

Using the Power of Two Model in Teaching Science in Primary School

Widdy Sukma Nugraha¹, Eko Fajar Suryaningrat², Muhammad Nurjamaludin³
{Widdy Sukma Nugraha@gmail.com¹, ekofajarsuryaningrat@gmail.com,
Muhammadnurjamaludin@gmail.com}

Institut Pendidikan Indonesia^{1,2,3}

1 Introduction

Education plays an important role in human life. It is a supporting factor that plays an important role in all sectors of life because the quality of nation life is closely related to the education level. Slameto (2003: 2) states that "learning is a business process carried out by someone to obtain a change in new behavior as a whole as their own experience in interaction with their environment". This opinion is in line with Taufik (2008: 1-2) stating that "civilized humans have at least a common sense about education that education has an important role in human life." Thus, from the two opinions above, it can be inferred that education is a matter that is important for human life and is a supporting factor for the quality of life of the nation. A good nation is born from a good education. Therefore, education is substantial.

The most basic level of education is elementary school education (*Sekolah Dasar*, SD). Children get new learning and experience from the school environment, where they learn about what is around them, which are something that they have never studied before and have not been taught by their parents.

Taufik (2008: 18) defines elementary school education as follows:

Education in elementary school can be defined as the process of developing the most basic abilities of every student, where each student learns actively because of the encouragement in themselves and the atmosphere that provides convenience for their optimal development. Education in elementary school is not only oriented towards giving students the ability to read, write, and count, but also optimally preparing the students intellectually, socially, and personally to learn to actively develop themselves as individuals, as members of society, as citizens, and as God's creatures.

Learning is an activity that is often carried out by students at school. Learning activities require physical and mental readiness because they are related to cognitive, affective, and psychomotor aspects. Hanafiah (2010: 23) argues that activity is needed in learning because without any activity the learning process may not be conducted properly. The process of learning activities must involve all aspects related to students, both physical and spiritual. Therefore, the students behavior can improve quickly, precisely, easily, and properly related to cognitive, affective, and psychomotor aspects.

At school, the teacher has a very important role in creating conducive learning process and optimal learning outcomes since the learning process is much influenced by the ability of teachers to carry out learning activities, and achievement level of learning outcomes. In an effort to improve the quality of optimal learning processes and outcomes, teachers should provide opportunities for students to be more active in learning both individually and socially.

This is done so that students can develop their insights about things inside and outside themselves.

The science learning process, especially on earth and solar structures, still found various obstacles, especially those on the use of learning models used. Likewise, the problems that arose in the process of science learning in the Grade 5 students of Parakan Waas Elementary School in Pameungpeuk District, Garut Regency, the researchers found several problems arising from teachers and students.

One effort that can be done to improve students' understanding of earth structure and solar structure materials is to implement the appropriate learning model. One learning model that can be implemented in the aforementioned materials is the Power of Two model.

The Power of Two model means combining the power of two heads. Combining the two heads, in this case, is forming a small group consists of a pair of students. This activity is carried out to make a synergy based on the proverb "two heads are better than one" (Silberman, 2006: 173). Whereas, according to Ramadan (2009: 1), "The Power of Two learning model includes part of cooperative learning in small groups by fostering maximum cooperation through learning activities by one's own friends with members of two students in it to achieve basic competence". Thus, this model is a cooperative learning model that emphasizes on the students' activities in learning problems related to the learning material being taught.

2 Literature Review

2.1 Science Learning in Elementary Schools

Science is a study of the environment. It is related to discovering nature systematically, so that science is not merely a mastery of a collection of knowledge in the form of facts, concepts, or principles, but also a process of discovery. Cain & Evans (in the Ministry of National Education 2008) state that science contains four aspects: content or product, process or method, attitude, and technology.

As content and products, science consists of facts, laws, principles, and theories that have been accepted. As a process or method, science is a process or method for gaining knowledge. As an attitude, science can develop because of the diligent, thorough, open, and honest attitude. As a technology, science is related to improving the quality of life. If the science contains these four things, hence, in science education at schools, students should be able to experience these four things, so that students' understanding on science becomes intact and can be used to overcome life's problems.

The Ministry of National Education of the Republic of Indonesia (2008) states that science learning in schools is expected to be a vehicle for students to learn about themselves and their surroundings. Science education emphasizes on providing direct experience to develop competencies so that students are able to explore and understand the natural environment scientifically. Science education is directed to 'find out' and 'do', so that it can help students gaining a deeper understanding on environment. Therefore, the approach applied in presenting science learning is to integrate the science process experience and to understand science products and technology in the form of direct experience that impacts on the attitude of students who study science.

Based on the opinions above, it can be concluded that the nature of science learning in elementary schools is not merely the mastery of concepts, principles, laws, or theories. It is

also a process to develop skills and scientific attitudes to obtain scientific concepts about the universe.

Science learning in Grade 5 of elementary schools has its own scope. The Ministry of National Education of the Republic of Indonesia (2007: 13-14) states that the scope of science subjects in elementary schools/Islamic elementary schools is outlined into the following four groups:

1. Living things and life processes, which are humans, animals, plants, and their interactions with the environment and health;
2. Objects/materials, their properties, and their uses, including liquid, solid, and gas;
3. Its energy and modification, including force, sound, heat, magnetism, electricity, light, and simple machine;
4. The earth and the universe, including land, earth, solar system, and other celestial bodies.

2.2 Learning Activities

Learning is an activity that is often carried out by students at school. Its activities require physical and mental readiness because they are related to cognitive, affective, and psychomotor aspects.

Hanafiah (2010: 23) argues that Activity is needed in learning because without any activity the learning process may not be conducted properly. The learning activities must involve physical and spiritual aspects, so that students' behaviors can improve quickly, precisely, easily, and appropriately related to cognitive, affective, and psychomotor aspects.

Meanwhile, according to Hernawan (2013: 2), "learning is a process of behavior change, where changes in behavior are carried out consciously and are permanent. These behavioral changes include changes in cognitive, affective, and psychomotor terms.

Based on the opinions above, it can be concluded that learning activities are activities that involve both physical and mental, because when learning activities take place students require physical and spiritual readiness so that the learning process can take place and the results can be achieved well.

2.3 The Power of Two Learning Model

The Power of Two model means combining the power of two heads. Combining the two heads, in this case, is forming a small group consists of a pair of students. This activity is carried out to make a synergy based on the proverb "two heads are better than one" (Silberman, 2006: 173). Whereas, according to Ramadan (2009: 1), "the Power of Two learning model includes part of cooperative learning in small groups by fostering maximum cooperation through learning activities by one's own friends with members of two students to achieve basic competence". Thus, the Power of Two learning model is a cooperative learning model that emphasizes on students' activities in learning problems.

Furthermore, Ramadan (2009: 1) says that "the Power of Two learning model is an activity carried out to improve collaborative learning and encourage the emergence of the benefits of synergy, because two people are certainly better than one". Thus, it can be concluded that the Power of Two model is a learning model that can provide motivation to students so that it can improve learning activities during the learning process.

2.4 Steps of the Power of Two Learning Model

According to Sanaky (Ramadan, 2009: 2), the implementation of the Power of Two Learning model is carried out in the following steps :

1. The teacher formulates a problem. In the learning process, the teacher gives one or more questions to students who need reflection in determining the answers.

2. The teacher asks students to reflect and answer questions individually.
3. The teacher divides participants into pairs.
4. Group pairs are determined according to the list of absent orders or can also be randomized. In the learning process after all students complete the answer, form it into a partner and ask them to share the answers with others.
5. The teacher asks the pairs to discuss for new answers. In the learning process, the teacher asks students to make new answers to each question by improving the response of each individual.
6. The teacher asks participants to discuss the results of sharing.

In the learning process, students are invited to classically discuss problems that are not yet clear or that are not understood. All pairs compare the answers of each pair to the other pair. To end the learning, teacher together with students conclude the learning material. In order for the implementation to save time, it is necessary to have variations, which are determining certain questions for a particular pair. This is better than each pair answering all questions.

3 Research Methodology

This study employed a quantitative approach using Pre-Experimental Design. This method was chosen because the samples were taken randomly (purposive sampling) so that there are still factors that could not be fully controlled. According to Campbell & Stanley, pre-experimental research is a research that still has influential external variables (in Ary, 2011, p. 374).

3.1 Research Design

The design used in this study was pre-test and post-test design (Creswell, 2008, p. 314). This research was conducted to test an idea or behavior or procedure to determine its influence by changing a condition and observing its influence on other things. According to Arikunto (2006, p. 85), the design of the study used one class by giving a pre-test before learning and the final test (post-test) after the learning was conducted. The difference between pre-test and post-test results is assumed to be the effect of treatment or experiment. The research employed the pattern as in the following table:

Table 3.1 Research Design

Pre-test	Treatment	Post-test
O ₁	X	O ₂

(Campbell & Stanley in Ary, 2011, p. 374)

The subjects of this study were 16 Grade 5 students of Parakan Waas, Pameungpeuk District, Garut Regency, 2017/2018 Academic Year . They were chosen as the research subjects based on initial observations showing that there was a problem in science learning especially in the matter of earth structure and solar structure.

Data collection techniques employed in this study are observations. Observation was used to see an increase in learning activities after using the Power of Two learning model.

4 Results And Discussion

4.1 Results

The data on the initial conditions were obtained from the initial research conducted on science learning material on earth structure and solar structure before using the Power of Two model. The initial data in this study were obtained through observation of student learning activities. The initial conditions consisted of a description of the initial conditions of activities and student learning outcomes.

Based on the results of observations of the initial conditions, problems that arose from student learning activities were as follows.

1. Students were less enthusiastic about learning.
2. Students felt less comfortable in attending lessons because they were treated as learning objects.
3. Students did not show good attention to the assignment given.
4. Students were less active during learning activities.
5. Students seemed not serious in participating in learning. Some students preferred to chat and did activities that did not support the learning process.
6. Students seemed not motivated to follow the learning process.

Based on the results of observations during the learning process, the data on the initial conditions of student learning activities were obtained. From the total number of 16 students, the total score obtained was 662 with an average score of 41.37, and the total grade of 945.63 with an average grade of 59.10. Only six students or 37.5% were declared passed with different passing criteria, where two students or 12.5% got good grades (B) and four students or 25% got average grades (C). Meanwhile, the remaining 10 students or 62.5% were declared failed because the criteria for the grade obtained were poor (K).

The following percentage of criteria for the initial condition of student learning activities can be seen in the diagram below.

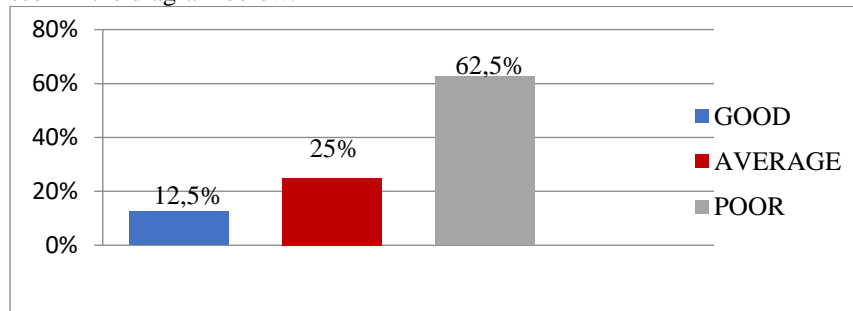


Diagram of the Student's Grade Criteria in the Initial Condition of Learning Activities

The percentage of the criteria for student learning activities after the use of the Power of Two model can be seen in the diagram below.

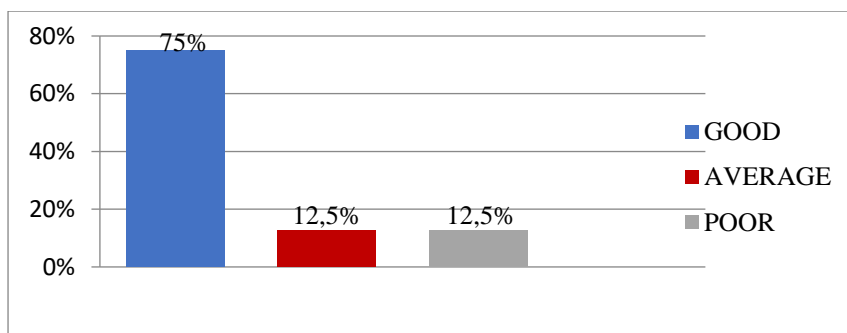


Diagram of the Student's Grade Criteria after the Implementation of the *Power of Two Model*

4.2 Discussion

The results of the analysis carried out in each cycle showed that the use of the Power of Two model could overcome the difficulties and obstacles of students in understanding the subject materials. This can be seen from the increase in the average and the number of students who passed in each cycle.

The use of the Power of Two model was very helpful for students in mastering the material because they were directly involved in learning. In addition, students stated that the use of the Power of Two model made the learning process was not boring, since each student was given the opportunity to speak and express their opinion. It fostered courage and pride for students.

The findings of the research described above showed that the use of the Power of Two model could improve the activities and learning outcomes of science in the materials of earth structure and solar structure.

4.2.1 Student Learning Activities

Student learning activities increased because it was followed by the performance of teachers who supported because analysis and reflection for further planning were always carried out at the end of the study. Hence, student learning activities experienced an increase in each cycle. Data on the increase in student learning activities can be seen in the following table.

**Table 4.7
The Status of Student Learning Activities**

No	Status	Percentage	
		Preliminary Data	After Treatment
1	Passed	37.5%	87.5%
2	Failed	62.5%	12.5%
Total		100%	100%

From the table above, it can be seen that there had been an increase in student learning activities. The students who passed in the initial conditions were only 37.5%. Then, after the use of the model, the percentage was increased to 87.5%.

The percentage increase in student learning activities can be seen in the diagram below.

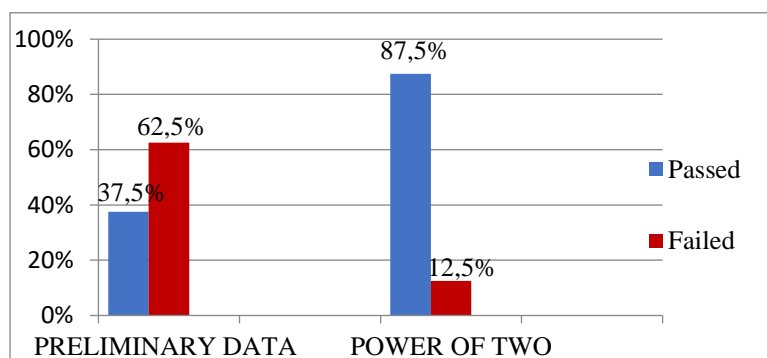


Diagram of the Percentage of Student Learning Activities Status

5 Conclusions And Recommendations

5.1 Conclusions

Based on the results of classroom action research conducted to Grade 5 students of Parakan Waas Elementary School, Pameungpeuk District, Garut Regency, 2017/2018 Academic Year regarding the learning of earth structure and solar structure through the implementation of the Power of Two model, some conclusions can be drawn, as follows:

1. Student Learning Activities

The implementation of the Power of Two learning model could improve student learning activities. This has been proven by an increase in student learning active engagement in each cycle. Preliminary data on student learning activities before the implementation of the Power of Two model showed that of the total number of 16 students, there were two students or 12.5% who were declared passed with the criteria of good grades (B), four students or 25% were declared passed with average criteria (C), while ten students or around 62.5% were declared failed with poor criteria (K). The number of students who completed the initial condition was 37.5% or only 6 students.

Furthermore, after the use of the model, there was an increase, namely from the total number of 16 students there were 12 students or 75% who were declared passed with the criteria of good grades (B), two students or 12.5% were declared passed with average criteria (C), while two students or around 12.5% were declared failed with poor criteria (K). The number of students who passed in the second cycle was 87.5%. The number of students who passed in the initial condition was 37.5% or only six students. Thus, it can be concluded that the implementation of the Power of Two learning model could improve student learning activities in science learning material in earth structure and solar structure.

5.2 Recommendations

Based on the conclusions above, following are the proposed suggestions to improve the quality of education in elementary schools.

1. For teachers, it is recommended to implement the Power of Two model in science learning, especially in the matter of earth structure and solar structure the findings show that the model has proven effective in increasing student learning activities and outcomes.
2. For students, it is recommended to be active in following the learning process and dare to express ideas so that they can improve their competencies and be easy in communicating.
3. For schools, it is recommended to provide space and facilities for all students so that students' abilities and competencies can be explored well.
4. For researchers and college students, it is recommended to carry out research on the implementation of the Power of Two Model with more subjects or with different learning materials, so that the effectiveness of the use of the model can be really tested.

References

- Abdullah. (1998). *Metodologi Pengajaran Ilmu Pengetahuan Alam*. Bandung: Alumni.
- Arikunto, S. (2010). *Prosedur Penelitian Pendekatan dan Praktek*. Jakarta: Rineka Cipta.
- Depdiknas. (2006). *Kurikulum Tingkat Satuan Pendidikan*. Jakarta: Depdiknas.
- Depdiknas. (2002). *Kamus Besar Bahasa Indonesia*. Jakarta: Balai Pustaka.
- Djojosoediro. (2014). *Hakikat IPA dan Pembelajaran IPA di Sekolah Dasar*. Jakarta: Rineka Cipta.
- Hanafiah, N. (2010). *Aktivitas Belajar Siswa*. [Online]. Tersedia: http://nananghanafi.blogspot.com/2010/11/aktivitas-belajar-siswa_dalam.html [25 Januari 2018].
- Hernawan. (2013). *Kegiatan Belajar Mengajar di Sekolah*. [Online]. Tersedia http://hernawan.blogspot.com/2010/11/kegiatan-belajar-mengajar-disekolah_dalam.html
- Iskandar. (2001). *Proses Belajar Mengajar di Sekolah*. Jakarta: Rineka Cipta.
- Mudjiono. (2006). *Upaya Optimalisasi kegiatan Belajar Mengajar*. Bandung: Remaja Rosdakarya.
- Maimunah. (2005). <http://www.kajianpustaka.com/2012/10/model-pembelajaran-group-investigation.html>

- Muniati. (2017). *Belajar dan Pembelajaran di SD* [Online]. Tersedia <http://muniati.blogspot.com/2016/17/belajar-dan-pembelajaran-di-SD.html>
- Silberman, M. (2006). *Active Learning: 101 Strategi Pembelajaran Aktif*, (terjemahan Raisul Muttaqien) Bandung : Nusamedia.
- Sudjana, N. (2014). *Penilaian Hasil Proses Belajar Mengajar*. Bandung: PT Remaja Rosdakarya.
- Slameto. (2003). *Belajar dan Faktor-faktor yang Mempengaruhinya*. Jakarta: Rineka Cipta.
- Taufik, A. (2008). *Pendidikan Anak di SD*. Jakarta: Universitas Terbuka.
- Wahyudin, D. (2008). *Pengantar Pendidikan*. Jakarta: Universitas Terbuka.