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Think Pair Share Integrated with Reading-Questioning-Answering: How Impact on Biological Literacy?

Rizhal Hendi Ristanto[a, 1, *], Sri Rahayu[b, 2], Adinda Maulidia[a, 3]

[a]Biology Education, Faculty of Science and Mathematics, Universitas Negeri Jakarta, Jakarta, Indonesia
[b]Biology, Faculty of Science and Mathematics, Universitas Negeri Jakarta, Jakarta, Indonesia
[1]rizhalhendi@unj.ac.id *; [2]srirahayu@unj.ac.id ; [3]adindamaulidia18@gmail.com
*Corresponding author: rizhalhendi@unj.ac.id

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ABSTRACT

In this modern era, students who are literate are needed, especially those who understand scientific facts and their application to everyday life. Biology is a subject that is needed in everyday life, so it is necessary for students to have a high level of biological literacy. One way to improve biological literacy is by applying cooperative and constructive learning models, one of which is called Think Pair Share combined with Reading Questioning and Answering. This study aims to determine the effect of the Think Pair Share (TPS) Learning Model combined with Reading Questioning Answering (RQA) on the Biological Literacy of Students at SMAN 13 Jakarta on the reproductive system. The research was conducted in May 2023 using a quasi-experimental research method with a pretest-posttest control group design. The research sample was selected by simple random sampling. The prerequisite test used is the normality test with the Kolmogorov-Smirnov test and the homogeneity test using the F test. Statistical hypothesis test with the independent t-test obtained the results of accept H0 at α = 0.05, which means that there is no influence of the Think Pair Share (TPS) learning model combined with Reading Questioning Answering (RQA) Biological Literacy's students on the reproductive system.

Keywords: Biological Literacy, Reproductive System, Reading Questioning Answering, Think Pair Share.

Introduction

Students becoming literate or someone who is able to understand, utilize, analyse and transform information is a way to face the challenges of this century (Irianto & Febrianti, 2017). In this modern era, we need people who understand scientific facts and the relationship between scientific facts, technology and society (Rahayu, 2017). According to Rahayu and Suciati, the way to face the challenges of the 21st century is with science literacy which really needs to be developed for students (Rahayu, 2017; Suciati et al., 2014).

In Indonesia's current education system, students prioritize acquiring knowledge rather than developing the logic of knowledge (Sari et al., 2018). Most students struggle to acquire information due to their critical reading and comprehension skills (Krauja & Birzina, 2018). According to the Program for International Student Assessment (PISA) survey, Indonesians' scientific literacy is still low.

Scientific literacy is the ability to apply science in life and aims to build a society that understands science and technology (Santoso et al., 2017). Biology is one scientific discipline that is closely related to everyday life (Harefa et al., 2022). Biological literacy is a development of science literacy that focuses on biological concepts to solve problems (Suwono et al., 2017). Biology is a lesson that has many basic concepts related to life. To understand these concepts, students need to be active in class and they need to collect a lot of information and rearrange the information with their ability to understand biological concepts (Azizah & Alberida, 2021). Reproductive system is a material in biology that is considered difficult.

Most students find it difficult to study the reproductive system because it is hard to understand and analyze the concepts, as well as because there is too much content (Raida, 2018). Efforts to overcome these conditions can be made by choosing a learning model that allows students to take an active role and be responsible for themselves and the group (Saraswati et al., 2020).

Literacy activities, especially biological literacy, are expected to continue to improve students' ability to produce literate students. Through literacy, students can acquire, understand, analyze, and apply the acquired knowledge in solving problems in everyday life. The learning model is the most important element of learning (Lashari et al., 2017). Therefore, a learning model that can improve biological literacy is needed. Biological literacy can be improved by changing the way of teaching in the classroom through the provision of provocative questions that can be used to construct and explore learning (Adnan et al., 2021). Based on this, there is a need to integrate constructivist learning models and cooperative learning, two of which are Think Pair Share (TPS) and Reading Questioning and Answering (RQA) (Dominggus et al., 2021).

TPS is a cooperative learning model that aims to improve students' thinking and communication skills by creating an active discussion environment and increasing students' participation in the learning process (Sharma & Priyamvada, 2018). TPS should be integrated with the constructivist learning model, RQA, to develop students' thinking and understanding. The learning model improves reading culture because students are trained in reading, understanding the content of reading, finding the main idea of each comprehension, and training their independence in learning (Bahri & Idris, 2017). RQA can help teachers shorten the time used in TPS so that learning activities can be more efficient.

The application of both learning models together is expected to increase students' interest in reading and writing, improve communication skills, enhance student's ability to be critical and use their knowledge to solve problems in everyday life.

Methods

Research Design

This research is a quasi-experimental research with a non-equivalent control group design pretest-posttest. This research design at Table 1. Two groups were chosen to be research subjects, the experimental group received treatment with learning model TPS combined RQA and the control group received treatment with only learning model TPS. Each group received a biological literacy instrument in the pretest and posttest.

Table 1. Design of Quasi-Experimental Research with Pretest-Posttest Non-Equivalent Control Group Design

Experimental Group	**O_1**	**X**	**O_3**
Control Group	**O_2**	**C**	**O_4**

In which:

O_1 and O_2 : *Pretest score*

O_3 and O_4 : *Posttest score*

X : Learning model TPS combine RQA

C : Learning model TPS

Research Population and Sample

The population in this study were 180 students of grade XI of SMAN 13 Jakarta. The samples in this study were 62 students of grade XI Science. The sample is determined with a *simple random sampling* technique and Slovin formula to determine the number of students in each class.

Instrument

The instrument which is used to measure biological literacy skills is a multiple choice test using biological literacy level by Uno (1994). The instrument will given before and after the treatment. Before being used, the instruments were tested for validity and reliability. There were 31 valid questions and 9 invalid questions in the validity test. The results of the reliability test showed that the instrument is very reliable with a value of 0.820.

Data Analysis Technique

The data results were analyzed using a normalized gain score, to know the increase in pretest and posttest scores obtained by the students. The obtained data then will be tested for its descriptive, normality and homogeneity. The data were normal and homogenous. After that, the data were analyzed using a t-independent test on SPSS vol. 29. The t-independent test to analyze the effect of TPS combines the RQA model to improve biological literacy.

Procedure

This research begins with determining the school, population, sample and lesson plan TPS combined RQA. After the lesson plan is completed, it can be used for treatment in any group. The next step is the development of a biological literacy instrument test. After the instrument is completed, it is tested for validity and reliability. Instrument tests can be used for pretest and posttest. After the pretest, treatment can be used as planned in the lesson plan. In the end,

an instrument test was used for the posttest to get the data, so it can be seen the difference between the experimental group and the control group. This research procedure can seen in Figure 1.

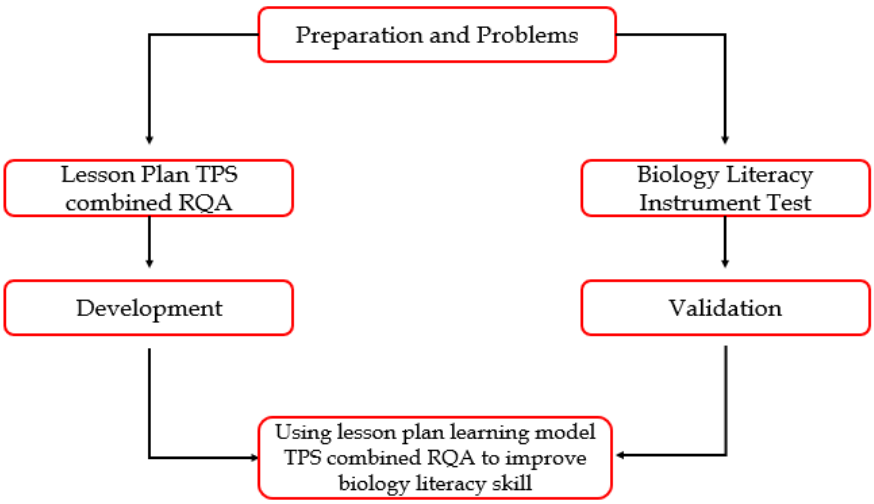

Figure 1. Research Procedure

Results and Discussion

The Data from the result of the research consist of pretest and posttest scores of biological literacy skills that will be analyzed by using t-independent analysis. There should be a test of Kolmogorov Smirnov and Levene's prerequisite. The result of Kolmogorov Smirnov is 0.2 for the experimental group. Which shows that pretest and posttest data are distributed normally. Levene's prerequisite shows at 0.335, which is more than alpha (0.05) and can be said the data are homogeneous.

This study aims to determine the effect of the TPS learning model combined with RQA on students' biological literacy on reproductive system material. It was found that there was no effect of the TPS learning model combined with RQA on students' biological literacy on reproductive system material based on hypothesis testing in the study.

The result of the t-independent test, the comparison of biological literacy of students who get TPS combined RQA treatment and TPS-only treatment can be seen in Table 2.

Table 2. The Result of the t-Independent Test

Group	n	Average	SD	α	*p value*	Description
Experimental	31	66.07	19.78	0.05	0.081	$p > \alpha$
Control	31	57.45	18.37	0.05	0.081	$p > \alpha$

In which:
n : number of samples
SD : standard deviation
α : significance level

Based on Table 2, *p value* > α can be said there's no influence of TPS combined RQA treatment on students' biological literacy on reproductive system. Based on the

results of descriptive tests, the average score in the TPS class combined with RQA has a good increase. The results can be seen in Table 3.

Table 3. Descriptive Test

Group		Description				
		n	Minimum Score	Maximum Score	Average	SD
TPS combined RQA	*Pretest*	31	29.03	87.10	55.15	14.41
	Posttest	31	64.52	100	84.18	9.87
TPS	*Pretest*	31	22.58	80.65	54.11	15.05
	Posttest	31	51.61	100	79.92	11.95

In which:
n : number of samples
SD : standard deviation

To prove this, the normalized gain test was conducted and it can be concluded that the application of TPS combined with RQA is effective enough to improve students' biological literacy. The results differed from Syarifah's (2016) study, which said TPS combined with RQA can increase students' metacognitive.

In addition, the comparison of the average score of each dimension of biological literacy, namely nominal, functional, structural, and multidimensional, was made. The results can be seen in Table 4. In the study, the average of each dimension in the TPS group combined with RQA was quite high.

Table 4 Comparison of Average Score in Biological Literacy Level

Biological Literacy's Level	TPS combined RQA (n=31)		TPS (n=31)	
	***Pretest* ±SD**	***Posttest* ±SD**	***Pretest* ±SD**	***Posttest* ±SD**
Nominal	63,87 (22,61)	87,10 (12,43)	58,71 (26,55)	82,26 (14,54)
Functional	57,42 (22,94)	81,94 (17,40)	49,68 (23,59)	72,26 (25,13)
Structural	44,80 (14,20)	77,42 (18,48)	45,52 (18,22)	67,74 (23,72)
Multidimensional	55,30 (19,07)	82,49 (17,96)	53,00 (22,50)	70,51 (27,09)

In which:
n : number of samples
SD : standard deviation

The nominal dimension has a relatively high average compared to other dimensions. In the comparison of the gain score, which can be seen in Figure 4, the nominal dimension has increased quite well in the experimental group and the control group. An independent t-test was conducted on the gain score to determine the effect on the dimensions of biological literacy alone, it was found that the TPS learning model combined with RQA had no effect on improving the biological literacy skills of the nominal dimension.

The nominal biological literacy level has a criterion that students know biological terms and issues related to biology, but there are misconceptions about understanding the concepts (Arum et al., 2014). In the biology research instrument, basic questions are presented, such as

initial knowledge of the reproductive system. Students possess the achievement at this level as they should have been taught about the reproductive system at the previous level. However, if learners have a nominal level of understanding, they have entered a level of biological literacy (Uno & Bybee, 1994).

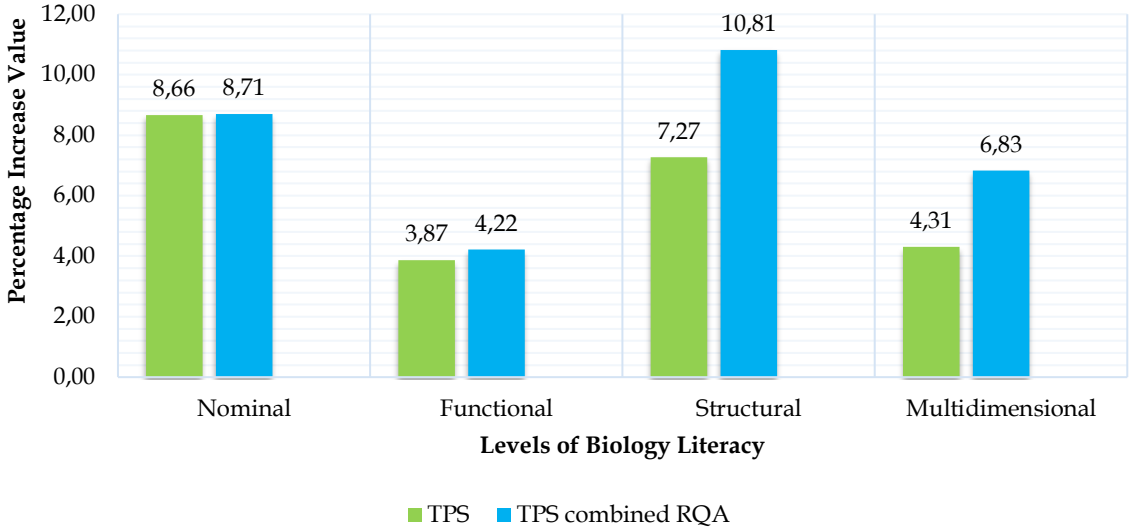

Figure 2. Increased Value Comparison of the Levels of Biological Literacy

Meanwhile, the functional biological literacy dimension has a fairly good average score. However, there is no significant increase based on the gain score. The independent t-test proved that in the functional dimension, there is no effect of the TPS learning model combined with RQA on the functional dimension of biological literacy. T-independent test with the result in Table 5. In this dimension, teachers give tests on biological concepts that students should be able to understand. Teachers give tests with biological concepts so that students can understand and ask critical questions in everyday life (Anakara, 2021).

Table 5. t-Independent Test In Biological Literacy Level

Level	n	Average	SD	α	*p value*	Description
Nominal	31	23,54	7,42	0,05	0,985	$p > \alpha$
Functional	31	10,53	4,11	0,05	0,764	$p > \alpha$
Structural	31	17,09	6,82	0,05	0,045	$p < \alpha$
Multidimensional	31	14,75	5,59	0,05	0,143	$p > \alpha$

In which:
n : number of sample
SD : standard deviation
α : significance level

The structural level has the lowest *p value* of the four dimensions. However, it has the highest increase in value and also an independent t-test stating that there is an effect of the TPS learning model combined with RQA on the biological literacy of the structural dimension. At the structural level, students are asked to connect biological concepts that they know. Developing students' skills effectively and efficiently is demonstrated in the nominal and functional dimensions, and then it can be reflected in the structural dimension (Anakara, 2021).

Biological literacy in the multidimensional level in TPS combined with the RQA group has a gain score as well as a good average compared to TPS group. In the independent t-test for the multidimensional level, it was found that there was no effect of TPS combined with RQA on the ability of biological literacy at the multidimensional level. Students who have a multidimensional level of biological literacy are students who can connect biology with other subjects (Onel & Firat Durdukoca, 2019).

Improving students' biological literacy is difficult because there are several factors that affect students' literacy, such as textbook selection, misconceptions, out-of-context learning, low reading skills, and the learning environment and climate (Fuadi et al., 2020). That underlies this study, providing a different learning model than usual.

The research activities took place in three weeks with six meetings of activities arranged according to the lesson plan. The first meeting in both control and experimental groups was given a pretest to measure the initial ability of students. After that, students were presented with apperception in the form of photos and videos relative to the reproductive system such as giving birth scenes in drama and photos of the disorder, so that students could take part in learning activities well.

Based on observations, in TPS and TPS combined with RQA group, there was interest in learning, in addition to interesting learning materials, students felt involved in learning. However, the student's activity during learning is clearly different. Students in the TPS group are more passive than those in the TPS combined with RQA. Based on the results of the students' response questionnaire, it is known that students' interest in biology subjects is low. On the other hand, learning with TPS model is active learning that is interdependent, individual responsibility, face-to-face, communication among members, and evaluation of the group process (Lindawati et al., 2018).

Providing students with worksheets began the core learning activities. The TPS group was given articles and questions that encouraged them to make broader questions or answers. Meanwhile, the TPS combined RQA was given an article with instructions for students to make questions and provide answers to the questions they made. In the TPS combined RQA group, the response was quite good, but the short time made students rush to complete the worksheet and copy from the Internet. Corebima stated that one of the difficulties in implementing the RQA learning model is the lack of systematic delivery of answers from students to teachers (Amin & Corebima, 2016). The difference between TPS and TPS combined RQA is at the Think phase, TPS combined RQA will be filled with the syntax of RQA learning model.

The next activity is Pair. Students are asked to discuss the worksheet with one of their friends (in pairs). The students can discuss the questions that come up or the answers that they have come up with. In both control and experimental classes, the discussion activities went quite well, but most of the students had been discussing from the beginning when doing individual work. So there is not much change from the previous activity.

At the end of the discussion, students are asked to share the results of their discussion. This activity went well in both groups. Students actively responded to the activity by asking questions and responding to the presentations. However, due to time constraints, not all groups were able to present their discussion results.

Based on the activities that were held, it can be said that the learning activities proceeded well. However, there were some limitations in the implementation of the activities due to time constraints. Also, the learning activities have to follow the set time because the learning activities are divided into two sessions. According to Kasimuddin, one of the disadvantages of learning with TPS is that the time used is quite long (Kasimuddin, 2016).

Two observers were present at each session to observe the implementation of the learning. The results can be seen in Figure 4. They found that the activities went according to plan. However, based on the results of the students' response questionnaire, it is known that

students' interest in biology subjects is low. The students are aware of the benefits of learning biology, but they are not interested in the reading activities. This proves Sari's research that students prioritize acquiring knowledge rather than developing reasoning about the knowledge they have acquired (Sari et al., 2018). Consistent with Purwani's research that many students do not read proficiency test questions (Purwani et al., 2018).

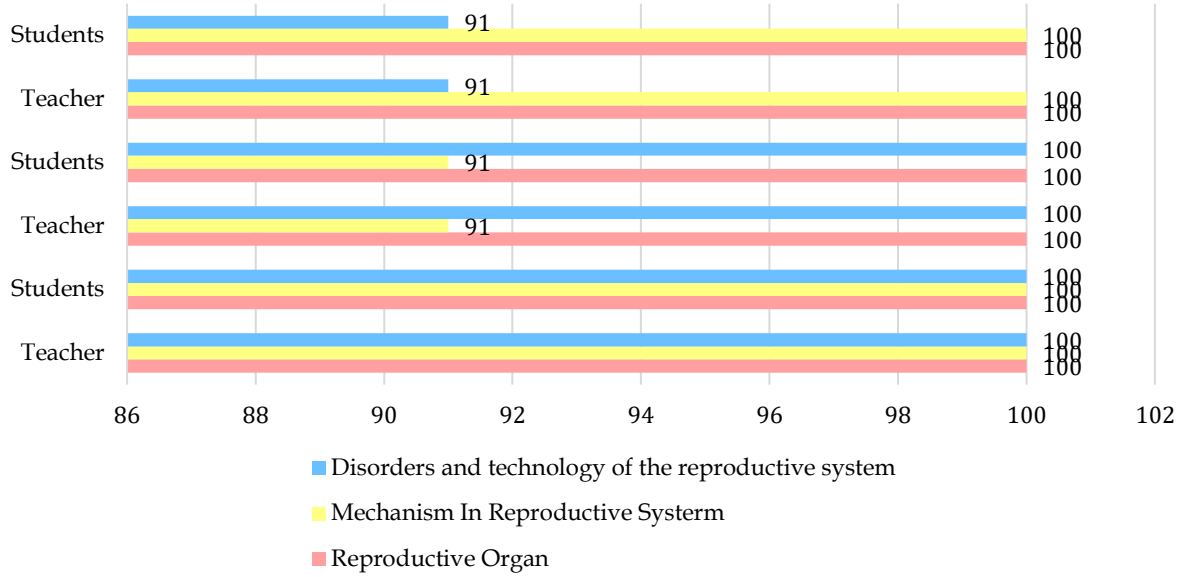

Figure 3. Percentage of Learning Implementation Observation

The students' biological literacy is quite high based on the average score. The average score of each level is also good. However, it is difficult to improve biological literacy skills. Based on learning activities, many students are too comfortable with conventional ways of learning. The learning environment and climate are important factors that influence the variation of scores on biological literacy instruments (Hayat and Yusuf, 2006). Many students also complained about the difficulty of the worksheet. Many students dislike science because they think science is hard (Fuadi et al., 2020).

In addition, the lack of effect of the TPS learning model combined with RQA on biological literacy on reproductive system material is influenced by many other things. Biological literacy is not the end of learning in biology, the biological literacy test is not an achievement, only that students are classified as biological literate or not (Uno & Bybee, 1994). Learners may not be able to understand biological concepts in certain materials, but they can understand concepts in other materials (Onel & Firat Durdukoca, 2019). The task of the teacher, in this case, is not only until the students can read and write, but at least teachers change students' knowledge for the better than before (Uno & Bybee, 1994).

Conclusion

Based on the results of the research that has been done, it can be concluded that there is no influence of the TPS learning model combined with RQA on students' biological literacy.

References

Adnan, Mulbar, U., Sugiarti, & Bahri, A. (2021). Biology Science Literacy of Junior High School Students in South Sulawesi, Indonesia. *Journal of Physics: Conference Series*, *1752*(1). https://doi.org/10.1088/1742-6596/1752/1/012084

Amin, A. M., & Corebima, A. D. (2016). Analisis Persepsi Dosen Terhadap Strategi

Pembelajaran Reading Questiong And Answering (RQA) Dan Argument Driven Inquiry (ADI) Pada Program Studi Pendidikan Biologi Di Kota Makassar. *Prosiding Seminar Nasional II*, *March*, 333–347.

Azizah, N., & Alberida, H. (2021). Seperti Apa Permasalahan Pembelajaran Biologi pada Siswa SMA? *Journal for Lesson and Learning Studies*, *4*(3), 388–395. https://doi.org/10.23887/jlls.v4i3.38073

Bahri, A., & Idris, I. S. (2017). Teaching Thinking : Memberdayakan Keterampilan Metakognitif Mahasiswa melalui PBLRQA (Integrasi Problem-based Learning dan Reading , Questioning , & Answering). *Jurnal Seminar Nasional Lembaga Penelitian UNM*, *2017*, 59–69.

Damayanti, V. (2015). *Profil Penguasaan Pembelajaran Reading, Questioning, and Answering (RQA) oleh Guru IPA SMP di Jember*. Universitas Negeri Jember.

Dominggus, R., Kristin, S., Martha M, B., Since Y, K., Vera V, K., & CorneliLatu, P. (2021). Resource based learning design thinking (RBLDT): A model to improve students' creative thinking skills, concept gaining, and digital literacy. *Cypriot Journal of Educational Sciences*, *16*(1), 288–302.

Fuadi, H., Robbia, A. Z., Jamaluddin, J., & Jufri, A. W. (2020). Analisis Faktor Penyebab Rendahnya Kemampuan Literasi Sains Peserta Didik. *Jurnal Ilmiah Profesi Pendidikan*, *5*(2), 108–116. https://doi.org/10.29303/jipp.v5i2.122

Harefa, M., Lase, N. K., & Zega, N. A. (2022). Deskripsi Minat Dan Motivasi Belajar Siswa Pada Pembelajaran Biologi. *Educativo: Jurnal Pendidikan*, *1*(2), 381–389. https://doi.org/10.56248/educativo.v1i2.65

Irianto, P. O., & Febrianti, L. Y. (2017). Pentingnya Penguasaan Literasi bagi Generasi Muda dalam Menghadapi Mea. *The 1st Education and Language International Conference Proceedings*, 640–647. http://jurnal.unissula.ac.id/index.php/ELIC/article/view/1282

Kasimuddin, D. H. (2016). Penggunaan Model Pembelajaran Kooperatif Tipe Think Pair Share (TPS) untuk Meningkatkan Aktivitas dan Hasil Belajar Fisika Peserta Didik Kelas XI IPA 2 SMA Negeri 9 Makassar. *Jurnal Pendidikan Fisika Universitas Muhammadiyah Makassar*, *4*(1), 54–72.

Krauja, I., & Birzina, R. (2018). Meaningful Reading Skills for Improvement of Biological Literacy in Primary School. *Rural Environment. Education. Personality. (REEP) : Proceedings of the 11th International Scientific Conference*, *11*(May), 185–193. https://doi.org/10.22616/reep.2018.022

Lashari, D. A., Lisa, Y., & Julung, H. (2017). Pengaruh Model Reading Questioning Answering (RQA) Terhadap Pengetahuan Metakognitif Siswa pada Materi Sistem Pernapasan. *JPBIO (Jurnal Pendidikan Biologi)*, *2*(2), 27–33.

Onel, A., & Firat Durdukoca, S. (2019). Identifying the Predictive Power of Biological Literacy and Attitudes Toward Biology in Academic Achievement in High School Students. *International Online Journal of Educational Sciences*, *11*(2). https://doi.org/10.15345/iojes.2019.02.014

Purwani, L. D., Sudargo, F., & Surakusumah, W. (2018). Analysis of student's scientific literacy skills through socioscientific issue's test on biodiversity topics. *Journal of Physics: Conference Series*, *1013*(1). https://doi.org/10.1088/1742-6596/1013/1/012019

Rahayu, S. (2017). Sinergi Penelitian dan Pembelajaran untuk Mendukung Pengembangan Literasi Kimia pada Era Global. *Prosiding Seminar Nasional Kimia UNY 2017*, *21*, 319–324. http://seminar.uny.ac.id/semnaskimia/sites/seminar.uny.ac.id.semnaskimia/files/2017/%40-1_Sri_Rahayu.pdf

Raida, S. A. (2018). Identifikasi materi biologi SMA sulit menurut pandangan siswa dan guru SMA se-kota Salatiga. *Journal of Biology Education*, *1*(2), 209–222. http://journal.stainkudus.ac.id/index.php/jbe%0AIdentifikasi

Santoso, A. B., Alimah, S., & Utami, N. R. (2017). Biological Science Curriculum Study 5e

Instructional Model dengan Pendekatan Jelajah Alam Sekitar terhadap Kemampuan Literasi Sains. *Journal of Biology Education*, *6*(2), 173–186. https://doi.org/10.15294/jbe.v6i2.19320

Saraswati, A., Kartijono, N. E., & Partaya, P. (2020). Aktivitas Dan Hasil Belajar Siswa Pada Pembelajaran Materi Sistem Sirkulasi Manusia Menggunakan Model Think Pair Share Di Sman 1 Karangrayung. *Bioma : Jurnal Ilmiah Biologi*, *9*(2), 143–156. https://doi.org/10.26877/bioma.v9i2.7055

Sari, M. S., Sunarmi, & Sulasmi, E. S. (2018). Pengaruh Model Pembelajaran Berbasis Proyek terhadap Keterampilan Literasi Botani Calon Guru Biologi. *Jurnal Pendidikan Biologi*, *9*(2), 56–63.

Sharma, H. L., & Priyamvada. (2018). TPS (Think-Pair – Share): An Effective Cooperative Learning Strategy for Unleashing Discussion in Classroom Interaction. *International Journal of Research in Social Sciences*, *8*(5), 91–100.

Suciati, Resty, W, I., Itang, Nanang, E., Meikha, Prima, & Reny. (2014). Identifikasi Kemampuan Siswa dalam Pembelajaran Biologi Ditinjau dari Aspek-aspek Literasi Sains. *Prosiding Pendidikan Sains UNS*, 1–8.

Suwono, H., Pratiwi, H. E., Susanto, H., & Susilo, H. (2017). Enhancement of students' biological literacy and critical thinking of biology through socio-biological case-based learning. *Jurnal Pendidikan IPA Indonesia*, *6*(2), 213–222. https://doi.org/10.15294/jpii.v6i2.9622

Uno, G. E., & Bybee, R. W. (1994). Understanding the Dimensions of Biological Literacy Linked references are available on JSTOR for this article : Education Understanding the dimensions of biological literacy. *BioScience*, *44*(8), 553–557.