group.

RESULT AND DISCUSSION

The implementation of the educational snake and ladder game was carried out in the Anmok Learning Group during three meetings, each lasting approximately 90 minutes. The focus of the activity was directed at improving understanding of integer operations through the application of the educational snake and ladder game as a fun, interactive, and contextual learning medium.

Stage 1. Field observation and socialization

In the initial stage, the research team carried out systematic field observations and socialization activities to obtain a comprehensive picture of the children's learning conditions and challenges (Prins et al., 2022). The primary focus was to identify specific difficulties related to their understanding of integer operations. The observations revealed that many students still struggled with mixed computational tasks and frequently confused the roles of positive and negative numbers in problem-solving situations (Woo & Falloon, 2022). These misconceptions often led to calculation errors and hindered the development of deeper conceptual understanding.

Furthermore, it was found that the learning facilities available at the Anmok Learning Group remained relatively limited. Learning resources, instructional media, and supporting tools were not yet optimal to facilitate interactive and student-centered activities. As a result, there was an urgent need for innovative learning media that could stimulate students' interest and help them visualize mathematical concepts more concretely (Jannah et al., 2025).

To ensure that the planned activities were well received, the team conducted socialization sessions with the Head of Rewarangga Village, the manager of the Anmok Learning Group, and the parents of the students. During these sessions, the objectives, benefits, and implementation

procedures of the program were explained in detail. The discussions generated positive responses, and all stakeholders expressed strong support for the initiative, recognizing its potential to create a learning process that was more enjoyable, meaningful, and easier for children to comprehend.



Figure 1. Socialization of the Anmok Reading Terrace in Rewarangga Village

Stage 2. Planning

The planning stage focused on creating educational snake and ladder game media. The game design was created using the Canva application with an attractive and colorful display to motivate children to learn (Blazhko & Luhova, 2018). Each square in the game is equipped with various integer operation questions, ranging from addition to mixed operations (Dresher, 2012). The media is then printed in the form of a 2x1.5 m2 banner so that it can be played in groups. This planning is in line with Huda (2018) opinion that learning that utilizes visual and kinesthetic media can increase student engagement and help the process of internalizing concepts in a more meaningful way (Boyliyeva, 2024).



Figure 2. Snake and ladder game banner

Stage 3. Implementation

The implementation stage represents the core phase of the activity, during which the educational snake and ladder game is integrated into a structured yet enjoyable learning environment (Mulyono et al., 2024). Before the commencement of the game, students were administered a pretest consisting of ten items that measured their understanding of basic integer operations. This instrument was designed to capture their initial conceptual grasp, particularly related to addition and subtraction involving positive and negative integers (Lopez,

2022). The pretest results revealed that a considerable proportion of the children experienced difficulties when performing operations with integers, especially in situations that required them to compare magnitudes, interpret signs, or operate with negative numbers. These findings confirmed the importance of providing learning experiences that are both concrete and engaging.

Following the pretest, the children were divided into two groups, each comprising ten participants, and they took turns engaging in the educational snake and ladder activity. At each step of the game, learners encountered integer-based questions or challenges that had been embedded into the board design. To progress to the next square, they were required to solve the given task correctly. This mechanism ensured that the game remained cognitively demanding while still being accessible and enjoyable. During the activity, the classroom atmosphere became noticeably more active and competitive, yet it retained a friendly and supportive tone (Rye et al., 2025). Students collaborated spontaneously, shared strategies, and demonstrated increasing confidence when explaining their answers to peers (Fakoya et al., 2023).

The observations during this stage indicated a gradual improvement not only in students' numerical accuracy, but also in their ability to reason about integer relationships. Discussions that emerged during gameplay encouraged students to articulate their thinking processes, negotiate meaning, and learn from one another's mistakes (Cicchino, 2015). Furthermore, the cooperative nature of the activity fostered positive social interactions, including mutual assistance, turn-taking, and respectful communication (Mondémé, 2022). These findings are consistent with Widyaningrum & Sari (2022), who reported that educational games such as snakes and ladders can enhance students' conceptual understanding of mathematics while simultaneously strengthening social collaboration and engagement within the learning environment.



Figure 3. *Use of mathematical snakes and ladders game*

After implementing the snakes and ladders game, the learning atmosphere became livelier and more enjoyable (Salsabila et al., 2025). The children were enthusiastic about participating in the game, working together in groups, and eagerly completing each problem on the game board (Ramani et al., 2012). Observations showed that most children improved their understanding of positive and negative numbers. They were able to verbally explain the calculation steps when asked by the activity facilitator (Hartnett & Gelman, 1998). This game also helped children remember the rules of number operations in a more contextual way because they were applied in a playful situation full of interaction and challenges (DePascale & Ramani, 2025).

Stage 4. Evaluation and reflection

At this stage, observations were made on the children's enthusiasm, engagement, and learning outcomes after the activity. Based on the results of observations and simple tests given

after the game, there was an increase in understanding of the concept of integer operations (Çankaya & Yildiz, 2022). Before the activity, most children still made mistakes in solving problems involving negative numbers, but after playing the educational snakes and ladders game, they began to understand the basic rules of these operations better (Abarua & Lokollo, 2021). In addition to cognitive improvement, this activity also had a positive impact on the children's motivation and attitude toward learning. They became more confident in answering questions, more focused, and enjoyed the process of learning mathematics more (Wu et al., 2022). This is in line with Uno (2020) view, which emphasizes that learning motivation can grow when students feel actively involved and have enjoyable learning experiences.

Overall, the use of the educational snakes and ladders proved to be effective in improving understanding of integer operations while also creating a positive learning atmosphere in a non-formal environment (Mulyono et al., 2024). In addition to improving conceptual understanding, this activity also had a positive impact on children's motivation and learning activity. During the activity, the children showed a high level of curiosity, cooperated with their peers, and displayed a healthy competitive spirit (Lyons, 2022). Based on simple interviews conducted after the activity, most children stated that learning mathematics through the snake and ladder game felt easier and more enjoyable than the usual learning methods (Aenuri et al., 2023). They also admitted to better understanding positive and negative signs because they often used them while playing.

This activity also shows that the process of community empowerment through education does not have to be done formally in schools but can be implemented through community learning spaces such as Study Groups. PMM students act as facilitators who help connect learning concepts with the real lives of children, making education more inclusive and empowering. Thus, the application of the educational snake and ladder game in the Anmok Study Group not only improves understanding of integer operations but also supports the strengthening of children's numeracy literacy in the Rewarangga sub-district in a sustainable manner.

CONCLUSION

Based on the results of the Community service activities in Rewarangga Village with the application of the educational game of snakes and ladders about integer operations, it can be concluded that the use of this game media is able to increase the understanding and motivation of the children in the Anmok Learning Group. Through a fun and interactive approach, children become more active, dare to try, and can understand the concept of integer operations more easily. In addition to improving learning outcomes, this activity also showed positive changes in children's attitudes towards mathematics learning. They no longer consider mathematics a difficult subject, but rather an interesting and challenging activity. Interactions between participants during the game also fostered social values such as cooperation, sportsmanship, and responsibility.

Thus, the application of the educational snake and ladder game has proven to be effective as an alternative contextual learning strategy in improving the understanding of basic mathematical concepts, especially integer operations. This activity is expected to inspire educators, students, and other literacy communities to develop similar learning media that are tailored to the needs and characteristics of children in non-formal learning environments.

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REFERENCES

- Abarua, H., & Lokollo, L. J. (2021). The Effect of Instruction Using Arithmetic Bowling and Snake and Ladder Games In Increasing Cognitive Development of Early Childhood In Ambon City. *International Journal of Education, Information Technology, and Others*, 4(1), 50-61. DOI: <https://doi.org/10.5281/zenodo.4668005>
- Acosta, C. P., & Soliba, B. L. (2024). Pedagogical approach of grade 7 teachers in teaching the learning competency of integers. *Educational Technology Quarterly*, 2024(1), 38-55. DOI: <https://doi.org/10.55056/etq.652>
- Aenuri, A., Wahyuningsih, W., & Zahro, A. (2023). Learning Model for Practicing Counting Through the "Snake and Ladders" Game Method. *Journal of Multimedia Trend and Technology*, 2(2), 102-110. DOI: <https://doi.org/10.35671/jmtt.v2i2.35>
- Asril, Z., Zeky, S., Utami, M., & Fitri, R. (2025). Implementation Of Snakes And Ladders Game On Cognitive Development Of 5-6 Year Old Children. *Journal of Islamic Early Childhood Education*, 3(1), 124-129. Restricted to link: <https://mail.jurnal.staiyastispadang.ac.id/index.php/Jiece/article/view/251>
- Blazhko, O. A., & Luhova, T. A. (2018). Features of using the canvas-oriented approach to game design. *Applied aspects of information technology*, 1(1), 66-77. DOI: <https://doi.org/10.15276/aa.01.2018.5>
- Boyliyeva, D. (2024). UTILIZING KINESTHETIC ACTIVITIES IN PRIMARY EDUCATION: ENHANCING LEARNING THROUGH MOVEMENT. *Mental Enlightenment Scientific-Methodological Journal*, 5(09), 34-38. <https://doi.org/10.37547/mesmj-V5-I9-06>
- Bukit, S., Marcela, E. D., & Ernawati, E. (2023). Teacher's Strategy to Create Fun Learning in Elementary School. *Journal Corner of Education, Linguistics, and Literature*, 2(3), 244-249. <https://doi.org/10.54012/jcell.v2i3.129>
- Çankaya, E. A., & Yıldız, C. E. (2022). Examining Integers-Based Math Game Created By A Fourth Grade Student. *Problems of Education in the 21st Century*, 80(6), 750. <https://www.cceeol.com/search/article-detail?id=1086625>
- Cicchino, M. I. (2015). Using Game-Based Learning to Foster Critical Thinking in Student Discourse. *Interdisciplinary Journal of Problem-Based Learning*, 9(2), 4. DOI: <https://doi.org/10.7771/1541-5015.1481>
- DePascale, M., & Ramani, G. B. (2025). The Role of Math Games for Children's Early Math Learning: A Systematic Review. *Journal of Numerical Cognition*, 11, 1-24. <https://doi.org/10.5964/jnc.14897>
- Dresher, M. (2012). *The mathematics of games of strategy*. Courier Corporation.
- Fahrurnisah, F. (2025). Application of the Traditional Snakes and Ladders Game as an Indonesian Language Learning Media to Train Students' Language Skills in Elementary Schools. *MANDALIKA: Journal of Social Science*, 3(1), 1-7. DOI: [10.56566/mandalika.v3i1.177](https://doi.org/10.56566/mandalika.v3i1.177)
- Fakoya, A. O. J., Ndrio, M., & McCarthy, K. J. (2023). Facilitating active collaborative learning in medical education; a literature review of peer instruction method. *Advances in medical education and practice*, 1087-1099. <https://doi.org/10.2147/AMEP.S421400>
- Fatmawati, E., & Andriani, A. E. (2024). Development of Interactive Edugame Learning Media Based on Snakes & Ladders to Improve IPAS Learning Outcomes. *Jurnal Pijar Mipa*, 19(3), 429-436. DOI: [10.29303/jpm.v19i3.6668](https://doi.org/10.29303/jpm.v19i3.6668)

- Hartnett, P., & Gelman, R. (1998). Early understandings of numbers: Paths or barriers to the construction of new understandings?. *Learning and instruction*, 8(4), 341-374. [https://doi.org/10.1016/S0959-4752\(97\)00026-1](https://doi.org/10.1016/S0959-4752(97)00026-1)
- Huda, M. (2018). *Model-Model Pengajaran dan Pembelajaran: Isu-Isu Metodis dan Paradigmatik*. Yogyakarta: Pustaka Pelajar.
- 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, 1105806. <https://doi.org/10.3389/fpsyg.2023.1105806>
- Hwang, G. J., Huang, H., & Chen, H. Y. (2025). Promoting students' civic literacy and positive learning behaviors: A supportive feedback-based decision-making gaming approach. *Education and Information Technologies*, 30(1), 189-227. <https://doi.org/10.1007/s10639-024-12839-0>
- Jamaludin, A., & Tan, A. L. (2024). Implementing Neuroscientific Game-Based Pedagogy to Remediate Math Learning Struggles in Singapore: A CEREBRATE-MATH Model. In *Developing Future-ready Learners for a Global Age* (pp. 103-116). Routledge.
- Jannah, G. F., Robicha, N., Syarifah, K. I., & Rasilah, R. (2025). Introduction to basic Mathematical concepts through learning media. *Journal of Mathematics Instruction, Social Research and Opinion*, 4(1), 43-56. DOI: <https://doi.org/10.58421/misro.v4i1.290>
- Khairi, M. (2023). STUDENT LEARNING OUTCOMES ON THE APPLICATION OF TGT LEARNING MODEL THROUGH DEVELOPMENT MEDIA SNAKES LADDERS. *INCARE, International Journal of Educational Resources*, 4(2), 183-189. DOI: <https://doi.org/10.59689/incare.v4i2.720>
- Lopez, L. M. R. (2022). Enhancement of the performance of junior high school students using numeracy mobile game on operations of integers. *International Journal of Multidisciplinary: Applied Business and Education Research*, 3(11), 2397-2418. DOI: <https://doi.org/10.11594/ijmaber.03.11.23>
- Lyons, S. (2022). *Cooperative games in education: Building community without competition, Pre-K-12*. Teachers College Press.
- McMullen, J., et al. (2024). A game-based approach to promoting adaptive rational number knowledge. *Mathematical Thinking and Learning*, 26(4), 411-427. <https://doi.org/10.1080/10986065.2023.2177818>
- Mondémé, C. (2022). Why study turn-taking sequences in interspecies interactions?. *Journal for the Theory of Social Behaviour*, 52(1), 67-85. <https://doi.org/10.1111/jtsb.12295>
- Mulyono, R., Hidayat, T., & Purbonuswanto, W. (2024). The Application of Educational Snakes and Ladders Media to Enhance Learning Engagement among Elementary School Students at Home. In *Proceedings of International Conference on Science and Technology for the Internet of Things*, Vol. 1, No. 01, pp. 55-63. <https://seminar.ustjogja.ac.id/index.php/ICSTI/article/view/2627>
- Nadeem, M., Oroszlanyova, M., & Farag, W. (2023). Effect of digital game-based learning on student engagement and motivation. *Computers*, 12(9), 177. <https://doi.org/10.3390/computers12090177>
- Nurnberger-Haag, J., Wernet, J.L., & Benjamin, J.I. (2023). Gameplay in perspective: Applications of a conceptual framework to analyze features of mathematics classroom games in consideration of students' experiences. *International Journal of Education in Mathematics, Science, and Technology (IJEMST)*, 11(1), 267-303. <https://doi.org/10.46328/ijemst.2328>
- Pancasilawati, E. S., Sutopo, Y., & Yuwono, A. (2025). Development of Fun Multiplication Learning Media with Snakes and Ladders and Multiplication Cards to Improve Cognitive Abilities of Grade IV Elementary School Students. *DIAJAR: Jurnal Pendidikan dan Pembelajaran*, 4(2), 209-220. DOI: <https://doi.org/10.54259/diajar.v4i2.4218>

- Prasetyo, Y. (2021). Pemanfaatan Permainan Edukatif dalam Meningkatkan Motivasi Belajar Matematika Siswa SD. *Jurnal Cendekia Pendidikan Matematika*, 5(2), 102–113.
- Pratiwi, E. D., & Shodikin, A. (2022). Analysis of Understanding Mathematical Concepts in Junior High School Students on Integer Operation Material. *UJMC (Unisda Journal of Mathematics and Computer Science)*, 8(1), 11-18. DOI: <https://doi.org/10.52166/ujmc.v8i1.2834>
- Prins, J., van der Wilt, F., van der Veen, C., & Hovinga, D. (2022). Nature play in early childhood education: A systematic review and meta ethnography of qualitative research. *Frontiers in psychology*, 13, 995164. <https://doi.org/10.3389/fpsyg.2022.995164>
- Putri, D. & Kurniawan, R. (2020). Penggunaan Permainan Ular Tangga untuk Meningkatkan Pemahaman Operasi Hitung Bilangan Bulat. *Jurnal Ilmiah Pendidikan Dasar*, 7(3), 213–222.
- Ramani, G. B., Siegler, R. S., & Hitti, A. (2012). Taking it to the classroom: Number board games as a small group learning activity. *Journal of Educational Psychology*, 104(3), 661–672. <https://doi.org/10.1037/a0028995>
- Rye, S., Sousa, M., & Sousa, C. (2025). Introduction to game-based learning. In *Transformative Learning Through Play: Analogue Games as Vehicles for Educational Innovation* (pp. 29-68). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-78523-8_2
- Salsabila, S., Soraya, I., & Hamdani, A. S. (2025). Development of Snakes and Ladders Learning Media Based on Joyful Learning in Islamic Religious Education Subjects. *AL-WIJDA'N Journal of Islamic Education Studies*, 10(2), 449-461. DOI: <https://doi.org/10.58788/alwijdn.v10i2.6854>
- Salvia, G., Pluchinotta, I., Tsoulou, I., Moore, G., & Zimmermann, N. (2022). Understanding urban green space usage through systems thinking: A case study in Thamesmead, London. *Sustainability*, 14(5), 2575. <https://doi.org/10.3390/su14052575>
- Sari, N., Lestari, F., & Handayani, M. (2021). Pengembangan Media Pembelajaran Ular Tangga Matematika untuk Siswa Sekolah Dasar. *Jurnal Inovasi Pendidikan Dasar*, 9(2), 178–189.
- Sorkin, G. B. (2023). Snakes and Ladders and Intransitivity, or what mathematicians do in their time off. *The Mathematical Intelligencer*, 45(4), 312-318. <https://doi.org/10.1007/s00283-022-10250-6>
- Uno, H. B. (2020). *Teori Motivasi dan Pengukurannya: Analisis di Bidang Pendidikan*. Jakarta: Bumi Aksara.
- Widyaningrum, A., & Sari, R. N. (2022). Penerapan Permainan Ular Tangga dalam Pembelajaran Matematika untuk Meningkatkan Pemahaman Konsep Bilangan Bulat Siswa Sekolah Dasar. *Jurnal Pendidikan dan Pembelajaran Dasar*, 9(2), 112–120.
- Woo, K., & Falloon, G. (2022). Problem solved, but how? An exploratory study into students' problem solving processes in creative coding tasks. *Thinking Skills and Creativity*, 46, 101193. <https://doi.org/10.1016/j.tsc.2022.101193>
- Wu, C. H., Liu, C. H., & Huang, Y. M. (2022). The exploration of continuous learning intention in STEAM education through attitude, motivation, and cognitive load. *International Journal of STEM Education*, 9(1), 35. <https://doi.org/10.1186/s40594-022-00346-y>