European Journal of Social Sciences Studies
ISSN: 2501-8590
ISSN-L: 2501-8590
Available on-line at: www.oapub.org/soc

DOI: 10.46827/ejsss.v7i1.1194 Volume 7 | Issue 1 | 2021

THE EFFORT OF SCIENTIFIC LITERACY ENHANCEMENT FOR CHILDREN IN CITIZENS ASSOCIATION 1 PADUKUHAN SANTREN THROUGH COMMUNITY SERVICE

Nur Kholis[1],
Aulia Nishful Laila[2i]
[1]Electrical Engineering Education,
Faculty of Engineering,
Universitas Negeri Yogyakarta,
Yogyakarta, Indonesia
[2]Non-formal education,
Faculty of Education,
Universitas Negeri Yogyakarta,
Yogyakarta, Indonesia

Abstract:
Scientific literacy for children is really needed now days, regarding the development era which is more dynamic requiring children to adapt with the development. Through the community service program, college students make an effort of scientific literacy enhancement for children in Padukuhan Santren which is conducted with the scientific experimentation activities. Those activities have been done for five meetings, such as 1. Introducing primary and secondary colors and experimenting the running water, 2. Experimenting floating egg and chewy egg, 3. Experimenting the pepper away, 4. Experimenting the water, fire and oil, 5. Experimenting the rainbow candy. The implementation program method is conducted gradually, include general preparation, designing, implementation and evaluation. All implementation of activities and programs that have been designed have run successfully and corresponding with the problems we identified before, during pre-community service program. The result obtained from this program is children are able to know and understand about scientific literacy through scientific experimentation that have been performed.

Keywords: scientific literacy, community service, children

1. Introduction

The globalization era requirement which is more advanced, and complex makes the educational process always innovate to be able to create the qualified generation. One of

[i] Correspondence: email laarul892@gmail.com, nurkholisnkh@uny.ac.id

the indicators of qualified generation is the generation understanding the scientific literacy. One of the applications of science and technology in educational sector is scientific literacy. Scientific literacy is the main key to face various challenges in 21st century to make the need of water and food is sufficient, the disease control, produce the sufficient energy and face the climate change (UNEP, 2012).

In this era, delivering the scientific literacy is performed through the scientific experiment. The beginning formation of scientific experimentation program due to the development of 21st Century brings the change in many human life aspects. One of the significant sectors bringing the change is in field of science and technology. The development of science and technology has brought the effect for educational world in various countries, in this case, education is required to be able to produce a superior human resource so that there is an intense competition among countries which creates the superior human resource. So, it can be confirmed that the scientific literacy performed through the scientific experimentation activity could produce the superior human resource.

Scientific literacy according to Firman dalam Dityawiyana (2016) is an ability in using the knowledge, identifying the question and making conclusion based on the evidences in the term of understanding as well making the conclusion relate to the nature and the change performed toward the nature through human activities. The advantage of scientific literacy can encourage children to think critically toward the incident existing in daily life, arising the curiosity and building the character of the generation that is care and responsible. This case is in line with Hidayati and Julianto's opinion (2018) learners are required to be able to think critically in solving the problem, learning independently which is oriented to the character building, and thinking rationally as well as having commitment on logical science.

Today, scientific literacy begins to be integrated into the learning at schools and society. The thing that could help and encourage children to think critically and creatively. However, in the reality, the scientific literacy learning has not run well at schools. The study result from PISA in 2000 to 2012 shows that the profile achievement of Indonesian students' scientific literacy is still low. The fact of PISA result in 2015 shows that the value average of science of OECD countries is 493, while Indonesia reaches the score 403. This case shows that there is a gap in treating the scientific education. The low of children's ability in scientific literacy could describe that science learning in Indonesia has not been facilitated well such as describing the scientific phenomena, evaluating and designing the scientific research as well as interpreting the scientific data or evidence (OECD, 2016).

There are several factors that are able to cause the low of students' ability of science. This case is in line with the research result conducted by Irawan (Ashri & Hasanah, 2015) one of the factors cause the low of scientific literacy relate and close to the children is the selecting learning source. In scientific literacy, learning can be done by interactive, innovative, creative and pleasure method. One of the ways that could be done by facilitator to applying the scientific literacy is by doing the scientific experimentation.

As the college students conducting community service activity, so they initiate the scientific literacy program which is made into scientific experimentation for children.

Based on the problem background, it can be identified several problems as follow:

1) The scientific literacy in children is still low which is proved by the study result of PISA showing the profile achievement of Indonesian students' scientific literacy which is still low.
2) The scientific learning in Indonesia mainly in schools have not facilitated yet relate to the scientific literacy.
3) Generally, children only learn about science in the term of theory, therefore sometimes it makes children feel bored to attend the learning relate to the scientific literacy.
4) The program out of school relating to the scientific literacy in children is still insufficient.
5) The effort to obtain and transform the knowledge and skill to children about the scientific literacy is really needed.

Based on the problem, it is needed the scientific experimentation activities in order to increase the number of scientific literacies in Indonesia. Besides that, six basic literacies that need to be known by the students agreed by the World Economic Forum in 2015 include the literacy of reading writing, numeracy literacy, scientific literacy, digital literacy, financial literacy and cultural and civic literacy.

One of the six basic literacy that need to be mastered is scientific literacy (Susanto & Vidiawati, 2019).

Scientific literacy is a group of knowledge that aim to know and investigate the knowledge in order to obtain the explanation of the problem around the environment therefore it could be taken a conclusion from various facts existing (Sari et al., 2021). In line with the case, Nugraha (2005:14) explains that the scientific activity can encourage the children's cognitive to transform the knowledge which has more meaning for life. Besides that, scientific activity can sharpen the children's curiosity due to it is considered as something new and interested for children. Suyanto (2005) explains that science can help children in optimizing the five sense, knowing cause and effect as well as understanding about an object or event.

The experimental method is a method giving the change for learners to do an experiment. The expectation is, by using this method the learners can make a plan, do the experiment as well as able to solve the problem in real (Anwar 2014:112). In line with the statement, Azizah (2008:11) explains that experiment is an activity done through experiments where the children are asked to observe and look at the result from the experiment. The aim of experiment activity is to give the change for children in exploring the concept that has been learnt as well as develop the way of critical thinking and rational (Hurrohman 2004:16).

Khadijah (2016:103-104) in another side, experiment method has the advantage and weakness, the advantage of experiment method is: 1. Can make learners believe of the concept of an object or event through the experiment, 2. Can motivate learners in

making new findings from the experiment result, 3. The results of the experiment can be useful for human's life. Meanwhile, the weakness of experiment method includes 1. This method majority only appropriate with the field of science, 2. Need several facilities and materials which is sometimes not easy to be obtained and it is relatively expensive, 3. Need longer time (Faizi, 2013). Based on the explanation, this writing discusses about the effort of scientific literacy enhancement for children Padukuhan Santren through the community service.

2. The Method of Empowerment

The effort of scientific literacy enhancement for children in Padukuhan Santren through the community service is conducted by luring/ direct meeting with the target of the activity and still follow the health protocol of Covid-19 (washing hand, wearing masker and keeping distance). The method of program implementation is conducted gradually, such as: 1. Common preparation, such as observation, interview and coordination. Observation is done to know the need and problem in society by direct visit to the field (Sugiyono, 2017:230). Observation is done by observing the situation and condition in Padukuhan Santren. The interview is done to find out the problem and condition in more depth (Sugiyono, 2017: 231). The interview is done with community leader such as headman of Padukuhan Santren and the chief of Citizens Association 1. The result of observation and interview shows that the children's knowledge about scientific literacy is still less. The next step is, making coordination with the community in Padukuhan Santren area related to place use permit and the community service implementation, in this case, the permission is made by the owner of boarding house as a place provider. 2. Designing program, it is done by doing the discussion with the children to make mapping of problem in order to obtain the program concept, which is suitable for the need, the next step is making the concept steady relate to the effort of scientific literacy enhancement for children of Padukuhan Santren and arranging the plot of program implementation. 3. Implementation of program using experiment method. Due to the scientific literacy is suitable if it uses the experiment method. 4. Evaluation is done by college students of community service toward the target group. Program evaluation includes planning stage, implementation and after implementation. Evaluation is done by discussion method and observation. Besides that, evaluation is conducted to find out the advantage and weakness of the program. The target of this community service activity is the elementary school students RW 1 Santren with the total of students is 4 students. In detail, on the program "*experimental science in order to enhance the scientific literacy for children in Citizen Association 1 Padukuhan Santren*" is performed five times, such as: 1. Introducing the primary and secondary colors and experimenting running water, 2. Experimenting the floating egg and chewy egg, 3. Experimenting pepper away, 4. Experimenting water fire and oil, 5. Experimenting the rainbow candy. The execution time of this community service activity is started from 4th August 2021 to 5th September 2021.

3. Result and Discussion

Padukuhan Santren has a potency and variety community condition, therefore college students are expected to be able to practice their knowledge as a part of educational and learning process. Their experience obtained during the study period is expected could be able to be their asset to be applicated in the community after they graduate from the university. The community service program in Padukuhan Santren, Catur Tunggal village, Kapanewon Depok, Sleman Regency is conducted gradually and planned. This program becomes one of the efforts which needs to be done to overcome the low of scientific literacy in the community specially for children.

3.1 Preparation Stage

The community service program in Santren, caturtunggal, Depok, Sleman is conducted gradually and planned, first is general preparation stage program. In this preparation stage is done by coordinating the locational permission of community service and identifying the need which is corresponding to the data obtained when doing the observation in the field and completed the data of interview result to the headman of Padukuhan Santren (Mr. Yanuar). Identification the need is done to facilitate the arrangement of planning program or community service activities in order to be corresponding to the community's need and condition. Second is designing stage and making the program steady as well as the discussing through socialization program. The designing is done by arranging the matrix or planning activity program during the community service in order to make college students are easy in implementing the community service program and it has been consulted to the mentor lecturer before the program was implemented until the matrix obtained the mentor's permission.

3.2 Implementation Stage

The effort of scientific literacy enhancement for children in Citizen Association 1 Padukuhan Santren through the community service which is conducted as follow:

1) The first meeting is done by introducing among college students and the target group, then followed by introducing the primary and secondary colors as well doing the experimentation of running water. This program is attended by four children and performed in the boarding house owner's house at 12.30 to 15.30. the equipment and material used are eight plastic glasses, three food coloring (red, yellow, and blue), spoons, water, tissue. The activity is begun with asking several questions related to the experimental materials which will be delivered in order to make interaction between college students and the target group. The result of this meeting activity is the children are able to know the primary and secondary colors and able to do the experimentation of running water under the supervision. Children could understand the reason that the water could run or spread by itself. Besides, the children feel happy and enthusiastic in mixing the colors and trying to guess which secondary colors which will be produced in color mixing done.

However, there is an obstacle, i.e., children came late from the time that has been agreed together therefore the activity finished longer. The solution done by the college students is disciplining the children and make sure them to not being late in the next meeting.

2) Second meeting, children did the experimentation of floating egg and chewy egg. This activity was attended by three children and conducted in boarding house owner at 12.30 to 15.30. The equipment and material used are three plastic glasses, spoons, water, eggs, salt, vinegar. This activity was begun by opening and then continued by experimenting the floating egg and continued by chewy egg. But the experiment result of chewy egg could not be observed directly due to it should be put for a night. The result of this meeting activity is children are able to know about weight, object mass from the experimentation of floating egg and children could understand the concept of acid base from the experimentation of chewy egg. Besides that, children feel happy that they did the experimentation with egg in this meeting. Some of children have ever done the experimentation about chewy egg in their school. The obstacle faced in this activity is the activity was obstructed due to the wifie in boarding house owner's house was broken and it disturbed the activity, therefore the activity should be conducted in another place
3) The third meeting, children did the experimentation of pepper away. This activity was attended by four children and conducted in boarding house owner's house at 12.30 to 15.30. The equipment and material used are plates, pepper, water, food coloring, sunlight. The activity was begun by pouring the water into the plate then put the pepper into the plate. Then, the target group's hands were smeared by sunlight then dipped into the pepper solution, and the result is the pepper on the plate will be away and split due to the sunlight. The result achieved from this activity is children are able to know the reason why the pepper could be away when the hands are closed to the water. Besides, children feel happy and wonder with the experimentation done and they did not suppose that the pepper will be away. The obstacle faced in this activity is the plates available are only two and it makes spending more time to finish, because children need to alternate in doing this experimentation.
4) Fourth meeting, children did the experimentation of water, fire and oil. This activity was attended by five children in boarding house owner's house at 12.30 to 15.30. the equipment and material used are candles, match/lighter, plates, glasses, oil, food coloring. This activity was opened by introducing the concept of water, fire and oil as well their characteristics related to the experimentation that will be done. Then it is continued by the experimentation of water and fire. First, the water is put into plate and put the candle in the middle of plates, then children are asked to close the candle with the glass and observe what will happen. The result is the water which is out of glass will get into the glass and the fire is off. This case shows that the fire needs the oxygen. After that, children did the experimentation of water and oil. The first stage is the water is poured into the glass, then the oil that

was put with some food colorings before is poured into the water. The result is the colors mixing will be spread according to its initial color and when it mixed with the oil there is an explosions like fireworks. The result achieved from this meeting is children are able to do the experimentation of seep water and the experimentation of firework in the water. Besides that, children want to retry the experimentation at home. This shows that the children are interested toward the experimentation.

5) Fifth meeting, children did the experimentation of rainbow candy. This activity was attended by three children and conducted in boarding house owner's house at 12.30 to 15.30. the equipment and material used are color candy, two plates, spoon, water. The activity was begun by opening and explaining what experimentation that will be done. Besides, in order to the learning could run interactively, college student asked question to the target group related to the material experimentation that will be done. First, children are asked to arrange the candy into the plate with round shape, after it is shaped, children should pour the water in the middle of plate and wait until several minutes. The result is the colors in the candy will be fade to the middle and they are side by side each other like rainbow colors. Children are able to make the rainbow candy and know the reason why the color of candy could be fade and mixing as well as they know about the spectrum of colors. Children feel happy looking at the candy on plate could produce the different colors and it looks as if it is united and make a shape like a rainbow color. The obstacle faced in this meeting is there is one child that did not attend this meeting.

At the end of meeting the college student give several snacks to children in order to make them feel enthusiastic in enjoying this course and in the next meeting they will come again. Actually, giving snack is not done in every meeting regarding the budget is limited for this program. Besides the planning that has been designed, there is a session of test for children to measure how far they have understood the material as well to evaluate themselves. For the next, evaluation activity will be presented on the next sub chapter.

3.3 Evaluation

Evaluation is conducted to know the level of success of the program. The evaluation model used is evaluation model of CIPP (Context, Input, process, Product). Evaluation is conducted by using the method of Q&A and observation both during the activity's running and finish.

Table 1: Evaluation Result of Scientific Literacy Program Enhancement

No.	Aspect	Explanation
1.	Context	The program conducted has finished which is suitable for the need and problem faced by the children in Citizen Association 1 Padukuhan Santren.
2.	Input	Facilities and infrastructure are sufficient. The program financing is really limited due to the fund given by the college party should be shared with another activity, therefore sometimes college students should take their personal fund. The human resource consists of college students as a presenter and target group that play in active role.
3.	Process	Learning method used is lecturing, Q&A and practice that run smoothly, there is interaction between the service and the target group. The service can be said to be good from the presence of good interaction. Time in the activity is effective and efficient since it is appropriate with the planned.
4.	Product	The product produced is early childhood is able to have the knowledge and skill about scientific literacy in their daily life through the experimentation activity.

The supporting factor of this activity include: 1. The community leader's policy that have approved and authorized the community service work program, 2. Community's positive response and open attitude toward the presence of Community Service Program of State University of Yogyakarta students to conduct the activity in Padukuhan Santren, 3. The access to get the place of implementation of activity is easy to reach, because it is not far from the residence of the target group, 4. Elementary school children that still have no idea about scientific literacy, 5. Children's big curiosity and enthusiasm supports the implementation of the program, besides that, the knowledge taught has not been obtained in their school, so it is a new thing for them. Meanwhile, obstacle factors of this activity are as follows: 1. The difficulty of coming on time in attending activity so that activity cannot be carried out according to the planned time, 2. The equipment and material used for scientific experiments are limited, 3. The diversity of school age of the target group, so it needs extra learning in order to the material can be understood properly.

4. Conclusion

All the description that has been explained about the effort of scientific literacy enhancement for children in Citizen Association 1 Padukuhan Santren through the community Service could be make a conclusion that all the implementation activities and programs that have been designed have run successfully and corresponding with the problems identified before. The result of this program is children are able to know and understand about scientific literacy through the scientific experimentations that have been done. This case can be observed from the result of evaluation. Besides that, this activity also got a support and appreciation from the community leader.

Conflict of Interest Statement

The authors declare no conflicts of interests.

About the Authors

Nur Kholis has Master of Education in Educational Research and Evaluation, Lecturer at Electrical Engineering Education, Faculty of Engineering, Universitas Negeri Yogyakarta, Indonesia. Research interest in Educational Assessment and Vocational Education.

Aulia Nishful Laila is final-year students of Non-formal Education, Faculty of Education, Universitas Negeri Yogyakarta, Indonesia.

References

Anwar, C. (2014). Hakikat Manusia Dalam Pendidikan. Yogyakarta: Suka Press.

Ashri, N., & Hasanah, L. (2015). Pengembangan Bahan Ajar Ipa Terpadu Tema Udara. Prosiding Simposium Nasional Inovasi Dan Pembelajaran Sains 2015 (SNIPS 2015), 2(1), 469–472.

Azizah, M. (2008). *Metode Pengembangan Perilaku dan Kemampuan Dasar Anak Usia Dini*. Universitas Terbuka.

Faizi, M. (2013). Ragam Metode Mengajarkan Eksakta Pada Murid. Yogyakarta: Diva Press.

Hidayati, Fitria., Julianto. (2018). Penerapan Literasi sains dalam Pembelajaran IPA di Sekolah Dasar untuk Meningkatkan Kemampuan Berpikir Kritis Siswa dalam Memecahkan Masalah. Journal Seminar Nasional Pendidikan.

Hurrohman, N. (2004). Peranan Motivasi dan Kemampuan Awal dalam Kegiatan Pembelajaran. Jakarta: Delia Press.

Khadijah. (2016). *Pengembangan Kognitif Anak Usia Dini*. Medan: Perdana Publishing

Nugraha, A. (2015). Pengembangan Pembelajaran Sains Pada Anak Usia Dini. Jakarta: Bumi Aksara.

OECD. (2016). The PISA 2016 Assessment Framework. Paris: OECD.

Sari, dkk (2021). Implementasi Metode Eksperimen Untuk Mengembangkan Keterampilan Proses Sains Dan Literasi Sains Anak Usia Dini. Jurnal Teknologi Pendidikan dan Pembelajaran, 8(1).

Sugiyono. (2017). Memahami Penelitian Kualitatif. Bandung: Alfabeta.

Susanto, & Vidiawati, V. (2019). Implementasi Program Literasi dalam Meningkatkan Minat Baca Siswa Madrasah Ibtidaiyah Negeri 4 Jakarta Selatan. Jurnal Ilmu Pendidikan Islam, I(1), 45–82. http://jurnal.fatahillah.ac.id/index.php/elmoona/article/view/6

Suyanto, S. (2005). Pembelajaran Anak TK. Depdiknas.

UNEP, U. (2012). 21 Issues for the 21st century: Results of the UNEP foresight process on emerging environmental issues. http://wedocs.unep.org/handle/20.500.11822/8056