

UTILIZATION OF FUN GAMES AS EARTHQUAKE DISASTER MITIGATION EFFORTS FOR INCLUSIVE CHILDREN

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Abstract

The lembang fault is active and can potentially trigger earthquakes in the West Bandung Regency area and its surroundings. The lembang fault has two segments, namely the western and eastern segments, with a 3 mm/year movement. The Ngamprah Raya Special School (SLB) is a school for children with special needs located in the Lembang fault area in the western segment. This condition causes SLB Ngamprah Raya to be in an earthquake-prone area. One of those affected is highly vulnerable to earthquakes, namely children, even more vulnerable, namely children with special needs or inclusion. Children with special needs need education regarding the Lembang fault earthquake and earthquake disaster mitigation. Earthquake disaster mitigation learning based on fun games needs to be done for Children with Special Needs. The purpose of this study is to utilize fun game media for earthquake disaster mitigation education for children with special needs. The method used is participatory observation involving accompanying teachers and students. The sample used is accidental sampling. The study results show that the fun game of snakes and ladders based on disaster mitigation is effective and efficient for children with special needs with mental retardation. In its implementation, game time and participants must be considered and limited to achieve learning. Students get developmental achievements as expected by going through three cycles. Each cycle is carried out with an effective and efficient snake and ladders game adjustment scheme. Learners are more likely to be able to capture interactive material. Snakes and ladders fun game can be an alternative solution in developing earthquake disaster mitigation learning media for mental retardation.

Keywords: Fun game, Disaster Mitigation, Children with Special Needs.

INTRODUCTION

West Bandung Regency has a structural area forming a fault formation, commonly referred to as the Lembang fault. The Lembang fault is an active fault that moves from east to west (Rasmid, 2014). This fault has a high disaster risk, including ground shaking, surface rupture, and possible erosion or liquefaction (Handayani et al., 2021). The Lembang fault is active even though its tectonic activity level is low

to intermediate (Syalsabilla et al., 2020). The estimated slip rate is 6 mm/yr, with fault locking at 3-15 km and shallow creeping at the same rate (Meilano et al., 2012). This condition causes the Lembang fault area and its surroundings to be included in an earthquake-prone area (Aji et al., 2018).

The Ngamprah Raya Special School is located at a location traversed by the Lembang fault. The Lembang fault is in the

West Bandung Regency area (Ricky, 2021), so vulnerable to earthquakes caused by the Lembang fault. Ngamprah Raya Special School is close to the Lembang fault and to an active volcano, namely Tangkuban Parahu so earthquake triggers can be caused by tectonic or volcanic activity.

One affected is highly vulnerable to earthquakes, namely children, especially inclusive children (Children with Special Needs) (Barus, 2021). A disaster is an event that causes trauma for those who have experienced it, and there are different emotional reactions based on age groups (Nurfalah et al., 2022). Children are considered more difficult to deal with traumatic events because they have limitations in life experience, problem-solving skills and the ability to express feelings (Putra and Aditya, 2014). Children are most vulnerable to disasters due to a lack of understanding of disaster mitigation (Muhlisah et al., 2021). Disaster mitigation efforts are crucial in active fault areas such as the Lembang Fault (Muslim and Endayana, 2015).

Preparations to reduce the impact of natural disasters can be done with preventive measures called mitigation (Yildiz et al., 2020). Mitigation is actions to reduce or minimize the potential negative impacts of a disaster and the initial stages of disaster management (Irawan et al., 2022). Disaster mitigation is not only a skill that adults must possess, but children are also very important to master disaster mitigation skills (Rahiem and Widiastuti, 2020). Children with special conditions also have the right to master disaster mitigation skills. Children with special needs have a very large risk impact compared to children with normal conditions when a disaster occurs (Sari et al., 2020). Therefore, educating children on disaster mitigation is urgently needed for children with special needs.

The fun game method using the Snake Ladder is an alternative to developing children's skills (Chayati et al., 2021). Fun games like Snake-Ladder can be applied to learning about earthquake disaster

mitigation (Ersani and Mukminan, 2021). Children tend to easily accept learning related to earthquake disaster mitigation through the Snake Ladder game (Nirmala et al., 2021). Teachers and students learn with a response stimulant and practice in the Snake-Ladder game (Syawaluddin et al., 2020). The game of snakes and ladders can be a stimulant trigger and response for children with special needs (Putri Rahayu et al., 2019).

Ngamprah Raya Special School is a special school for special children in Sukatani Village, Ngamprah District, West Bandung Regency. This school is the only one that carries the concept of a boarding school for children with special needs in West Bandung Regency. The learning carried out in this special school is generally learning that is indeed applied as in schools for special children. So, learning about disaster mitigation has not been given to students. Participants living in disaster-prone areas need disaster mitigation education (Hayudityas, 2020).

The location of Special School Ngamprah, which is in an area prone to earthquakes, requires special attention for students to receive disaster mitigation training; therefore, learning about disaster mitigation must follow the circumstances of the children at Special School Ngamprah so that it is interesting and can be understood easily. Games are a fun way of learning for disaster mitigation education (Kurniawan, 2017). Modifications of traditional games such as snakes and ladders are considered effective in teaching knowledge about disaster mitigation.

The novelty of this research is to create an earthquake-based snakes and ladders game scheme for children with special needs by directly introducing earthquake-trigger areas around the school. The modification of the game will later be adapted to the conditions of the students in the research area. This research aims to use the fun game media for earthquake disaster mitigation education for children with special needs.

RESEARCH METHODS

Location

This research was conducted at Ngamprah Raya Special School, Sukatani Village, Ngamprah District, West Bandung Regency. This location is at latitude coordinates -6.836791461723072, longitude 107.49493329207311. The Lembang fault traverses the study location in the western area of the fault. The characteristics of the study site are in a hilly topography, so it has a degree of slope ranging from gentle, rather steep to steep.

Methods

This study uses a participatory observation approach. Observations involve students (Pradhana, 2018) and companions in the fun game snakes and ladders. Fun games here provide education related to disaster mitigation in direct practice, and later there will be an explanation at each stage. This participatory observation is carried out in its entirety using fun game products and evaluation instruments that have been made previously. The snake and ladder design are large, so the game is interactive, and each student will take turns being placed in the appropriate box for earthquake disaster mitigation content.

Research stages

The first stage is identification planning and concept formulation. The concept of snakes and ladders will be adjusted to the existing conditions, so a literature study and field survey will be carried out to obtain secondary and primary data. The population in this study is all children with special needs and assistants at SLB Ngamprah Raya. The research sample is children with special needs using the accidental sampling technique.

The second stage is implementation. The implementation of the service will be carried out in several terms or due diligence related to the game of snakes and ladders.

Based on several references, feasibility can be tested with two activities. The first activity is an experiment on the suitability of earthquake mitigation content, the type of game of snakes and ladders, and the participation of children with special needs and their companions. The second stage of testing is the same activity but based on the evaluation results of the first activity so that later there will be a game model feasibility questionnaire.

The third stage is conducting monitoring and evaluation; monitoring and evaluation are carried out when the implementation occurs, after activity one and after activity two. When implementation takes place, monitoring is carried out based on research instruments provided by the developer. The instrument will be adjusted to the criteria for student participation according to the percentages and categories attached in table 1. This stage is carried out in several cycles, according to the needs of respondents in achieving mitigation education. The instrument includes variables and indicators in table 2. The detailed research stages are attached in Figure 1 of the research flowchart.

The percentage of instruments is adjusted to the number of observation points, including the indicators in table 2 of the research variables. The percentage is measured from the direct participatory observation action assessment. The instrument includes the number of questions, the achievement percentage of each variable in earthquake disaster mitigation education, and the snake and ladder game model. The accompanying teacher will fill in the instrument because she is the one who knows more about the development of inclusive students. The researcher also filled out the instrument as a comparison of the results of each variable.

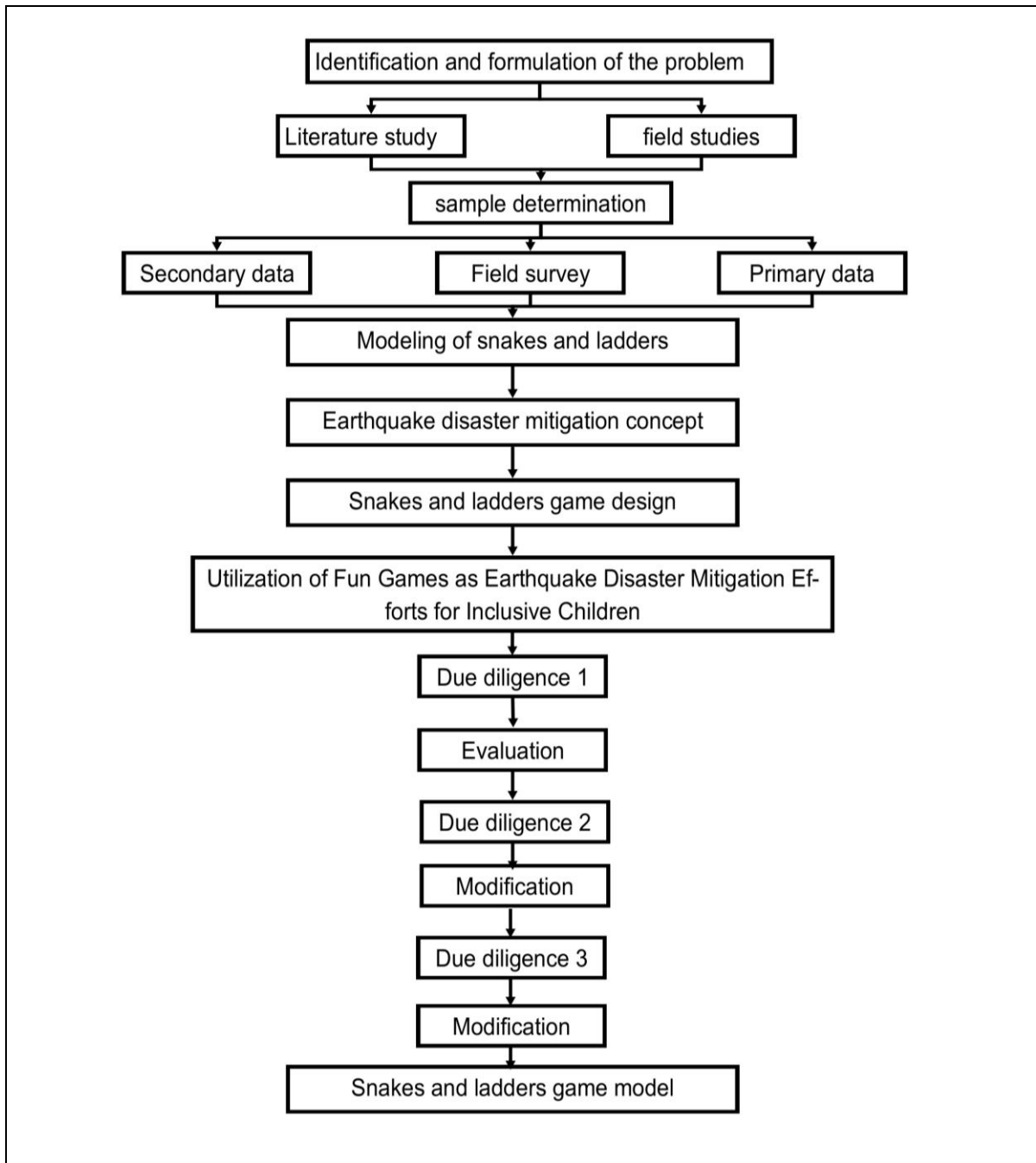


Figure 1. Research flow design

Table 1 Category of Research Instruments

No	Percentage	Category Student development	Game Model Design Category
1	76% - 100%	Very well developed	Very suitable
2	51% - 75%	Develop as expected	Suitable
3	26% - 50%	Starting to develop	Enough
4	0% - 25%	Undeveloped	Not suitable

Table 2 Research Variables

Variable X	Indicator	Variable Y
Earthquake Disaster Mitigation	Prepare a plan for self-rescue in the event of an earthquake.	Snake Ladder Game Model Based on Earthquake Disaster Mitigation
	I am doing exercises that can be useful in dealing with the debris during an earthquake, such as ducking, head protection, holding on or hiding under a table.	
	Stay alert for aftershocks	
	Stand in the open, away from buildings and electrical and water installations.	
	Knowledge of the Lembang Fault.	
Snake and ladder game model	Game design	
	User ease of use	
	Game set (Game board, Pawns, Dice, Cards (Contains Materials, bonuses, zones, treats, orders).	
	Perceptions of companions and children with special needs related to the suitability of the game model.	

RESULTS AND DISCUSSION

Student Characteristics

Based on data, Ngamprah Raya Special School has several types of inclusive students, namely autism, moderate mental retardation, mild mental retardation, mild quadriplegic, moderate quadriplegic, deaf, Down syndrome, deaf and hyperactive. Students are between 2002 to 2013, so it is assumed that they have an age range of 9 to 20 years. Most students live in West Bandung; some live in Bandung City, East Bandung, Cimahi City, Bekasi Regency, and Bogor City. Previously, students had received education on earthquake disaster mitigation from schools, so knowledge related to earthquakes was relatively familiar.

In this study, the type of Children with Special Needs who became the object of study on average was mentally retarded. Children with special needs are, of course, accompanied by accompanying teachers, who are indeed more competent in dealing with students. According to children with special needs and the type of mental retardation, students have various characteristics. The instructor first gives the material related to the style that mentally disabled students can understand, and then

the accompanying teacher assists in receiving the material. Students tend to respond well in teaching, and disaster knowledge tends to be accepted quite well.

Earthquake Disaster Mitigation Education

The achievement of development is carried out in three cycles. In the first cycle, the average child is in the assessment of starting to develop, which is around 26% - 50%. Aspects that are assessed include the following:

1. Children with Special Needs understand the concept of earthquake disaster situations and conditions.
2. Children with Special Needs know the mitigation steps to be taken when an earthquake occurs.
3. Children with Special Needs always carry out earthquake disaster mitigation practices.
4. Children with Special Needs can learn simple evacuation routes in an earthquake.
5. Children with Special Needs can work together in earthquake disaster mitigation practices.

6. Children with Special Needs recognize the dangers of the Lembang fault in the area where they live/school.

In the second cycle, there began to be developments in the concept of the situation (number 1), mitigation practices (number 3), knowledge of evacuation routes (number 4), and cooperation in mitigation practices (number 5), which had an increase in that it developed as expected,

was in the range of 51% - 75%. Conceptually, students' knowledge is slow in capturing a discussion, but in practice, students can follow it carefully so that the assessment develops as expected. Some students get different assessments, while students in the first cycle have an assessment of developing expectations. Only one assessment began to develop, namely knowledge related to the Lembang fault



Figure 2. Earthquake disaster mitigation education



Figure 3. Simulation of shelter during an earthquake

The concept of mitigation and the Lembang fault area has not been able to develop as expected; students only know and cannot describe according to development achievements. Still, students know what to do when an earthquake

occurs. Previous students have done disaster simulations at school so that, in practice, they can know what to do when an earthquake occurs. The accompanying teachers and the school are also responsive in earthquake disaster mitigation, so that

disaster mitigation education can increase knowledge, especially those that are fun games. The third cycle tends to have the same assessment as the second cycle.

Snaks and Ladders Game Design

The snake and ladder game design contains the concept of a fun game based on disaster mitigation. Several approaches are implemented in this game, such as each student taking turns rolling the dice, which

is a Montessori approach. In this activity, students can engage in dice-throwing activities and child-centred learning (Wulandari et al., 2018). The teacher provides evaluations and conclusions regarding the earthquake disaster mitigation fun game, which is included in the high-scope approach. In this section, students develop problem-solving, interpersonal and communication skills (Rohmah N et al. 2019).



Figure 4. Fun process of disaster mitigation games

Each snake and ladder box contains disaster mitigation information material, detailed in table 3. If the dice show the numbers 1 to 4, then enter the discussion of earthquake material and the first attitude in the event of an earthquake. If the dice show the numbers 5 to 6, then the discussion about the causes and attitude toward earthquakes is included. The next line stage is a discussion related to attitudes when an earthquake occurs and attitudes at the end of the earthquake. This section includes the Erikson and Resources, Events and Agents (REA) approaches. Erikson's approach refers to the concept of calm self, goal setting, values and beliefs (Sunuhadi et al., 2013). The REA model has a give-to-get principle (Yuliana, 2001), so this approach

follows the snake and ladder design in earthquake disaster mitigation.

The disaster mitigation design assessment cycle has a cyclical task. Snakes and ladders are used and practised following disaster mitigation educational instruments, then evaluated according to the directions for use. In cycle one, the snake and ladder design are in the good category in the 26% to 50% range. The snake and ladder designs were then re-modified in the second and third cycles. The second and third cycles have similarities in the assessment. The aspects of being assessed are:

1. The snake and ladder model is easy to understand by users, teachers or students.

2. The game model always develops a series of activities that are easy to understand for Children with Special Needs.
3. The form of activities is interesting, makes it easier for teachers to learn about disaster mitigation, and is friendly to children with special needs.
4. Games improve the quality of the readiness of teachers and children with special needs.
5. Simulating disaster mitigation for Children with Special Needs is more efficiently developed through this model.
6. The use of cutting-edge games to develop the ability of Children with Special Needs to understand disaster situations.

1 Start (keep Calm)	2 What is an Earthquake? (given an earthquake definition card)	3 Given a picture of the <u>Lembang</u> fault (the cause of the earthquake) Up to 5	4 Stay calm Go up to number 6
5 Given a picture of the <u>Lembang</u> fault (the cause of the earthquake)	6 What is an Earthquake? (given an earthquake definition card) Down to number 4	7 Hiding under the table	8 Follow the evacuation route symbol
9 Avoid glass and electricity	10 Avoid high building	11 Keep your distance from friends so they don't pile up (Down to 8)	12 Keep your distance from potentially falling items (Up to 14)
13 Follow the parent's instructions to the open	14 Run to the open area (Down to 12)	15 Follow the teacher's instructions to the open	16 Finish Gather in an open area

Figure 5. Snakes and ladders design

The percentage of instruments is adjusted to the number of observation points, including the indicators in table 2 of the research variables. The percentage is measured from the direct participatory observation action assessment. The instrument includes the number of questions, the achievement percentage of each variable in earthquake disaster mitigation education, and the snake and ladder game model. The accompanying

teacher will fill in the instrument because she is the one who knows more about the development of inclusive students. The researcher also filled out the instrument as a comparison of the results of each variable.

The category is very appropriate with a percentage of 76%-100%, including the game, always developing a series of activities that are easy to understand for inclusive children and interesting forms of activity (number 2) and make it easier for

teachers to carry out learning about disaster mitigation, are friendly to inclusive children (number 3). The categories, according to the percentage of 51% - 75%, include aspects that are easy to understand for users (number 1), improving the quality of teacher and inclusive children alertness (number 4), efficiency of mitigation simulations (number 5), and the use of cutting-edge games to develop inclusive children's ability to understand situations disaster (number 6).

CONCLUSION

A fun game based on disaster mitigation, snakes and ladders is suitable for children with special needs with mental retardation. Students get the achievement of development as expected by going through three cycles. Learners are more likely to be able to capture interactive material, such as direct practice and direct examples. The snake and ladder game model combines several learning approaches, such as the Montessori approach, the Erikson approach, the Resources approach, Events and Agents, and the high scope approach. The fun game snake and ladder can be an alternative solution in developing learning media for earthquake disaster mitigation for mentally disabled people.

REFERENCE LIST

- Aji, R.P., Prasetyo, Y., Awaluddin, M., 2018. Studi Sesar Lembang Menggunakan Citra Sentinel-1a Untuk Pemantauan Potensi Bencana Gempa Bumi. *J. Geod. Undip* 7, 304-313.
- Barus, S., 2021. Penerapan Pola Simulasi Mitigasi Bencana Alam (Gempa Bumi) Pada Guru dan Orang Tua Siswa Di Sekolah Luar Biasa. *J. Keperawatan BSI* 9, 41-48.
- Chayati, N., Sugiyo, S., ..., 2021. The Influence of Snake-Ladder Game toward Early Childhood Children's Mathematics Skills. *J. Prim. ...* 10, 373-380.
- Ersani, E., Mukminan, 2021. Disaster Mitigation Snake and Ladder Game to Improve Earthquake Disaster Preparedness (A Case Study: Yogyakarta 5 Senior High School). *IOP Conf. Ser. Earth Environ. Sci.* 884. <https://doi.org/10.1088/1755-1315/884/1/012042>
- Handayani, A.P., Abdulharis, R., Pamumpuni, A., Meilano, I., Hendriatiningsih, S., Hernandi, A., Leksono, B.E., Saptari, A.Y., Widyastuti, R., 2021. Assessment of Perception on Disaster Proneness of Lembang Fault in District of Cisarua, West Java Indonesia. *IOP Conf. Ser. Earth Environ. Sci.* 936. <https://doi.org/10.1088/1755-1315/936/1/012014>
- Hayudityas, B., 2020. Pentingnya Penerapan Pendidikan Mitigasi Bencana Di Sekolah Untuk Mengetahui Kesiapsiagaan Peserta Didik. *J. Edukasi Nonform.* 68, 1-12.
- Irawan, I., Subiakto, Y., Kustiawan, B., 2022. Manajemen Mitigasi Bencana Pada Pendidikan Anak Usia Dini untuk Mengurangi Risiko Bencana Gempa Bumi. *PENDIPA J. Sci. Educ.* 6, 609-615. <https://doi.org/10.33369/pendipa.6.2.609-615>
- Kurniawan, R., 2017. Jurusan Teknik Informatika 6, 1-7.
- Meilano, I., Abidin, H.Z., Andreas, H., Gumilar, I., Sarsito, D., Rahma, H., Rino, Harjono, H., Kato, T., Kimata, F., Fukuda, Y., 2012. Slip rate estimation of the lembang fault west java from geodetic observation. *J. Disaster Res.* 7, 12-18. <https://doi.org/10.20965/jdr.2012.p0012>
- Muhlisah, N., Arpin, R.M., Mukarramah, S.K., 2021. Sosialisasi Mitigasi Bencana Alam. *Abdimas Toddopuli J. Pengabdian. Pada Masyarakat.* 2, 107-111. <https://doi.org/10.30605/atjpm.v2i2.1232>
- Muslim, D., Endayana, C., 2015. Pentingnya

- Identifikasi Patahan Aktif Dalam Upaya Mitigasi Bencana di. *Bull. Sci. Contrib. ...* 13, 152-159.
- Nirmala, B., Agusniatih, A., Annuar, H., 2021. Development of snakes and ladders game (disaster response) as earthquake mitigation for children. *J. Early Child. Care Educ.* 3, 97. <https://doi.org/10.26555/jecce.v3i2.3111>
- Nurfalah, I., Maryanti, R., Wulandary, V., Irawan, A.R., 2022. Earthquake Disaster Mitigation Explanation to Prepare a Disaster Response Generation for Students in 3th-Grade of Elementary School. *ASEAN J. Sci. Eng. Educ.* 2, 147-152. <https://doi.org/10.17509/ajsee.v2i2.38687>
- Pradhana, O.P., 2018. Pengaruh Penerapan Permainan Kecil Terhadap Partisipasi Aktif Siswa Dalam Pembelajaran Pendidikan Jasmani, Olahraga Dan Kesehatan Kelas Viii Mtsn 4 Mojokerto. *J. Pendidik. Olahraga dan Kesehat.* 6, 64-67.
- Putra, H.P., Aditya, R., 2014. Pelatihan mitigasi bencana kepada anak-anak usia dini. *J. Inov. dan Kewirausahaan* 3, 115-119.
- Putri Rahayu, S., Marheni, E., Purnomo, E., 2019. Modification of Snakes and Ladder Games as Psychosexual Learning Media for Mentally Retarded 121-127. <https://doi.org/10.32698/25268>
- Rahiem, M.D.H., Widiastuti, F., 2020. Pembelajaran Mitigasi Bencana Alam Gempa Bumi untuk Anak Usia Dini melalui Buku Bacaan Bergambar. *J. Obs. J. Pendidik. Anak Usia Dini* 5, 36. <https://doi.org/10.31004/obsesi.v5i1.519>
- Rasmid, R., 2014. Aktivitas Sesar Lembang Di Utara Cekungan Bandung. *J. Meteorol. dan Geofis.* 15, 129-136. <https://doi.org/10.31172/jmg.v15i2.182>
- Ricky, N.K. dan M.A.B., 2021. Pemetaan Potensi Kerawanan Bencana Gempa Bumi Akibat Sesar Lembang di Kawasan Kabupaten Bandung Barat. *Semin. Nas. dan Disem. Tugas Akhir* 563-576.
- Sari, D.P., Priratmaningtyas, I.W., Sari, K., Afifah, I.N., Halisa, H., Astuti, T., 2020. Pekan Siaga Bencana Pada ABK Di SLB Manunggal Slawi. *Efektor* 7, 164-170. <https://doi.org/10.29407/e.v7i2.15042>
- Sunuhadi, B., Deliana, S.M., Hendriyani, R., 2013. Status Identitas Remaja dengan Latar Belakang Keluarga Etnis Jawa dan Tionghoa. *J. Soc. Ind. Psychol.* 2, 1-5.
- Syalsabilla, L.L., Haryanto, I., Sukiyah, E., 2020. The Levels of Lembang Fault Activity Based on Geomorphic Indexes on Around the Cikapundung Watershed, West Java. *J. Geol. Sci. Appl. Geol.* 4, 1-9.
- Syawaluddin, A., Afriani Rachman, S., Khaerunnisa, 2020. Developing Snake Ladder Game Learning Media to Increase Students' Interest and Learning Outcomes on Social Studies in Elementary School. *Simul. Gaming* 51, 432-442. <https://doi.org/10.1177/1046878120921902>
- Wulandari, D.A., Saifuddin, Muzakki, J.A., 2018. Implementasi Pendekatan Metode Montessori Dalam. *J. Pendidik. Anak* Vol. 4, 1-19.
- Yildiz, A., Teeuw, R., Dickinson, J., Roberts, J., 2020. Children's earthquake preparedness and risk perception: A comparative study of two cities in Turkey, using a modified PRISM approach. *Int. J. Disaster Risk Reduct.* 49, 101666. <https://doi.org/10.1016/j.ijdr.2020.101666>
- Yuliana, O.Y., 2001. Pendekatan Model Rea Dalam Perancangan Database Sistem Informasi Akuntansi Siklus Pendapatan. *J. Akunt. dan Keuang.* 3, 67-88.