Science Fun Learning for the Students Affected of Natural Disasters

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Abstract: Fun learning will attract students to classroom learning activities learning, especially for victims of natural disasters. Students who experience natural disasters fear doing various things at home and outside the home (school). This study aims to find out whether fun science learning carried out by planting plants can improve students' understanding of learning science. This quantitative descriptive research uses test instruments to measure students' knowledge of family medicinal plant material. The population in this study was elementary school students who were victims of the earthquake natural disaster earthquake in 2022, while the research sample was 15 elementary school students. This sampling is done randomly. The data obtained were analyzed descriptively to determine improved student understanding of learning science. The results of data analysis showed that science fun learning applied through outdoor learning activities by planting family medicinal plants can increase students' understanding related to science material. However, the improvement is categorized as low based on the N-gain score 0.2. The recommendation of this study is to improve student understanding of when fun science learning should be supplemented with other methods by referring to the local wisdom of participants. Thus, the feeling of trauma that saddens the survivors will be slightly forgotten with fun activities and education.

Keywords: Natural Disasters; Science Fun Learning; Students Affected; Trauma.

Introduction

Natural disasters in an area provide a domino effect on the sustainability of life in almost all aspects of life. Depending on the type of disaster and the nature of the geography in which it occurs, the extent of these effects differs[1]. Natural disasters are an unavoidable event. Natural disasters are caused by events that occur in nature without human intervention. This happens because of changes that occur in nature, both slowly and extremely [2]. Indonesia is one of the countries that is often hit by natural disasters. Geographical, demographic, sociological and historical conditions of Indonesia make the territory of Indonesia prone to disasters (natural, non-natural, and social) [3]. Some natural disasters that often occur in Indonesia are earthquakes, erupting volcanoes, landslides, floods and many others.

In disaster history, natural disasters such as Mount Merapi's eruption in Yogyakarta from 1600 to 2010 have erupted more than 80 times [4]. The flood disaster in DKI Jakarta also became the history of natural disasters major floods that occurred in 1621, 1654, 1918, 1942, 1976, 1996, and early 2002 [5]. Earthquakes are also natural disasters that have a very devastating effect. Large earthquakes, one of which occurred in Palu, Central Sulawesi, with a magnitude of 7.4 SR in 2018 [6] and an earthquake occurred in Cianjur, West Java in 2022 [7].

Natural disasters such as earthquakes, floods, and volcanic eruptions can directly change the order of human life, including education.This is because natural disasters also damage educational facilities that students should use comfortably. These natural disasters also profoundly affect the victims, including the children. Children who are students in elementary school are certainly very hurt by this incident. Not infrequently, they become traumatized by natural disasters. The risk that victims of natural disasters can experience is psychological trauma due to mental stress from the ordeal they face [8]. Exposure to trauma affects children, and it may adversely impact their schooling [9]. This is in line with the statement by [10] that childhood trauma is prevalent and has a profound impact on student learning, behaviour, social-emotional well-being, physical health, relationships and brain. Not only that, Duplechain et al. [11] present a dramatic difference in reading scores between students affected by trauma and their unaffected peers. Additional impacts include a range of behavioural and academic challenges, such as irritability, lethargy in school, cognitive struggles and aggression[12].

Remind the impact of trauma on learning, and it examines how schools can set up their practices to support students affected by it. Some educators have embraced a proactive approach to educating students affected by trauma by adopting methods outlined as trauma-informed or trauma-sensitive. Teachers must find ways to present learning that relaxes students. Educators (teachers) need various approaches and strategies to realize educational and fun learning [13]. Thus, fun learning is developed.

The concept of fun learning is approved if an atmosphere is relaxed, free from pressure, happy feelings, interesting, excited, and safe in the learning process. According to natural school community educators, to Syahrul [14] fun learning or a fun and exciting way of learning is a learning process that lifts life naturally and real as well as beautiful and comfortable. Research conducted by Zahrina [15] reveals that fun teaching activities have positively affected elementary learning. This is because students in elementary school are very fond of learning

through fun activities such as field learning, learning by playing, singing and other movements.

Fun learning is very suitable for science learning in elementary schools. Fun learning makes students happy in receiving science learning materisals [16-18]. Some studies prove that science fun learning can improve student motivation in elementary school [18-19]. Simultaneously Improving learning motivation will increase students' understanding [19], including in understanding related to science material. Holbrook [20] conveys that students will easily understand science whenever the material is related to daily life. Thus, researchers take the initiative to research to find out whether fun science learning carried out by planting plants can improve students' understanding of learning science.

Research Methods

This type of descriptive research is in the form of a survey of students in Cianjur who were victims of the earthquake in the Cianjur Earthquake in 2022. The sample used in this study was elementary school students who were victims of the Cianjur earthquake, as many as 15 students, which uses a random sampling technique. This collection was carried out based on purposive sampling techniques with several considerations, namely the students were students who were victims of earthquake natural disasters. The instrument used to determine the improvement in student understanding of science material is a test with several question items as many as five items. The five-question items consist of multiple choice and matching questions and correct answers.

Before students participate in science learning through science fun learning, students first do a pretest. A pretest is conducted to determine the basic knowledge students possess related to the material, such as students' understanding of family medicinal plants and the types and benefits of each family medicinal plant.

Activities that are included in creating fun learning are tree planting activities or in the form of family medicinal plants. Before the activity, students' initial knowledge of family medicinal plants is measured through a pretest. After the activity, students' final knowledge is assessed using a post-test. After participating in science fun learning, students do a post-test to find out the development of students' knowledge after learning.

The data obtained are analyzed using the N gain score formula as follows [16]:

$$\text{N-Gain Score} = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$$

The N-Gain Score can then be classified into the following categories:

Table 1. Category N-Gain Score [16]

N-Gain Score	Category
G > 0.7	High
$0.3 \leq g \geq 0.7$	Medium
G < 0.3	Low

Results and Discussion

The study, which aims to determine how students understand natural disaster victims of science material, is carried out through fun science learning. Science material in elementary schools that is suitable to be applied with science fun learning, for example, is material in grade 4 elementary school related to the introduction of family medicinal plants that can be found in daily environments. Fun activities can be done to learn this material, including outdoor activities by planting family medicinal plants.

Fun learning is a strategy used to create an effective learning environment, implement the curriculum, deliver material, and facilitate learning [18]. In this learning method, teachers position themselves as facilitators and partners of student learning [17].

Fun learning can be built in several ways, including field activities that foster students' enthusiasm for learning. One of them is by planting trees or family medicinal plants. Family medicinal plants are one of the materials taught to grade 3 elementary school students in the Merdeka Belajar and 2013 curricula. The material on medicinal plants delivered in the fun learning activity included an introduction to various types of medicinal plants and how the functions or benefits of each medicinal plant for human health.

Through this fun science learning, students learn what types of medicinal plants can be found in their environment, such as ginger, turmeric, onion, betel, curcuma, temuireng, etc. In science fun learning, students observe the shape of plants, plant sizes, leaf shapes and roots of medicinal plants. The students are also taught to know the scientific name of each medicinal plant, such as ginger, which has the scientific name *Zingiber officinale*. The scientific name turmeric *Curcuma longa* Linn, scientific name Curcuma *Curcuma xanthorrhiza*, scientific name onion *Allium cepa*, scientific name betel nut *Piper Betle Linn*, scientific name lemongrass *Cymbopogon citratus* and many others. The scientific names are made as labels affixed by the students to each student's plant pot. The following image is one of the documentation. In these activities, teachers delivered material related to the morphology of medicinal plants, such as the shape of roots, the shape of leaves, how these plants can reproduce, and the role of each plant in its benefits for human health. For example, ginger to prevent and treat various diseases such as cough, dizziness and pain [21], curcuma to improve appetite [22], red onions that can be used to reduce fever in children, turmeric is useful as an immunomodulator [23-24].

The results of the analysis of these activities aimed at increasing students' understanding of science material are shown in Table 2.

Figure 1. Fun science learning through planting medicinal plants

Table 2. Data Analysis of Understanding Improvement in Science

No	Sample	Pretest Score	Post-test Score	N-gain score
1	A1	23.5	65	41.265
2	A2	23	38.5	15.27
3	A3	42.5	73	30.075
4	A4	52.5	80.5	27.475
5	A5	47	55	7.53
6	A6	48.5	78	29.015
7	A7	52	59.5	6.98
8	A8	39	74.5	35.11
9	A9	21	35	13.79
10	A10	51.5	63	10.985
11	A11	39.5	84.5	44.605
12	A12	41.5	39.5	-2.415
13	A13	44.5	41.5	-3.445
14	A14	46.5	60.5	13.535
15	A15	13.5	19.5	5.865
Average		39.10	57.83	18.376
N- Gain Score				0.2

Data analysis shows an improvement in students' understanding of natural disaster victims of science material after providing fun science learning. When viewed from Figure 2, almost all of each student's N-gain scores improved, although some improved high, medium, and low, and a few others did not. The highest score achieved by students after participating in this fun science learning was 84.5, with the previous score being 39.5. The average N-gain score of all students sampled was 0.2. based on the category and classification of the N-gain score in Table 1, the N-gain score of 0.2 indicates a low improvement category, assuming G < 0.3.

To make it easier to read the table generally, the results of data analysis are also presented in Figure 2 below.

Figure 2 shows that the average pretest score taken before science fun learning was 39.1, while the average post-test score after science fun learning was 57.83. This clearly shows increased student understanding after learning Fun Science Learning.

The improvement of student's understanding of science after fun learning due to fun learning improves attention and reaction time to stimuli. This is because fun learning through outdoor learning attracts the attention and asks of students so that the students become focused on listening to the instructions given by the teacher. Science fun learning is also combined with ice breaking in short word games and short gymnastics that relax students in learning.

Improved attention leads to an improvement in the amount of information sensory receptors receive. Maximum receipt of information will encourage the encoding of information and the subsequent flow of information processing to produce useful memories [25]. Salvato [26] explains that sensory receptors in the form of information receive stimuli originating from the environment. This information only lasts for a very short time, so it is lost if not passed on to working memory. The transmission of this information requires attention or attention to the information when sensory receptors receive it. Information that can be

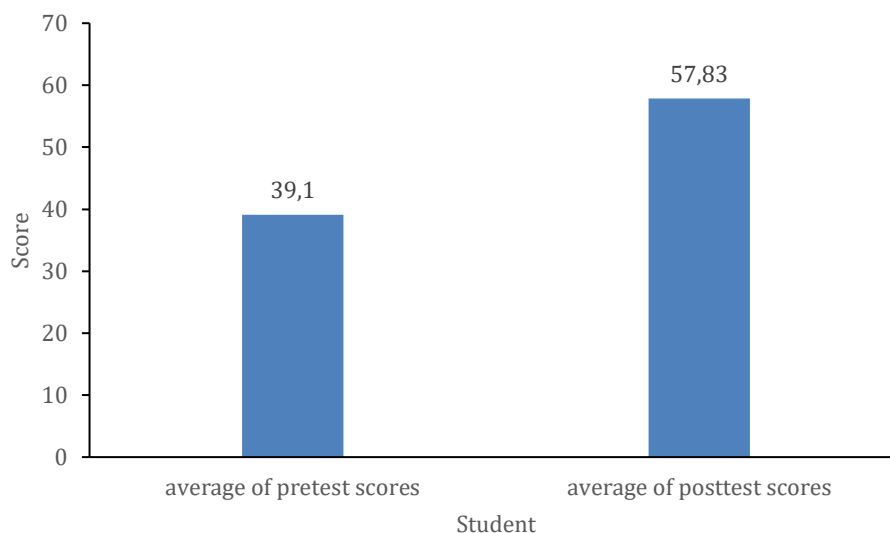passed on to working memory is more likely to be stored in long-term memory.

Figure 2. Graph of Comparison of Pretest Scores with Student Post-test Scores

However, implementing this fun learning activity has not been carried out optimally. There are still things that need to be improved. One is using the local language for students affected by natural disasters. This is because the students are still in the lower grades (grade 3 in elementary school), so many do not master Indonesian. This is why their ability to answer pretest and post-test questions is not maximal, where they have difficulty answering the questions. Therefore, improving the understanding of students who measured through post-tests is less significant.

Conclusion

Research on fun science learning for students affected by natural disasters implies the conclusion that the implementation of science learning through field learning activities by planting trees or medicinal plants is proven to improve students' understanding of science material, even with a low improvement category, namely with an N-gain score of 0.2. The low improvement in student understanding is because, at the time of the study, researchers did not pay attention to the use of local languages in learning or writing questions in the pretest and post-test. Thus, this reflects the development of science fun learning in students affected by natural disasters by paying attention to their local wisdom.

References

[1] Kocoglu, E., Demir, F. B., Öteles, Ü. U., & Özeren, E. (2023). Post-Earthquake Trauma Levels of University Students Evaluation: Example of 6 February Kahramanmaras Earthquake. *Higher Education Studies*, *13*(2), 121-127.

[2] Desilia, N. R., Lassa, J., & Oktari, R. S. (2023). Integrating Disaster Education into School Curriculum in Indonesia: A Scoping Review. *International Journal of Disaster Management*, *6*(2), 263-274.

[3] Nurjanah, A., & Apriliani, R. (2021). The role of community in disaster mitigation: the case of Umbulharjo Merapi Monitoring Community on Merapi Mount, Indonesia. *Jurnal Hubungan Internasional*, *10*(1), 72-83.

[4] Kiswiranti, D. (2013). Analisis Statistik Temporal Erupsi Gunungapi di Indonesia. *Bimipa*, *23*(3), 211-217.

[5] Nurjayati, R., & Mbarep, D. P. P. (2023, December). Studies on flood disaster causes in DKI Jakarta Province. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1266, No. 1, p. 012053). IOP Publishing.

[6] Yulianto, S., Apriyadi, R. K., Aprilyanto, A., Winugroho, T., Ponangsera, I. S., & Wilopo, W. (2021). Histori bencana dan penanggulangannya di indonesia ditinjau dari perspektif keamanan nasional. *PENDIPA Journal of Science Education*, *5*(2), 180-187.

[7] Rahayu, U., Hutasoit, L. R., Sekarwinahyu, M., Wahyuningsih, T., Kismiati, D. A., Setyawan, D. B., & Suciana, D. (2023). Development of Learning Models for Post-Earthquake Elementary School Students: Preliminary Studies. *Jurnal Penelitian Pendidikan IPA*, *9*(12), 11722-11727.

[8] Nawangsih, E. (2014). Play therapy untuk anak-anak korban bencana alam yang mengalami trauma (post traumatic stress disorder/ptsd). *Psympathic: Jurnal Ilmiah Psikologi*, *1*(2), 164-178.

[9] Ballin, A. (2023). Embracing a Trauma-Sensitive Approach: One School's Transformative Experience of Creating Equitable Schooling. *Journal of*

Teaching and Learning, *17*(1), 93-110.

[10] Wilson-Albright, C. M. (2023). *Trauma-Aware Professional Development and the Impact on Middle School Teachers' Perception of Student Behaviors* (Doctoral dissertation, Cabrini University).

[11] Duplechain, R., Reigner, R., & Packard, A. (2008). Striking differences: The impact of moderate and high trauma on reading achievement. *Reading Psychology*, *29*(2), 117-136.

[12] Avery, J. C., Morris, H., Galvin, E., Misso, M., Savaglio, M., & Skouteris, H. (2021). Systematic review of school-wide trauma-informed approaches. *Journal of child & adolescent trauma*, *14*, 381-397.

[13] 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.

[14] S. Syahrul. (2017). Application of Fun Learning Method to Improve Learning Outcomes Indonesian Class VII Students of Smp Negeri 1 Tompobulu, Gowa Regency. *Konfiks J. Bhs. Dan Sastra Indones.*, 3 (1).

[15] Keumalawati, C. (2023). Using Fun Learning Strategy to Enhance English Literacy. *JURNAL EKSPERIMENTAL: Media Ilmiah Pendidikan Guru Madrasah Ibtidaiyah*, *12*(1).

[16] M. Oktavia, A. T. Prasasty, and Isroyati. (2019). Gain Normality Test for Stabilization and Module with One Group Pre and Post Test. *Sci. Natl. Symp. with theme (Improving Qual. Sci. Publ. through Res. Results Community Serv.*, 1 (1).

[17] Pujiriyanto, P. (2021). Pembelajaran menyenangkan sebagai upaya menanggulangi pandemi Covid-19. *Epistema*, *2*(1), 1-10.

[18] Mulyati, M. (2019). Menciptakan pembelajaran menyenangkan dalam menumbuhkan peminatan anak usia dini terhadap pelajaran. *Alim*, *1*(2), 277-294.

[19] Azifah, N., & Jalil, M. (2023). Pembelajaran Berbasis Science Fun di Mi Islamiyah Syafiiyah Gandrirojo Sedan Rembang Untuk Meningkatkan Aktivitas dan Hasil Belajar Kognitif Siswa. *MUBTADI: Jurnal Pendidikan Ibtidaiyah*, *4*(2), 111-124.

[20] Holbrook, J. (2005). Making chemistry teaching relevant. *Chemical education international*, *6*(1), 1-12.

[21] Aryanta, I. W. R. (2019). Manfaat jahe untuk kesehatan. *Widya Kesehatan*, *1*(2), 39-43.

[22] Aisyah, S. D., Aizah, S., & WATI, S. E. (2022). *Efektifitas Temulawak dalam Meningkatkan Nafsu Makan pada Anak Usia Toddler di Posyandu Cemara Desa Patianrowo Kec. Patianrowo Kab. Nganjuk Jawa timur* (Doctoral dissertation, Universitas Nusantara PGRI Kediri).

[23] Saputri, G. Z., Dania, H., & Putranti, W. (2019). Optimalisasi Pemanfaatan Jahe (Zingiber Officinale) Dan Rosella (Hibiscus Sabdarifa) Sebagai Minuman Kesehatan Di Madrasah Muallimin Muhammadiyah Yogyakarta. *Jurnal Pemberdayaan: Publikasi Hasil Pengabdian Kepada Masyarakat*, *2*(2), 241.

[24] Azis, A. (2019). Kunyit (Curcuma domestica Val) sebagai obat antipiretik. *Jurnal Ilmu Kedokteran dan Kesehatan*, *6*(2), 116-120.

[25] Wikara, B., Sutarno, S., Suranto, S., & Sajidan, S. (2020). Efek pembelajaran yang menyenangkan (fun learning) terhadap kemampuan memori. *SPEKTRA: Jurnal Kajian Pendidikan Sains*, *6*(2), 192-195.

[26] Salvato, G., Patai, E. Z., & Nobre, A. C. (2016). Preserved memory-based orienting of attention with impaired explicit memory in healthy ageing. *cortex*, *74*, 67-78.