

Analysis of Science Literacy Abilities of Class VIII Junior High School Students in Padang

Maya Sari, Devinda^{1*}, Violita²

¹Student of Master Degree Program of Biology Education, Faculty of Mathematics and Sciences,
Universitas Negeri Padang, Indonesia

²Department of Biology, Faculty of Mathematics and Sciences,
Universitas Negeri Padang, Indonesia



Abstract. This research purpose is to describe the result of class VIII Junior High School student's science literacy ability in Padang. This kind of research is descriptive research. The technique that is used here is purpose sampling. Gathering data technique is using valid and reliable literacy question sheet supported with student's and teacher's interview data. The analyzing data technique is by counting average score of student's science literacy test. Technique for checking data's validity is by using triangulation technique. The result shows that student's science literacy categorized as low level. The conclusion of this research is the ability of class VIII Junior High School in Padang based on total scores, basic competency and science competency shows that the average value of SMPN 1 Padang is the highest. Then followed by the SMP Ar-risalah Padang and SMP Manjushri Padang with a low category.

Keywords - *Analysis, 21 century education; Science literacy; Science.*

I. INTRODUCTION

Education nowadays which reaches 21 century can be seen by development of science and technology. 21 century education demand education organization to develop new paradigm for creating breakthrough thinking process, concept arrangement, and necessary action in order to produce high quality human resources (Wijaya, 2016).

Nowadays education purpose is to encourage students to have skill as investment in preparing themselves against era and global competition. One of the many skills that need to be mastered in 21 century is science literacy (Rahmadani, 2018).

Science literacy is a skill used to comprehend and implementing, and science concept in solving scientific issue and nowadays problem (Holbrook & Rannikmae, 2009; Singh dan Singh, 2016). According to *Program for International Student Assessment (PISA)*, science literacy is

defined as a skill in implementing science knowledge, question identification and taking conclusion based on evidences in order to make a decision related to the nature and human activity toward it (OECD, 2016). Science literacy consists of 4 aspects; science content, science process and comprehension, context and science application and behaviour towards science (Dani, 2009).

Knowledge/content consists of content knowledge and procedural. Science process and competency include; explaining scientific phenomenon, evaluating and designing scientific analyzing and interpreting data and scientific evidence. Context and application include health and disease, nature resources, environment quality, the bad impact of science and technology. Behavior toward science include knowledge development, reaching career in science, and implementing concept and scientific method in people lives (OECD, 2017).

Science literacy is important to be mastered by students because it is crucial in education process (Fatmawati, 2015). Based on that explanation, science literacy skill is an important skill which need to be mastered by students in order to face globalization and industrialization so that it needs to be integrated in science learning teaching process.

Science is a knowledge that learns about living-creature, nature phenomenon and help a lot in technology development (Roberts, 2007; Sloman, 2001). According to Sudarisman (2015), science is crucial in whole life, so Indonesian people is needed to learn it so that they will be able to reach science literacy. Student's skill in science lesson can be measured by doing cognitive test based on science literacy that consist of content aspect, process and application in certain basic competency (Situmorang, 2016).

Science literacy-based cognitive test can be designed through science-related question, folks and environment issue, and technological impact (Situmorang, 2016). Based on that opinion, can be stated that students science literacy skill can be measured by formulating science literacy aspects in certain basic competency that related to science, scientific and technological issue, then doing try-out about question science literacy-based towards student.

Researcher has done a try-out of science literacy-based while doing observation to find out basic student's skill in grade VIII due to their age is 15 years old and believed to be productive age in implementing science literacy (Rustaman, 2003). Researcher has done a try-out about it by taking sample in Junior High School in Padang with different status. So 3 school is chosen; SMPN 1 Padang (Public), Ar-Risalah (Islamic School), and Manjushri School (Non Islamic School).

Try-out result while observing Grade VIII Junior High School in Padang can be seen in Table 1.

Table 1. The Result of Science Literacy Try out while Observing Grade VIII Junior High School in Padang.

No	School	Average Score	Category
1	SMPN 1 Padang	53,62	Low
2	SMP Ar-risalah Padang	44,40	Low
3	SMP Manjushri Padang	34,12	Low

That score shows that the skill of science literacy students in Padang is low. It indicates that they are not able to comprehend the concept and science process nor implementing what they already learnt in daily life. Then the researcher doing interview with students and teachers and doing observation in science learning teaching to find out the causes.

Based on interview with students, researcher get information that they never experience anything related to science literacy.

They said that science literacy question sheet that they were facing is the first time for them to experiencing it. Students said that the question sheet is different than what their teacher normally test them. Science literacy test consist of long discourse and demand high level analyzing skill, whereas common science lesson. Science lesson do not contain long discourse and the question is quietly simple. It related with Rukman (2015) research the causes of student's low level in science literacy is that the teacher never give them test like that before so that student skill in giving logical reasoning is still low.

Students statement is supported by interview result with science teacher. Teachers do not comprehend science literacy deeply. Then the question that teachers give to student is level C2 and still far from science literacy. Students statement is supported by interview result with science teacher. Teachers do not comprehend science literacy deeply. Then the question that teachers give to student is level C2 and still far from science literacy.

The other causes of student's lack of science literacy is nowadays school lesson goal is different than what it needs in this era. Another evidence is that learning goal in school fulfil standart that is demanded by government, but they do not involve science process so it makes student do not get enough skill to face nowadays demands in education. It is also suit with Rizkita (2016) research. Students science literacy mastery is low due to learning teaching process do not involve science process. Diana (2015) said that students who low in science literacy is caused by different target of learning teaching process and what it needs in this era, 21th century.

The researcher has conducted science literacy try-out in order to determining student's base skill by using question sheet that was made by another researcher. Researcher do not self-made question at that time so getting information about student's skill first is important. By doing all of that, solution will be revealed later based on the problem that

occurs. That is why researcher made a research with the title “Analysis of Science Literacy Abilities of Class VIII Junior High School Students in Padang”.

II. METHOD

This kind of research is descriptive-type with purpose sampling technique based on comparison and contrast of schools status so 3 school was chosen; SMPN 1 Padang,

Ar-Risalah and Manjushri Junior High School. Those school learn the same material; excretory and respiration system. The differentiation is SMPN 1 Padang is Public, Ar-Risalah is an Islamic School, and Manjushri School is Non Islamic School. In every school sample is decided randomly because each class is homogeny.

Gathering data technique is valid and reliable question of science literacy and supported by interview with both students and teachers. The analyzing data technique is

counting average score of science literacy result test. In checking the data validity is using triangulation technique.

III. RESULT AND DISCUSSION

Science literacy data is gathered from research respondent from those 3 school. Data is gathered from students' result test and also supported by interviewing both students and teachers.

The result shows that student's science literacy achievement is still low. It can be seen from average score from the total score of basic and science competency. Science literacy achievement is presented in Tables below; Table 2, Table 3, and Table 4.

3.1 Science Literacy Result Based on Total Score

Table 2. Science Literacy Result Based on Total Score.

No	Sekolah	Average Score	Category
1	SMPN 1 Padang	50,89	Low
2	SMP Ar-risalah Padang	46,67	Low
3	SMP Manjushri Padang	34,26	Low
4	All	45,60	Low

3.2 Science Literacy Result Based on Basic Competency

Table 3. Science Literacy Result Based on Basic Competency.

No	Basic Competency	Average Score			
		SMPN 1	SMP Ar-risalah	SMP Manjushri	All
1	Respiration system	55,30	52,20	35,29	49,65
2	Excretory system	46,01	40,55	33,13	41,12
	Total	101,31	92,75	68,42	90,77
	Average	50,66	46,38	34,21	45,39
	Category	Low	Low	Low	Low

3.3 Science Literacy Result Based on Science Competency

Table 4. Science Literacy Result Based on Science Competency.

No	Science Comptency	Average Score			All
		SMPN 1	SMP Ar-risalah	SMP Manjushri	

1	Explaining scientific phenomenon	46,15	44,16	31,22	42,05
2	Evaluating and designing scientific observation	54,84	46,03	34,45	47,05
3	Intepreting scientific data and evidence	51,36	49,86	37,10	47,59
	Total	152,35	140,05	102,77	136,69
	Average	50,78	46,68	34,25	45,56
	Category	Low	Low	Low	Low

The average combination of all test of science literacy is 45,56. That score shows that Class VIII Junior High School Padang skill in answering test is in low category. The causes is that students have no idea what science literacy is. Students do not know anything about science literacy and also science literacy Indonesian people is still low based on PISA result.

The lack of student's knowledge toward science literacy because the school do not implement science literacy-based learning. It suited with researcher observation that all 3 school, learning teaching process is curriculum centered and not science literacy-based learning. That result is supported by interview with the teacher and teachers said that curriculum is not science literacy based and teacher do not implement it in teaching. It is related with Firman (2017) ; Siagian, P., *et al.* (2017) research, one of the causes of low science literacy level in Indonesia is lack of implementation in learning teaching that includes science process like formulating scientific question in observation, using knowledge to explain natural phenomenon and taking conclusion based on the fact from observation.

Student's science literacy reached low-level is also caused by students behavior that they never see and doing science literacy test before. Students said that science literacy test is different than what their teacher normally give in learning teaching evaluation. In science literacy test, there is a long discourse that need high level comprehension and analizing in aswering it, in normal science test, there no discourse and the question is not as long as science literacy and also easier.

The differentiation between their normal test and science literacy test make students feel down in doing it. That statement is strengthen by interview result that is teachers said that students never face test like that before and not get used with test that needs high level analizing, and also the answer is not available in the book they have learned in daily learning teaching process due to their acitivity in

leaning is by remembering books content not by comprehending.

Teacher also said that they never implement science literacy based in their classroom, related to Karnela (2015) research, one of the factor that affects student science literacy skill is student never faced science literacy test before and also it really different than what they ever done in answering question in daily science. The test that their teacher give is not in that level yet because it does not need high level analizing and comprehension. It causes student's lack of critical thinking in comprehending phenomenon. The low student's comprehension level in analizing science literacy is also supprted by Zahara (2012); Osborne, J. (2007), student's comprehension level is still low because science literacy test is in hard level and need high level analizing to answer it.

Basic competency that is observed in this is KD 3.9 analizing respiration system in human and understand what bothers respiration system, and effort to keep respiration system in a good condition and KD 3.10 understand excretion system in human and understand its disturbance and efforts to keep it healthy. Combination average based 45,39. That score shows that Padang students in Class VIII Junior High School skill in understanding those two basic compentency is still in low level category.

If talking about minimal passing grade that was determined by Depdiknas so learning teaching process is not good yet. According to Depdiknas (2004), a student achieve goal if mastered 75% of competency or at least got minimal score 75. Based on observation in each school those KD already learned by students. Then science literacy test will be held after mid-semester. It means that hopefully they will be able to get a good result because they have prepared and get used to it. A bit different in reality because student's science literacy is still low. Students said the test is harder than test that teacher give before. That is why it affects student's science literacy score.

Competency that get the highest score is KD 3.9 about respiration system. Thus students have a good mastery skill in respiration system rather than excretion. They said respiration system material is easier when excretion is more abstract for them, like kidney structures. Respiration system easier because it rather simple while excretion is abit complicated like learning mechanism include urine production.

Students behavior toward both materials, they favoured respiration system than excretion due to they tend to like material that is simple, not complex and not abstract. It can be said that students is a bit lazy to do a critical thinking so it makes their critical thinking is low. It related to Nuryanti, *et al* (2018); Rachmatullah, A., *et al.* (2016) research, stated that Junior High School student's critical thinking categorized as low-level. It occurs due to learning style that is remembering text, rather than developing thinking skill so students will be lack of skill in aspire their own opinion or idea, lack in analizing and also depends on others rather than have confidence in their won decision.

Lack in critical thinking has a bad impacts on education world. Student's critical thinking is crucial to be developed because it will guide them to use their own thinking way to make their own decision and find smart solution rather than depends on other people. According to Kurniawati (2016); Rusilowati, A., *et al.* (2018), student's critical thinking need to be developed because by mastering it students will be able to differentiate what is right and what is wrong, appearance and reality, fact and opinion, knowledge and belief. By having critical thinking skill, students will be able to solve problem by wise decision and able to improve their cognitive achievement. One of the ways to train students critical thinking is by giving learning atmosphere based on science literacy (Haryadi, 2015).

Science competency that get observed in this research is scientific phenomenon, evaluating, designing and interpreting scientific data and evidence. Result of sience competency based on score combination of those 3 school got average 45,56. Those score shows that Junior High School students grade VIII in Padang at understanding content and understanding science process is still low.

Science content refers to core concept from science that is needed to comprehend nature phenomenon and changes that affects nature by human activity. Range of science content not only referenced by school science curriculum but also includes information from other sources.

Science process refers on mental process that is involve in answering certain question or solve it, like identification and interpreting evidence and explaining things.

The lack of students understanding in comprehend the content and science process shows that students science knowledge is still low and only based on what they learn in the school. It suits with research from Olyvia (2015), students skill in solving problem is not enough yet to be implemented in real life. When doing test they got problem in solving the problem and finding a good solution. It happens due to school way of learning still do not guide them in analizing problem in learning.

Based on the data that was described in Table 4, the competency that has highest average score is in interpreting words and scientific evidence, and the lowest is on explaining scientific phenomenon. It shows that students is better in interpreting the data and scientific evidence rather than explaining scientific phenomenon and designing and evaluating scientific observation (Genci, M. 2015).

Students skill in interpreting the data and scietific evidence shows that students have a good skills in transforming data from different representation, analizing and interpreting data and making a good conclusion, evidence and critical thinking in the text, assumption identification, evidence in comprehending text, differentiate argument that based on scientific argument and evidence from different source, even average score in interpreting and scientific evidence is higher than scientific phenomenon, but average score of interpreting and scientific evidende is categorizd as low-level. It means that student's skill in analizing, evaluating the data, claiming, and having argument is categorized as low-level.

The lowest science literacy competency is on expalining scientific phenomenon. It means that students have low skill in remembering, understanding, implementing and evaluating various nature phenomenon and technology. It is hard for them to explain scientific phenomenon because they never get trial of their skill in explaining it.

Less of activity that lets student develop their skill in explaining phenomenon make it hard for them to answer literacy test on that aspect. Then, in syllabus no text that relating learning with explaining scientific phenomenon, teacher only give material in the level of knowing certain phenomenon, not explaining phenomenon inscientific way that is why students have problem in doing this competency. The causes of bad score in explaining scientific phenomenon is students interest in reading books is still low (Martinez-Hernandez, K., *et al.* (2015); Purwani, (2018);

Ristina, H., *et al.* (2018); Ridho, S., *et al.* (2018) and also their habit is remembering what is on the book this whole time. In their usual time, teachers only gives them simple cases and phenomenon explanantaion so they would be able to explain other phenomenon if asked but in reality the causes is their interest affect their skill in analizing, critical thinking and problem solving. The problem also comes from students internal like less interest in reading discourse. It is related to Yulianda (2016) research that she said students is usually remembering material, but they do not comprehend and implement it in their lives, so it will fade quickly from their memory. When given science literacy test, many students answer it wrong..

Another low science competency is evaluation and designing scientific observation. It shows that students skill in describing and assessing scientific observation and also suggesting the way of solving the scientific question. It occurs due to science process skill of the students. Like what Hasan, E.N., *et al.* (2018); Nisa, E.N.C., *et al.* (2019); Rusilowati, A., *et al.* (2016); Winata, A. (2018), stated that a teaching that enhance students skill in science process so that they will get used to do science-literacy activity such as; identifying scientific question. The way that can be used to train students science process skill is by using sciene literacy based activity (Udompong, L., *et al.* (2014); Bellova, R., *et al.* (2018); Pamungkas, Z.S., *et al.* (2018).

IV. CONCLUSION

The conclusion of this research is the ability of class VIII Junior High School in Padang based on total scores, basic competency and science competency shows that the average value of SMPN 1 Padang is the highest. Then followed by the SMP Ar-risalah Padang and SMP Manjushri Padang with a low category.

V. SPECIAL THANKS TO

Special thanks to Mrs. Dr. Violita, M.Si as advisor. Mrs. Dr. Yuni Ahda, M.Si dan Ms. Dr. Dwi Hilda Putri, M.Biomed as contributor and all of big family in SMPN 1 Padang, SMP Ar-Risalah Padang, and SMP Manjushri Padang which help researcher in research location.

REFERENCES

- [1] Bellova, R., Melichercikova, D., & Tomčík, P. 2018. Possible Reasons for Low Scientific Literacy of Slovak Students in Some Natural Science Subjects. *Research in Science & Technological Education*, 36(2), 226-242.
- [2] Dani, D. 2009. Scientific Literacy and Purposes for Teaching Science: A Case Study of Lebanese Private School Teachers. *International Journal of Environmental and Science Education*. 4(3): 289-299.
- [3] Depdiknas. 2004. *Keterampilan Dasar untuk Hidup, Literasi Membaca, Matematika dan Sains*. Laporan Programme for International Student Assesment. Jakarta: Pusat Penelitian Pendidikan.
- [4] Diana, S. 2015. Profil Kemampuan Literasi Sains Peserta Didik Berdasarkan Instrumen *Scientific Literacy Assesment* (SLA). *Jurnal Pendidikan*. 1 (6), 285-291.
- [5] Fatmawati, I. N. & Utari, S. 2015. Penerapan Levels of Inquiry untuk Meningkatkan Literasi Sains Siswa SMP Tema Limbah dan Upaya Penanggulangannya. *Edusains*, 7(2), 151-159.
- [6] Firman, H. 2007. *Laporan Analisis Literasi Sains Berdasarkan Hasil Studi PISA Nasional Tahun 2006*. Jakarta: Pusat Penilaian Pendidikan Balitbang Depdiknas.
- [7] Genci, M. 2015. The Effect of Scientific Studies on Student's Scientific Literacy and Attitude. *Journal of Faculty of Education*. 34(1), 141-152.
- [8] Haryadi, E.F., Priyono, A., dan Retnoningsih. 2018. Desain Pembelajaran Literasi Sains Berbasis *Problem Based Learning* dalam Membentuk Keterampilan Berpikir Kritis Siswa. *Journal of Innovative Science Education*. 4(2): 1-7.
- [9] Hasan, E. N., Rusilowati, A., & Astuti, B. 2018. Analysis of Students Science Literacy Skills in Full Day Junior High School. *Journal of Innovative Science Education*, 7(2), 237-244.
- [10] Holbrook, J dan Rannikmae, M. 2009. The Meaning of Sciencic Literacy. *International Journal of Environmental and Science Education*. 4(3), 275-288.
- [11] Karnela, L. 2015. Analisis Literasi Sains Biologi Siswa Kelas IX Se Kota Padang. *Tesis*. Padang. Pascasarjana. UNP.
- [12] Kurniawati, Z.L., Zubaidah, S., dan Mahanal, S. 2016. Model Pembelajaran Remap CS (*Reading Concept Map Cooperative Script*) untuk Pemberdayaan Keterampilan Berpikir Kritis Siswa. *Proceeding Biology Education Conference*. 13(1): 399-403.
- [13] Martinez-Hernandez, K., Ikpeze, C., & Kimaru, I. 2015. Perspectives on Science Literacy: A Comparative Study of United States and Kenya. *Educational Research International*, 4(2), 25-34.
- [14] Nisa, E. N. C., Rusilowati, A., & Wardani, S. 2018. The Analysis of Student Science Literacy in Terms of

- Interpersonal Intelligence. *Journal of Primary Education*, 8(2), 161-168.
- [15] Nuryanti, L., Zubaidah S., dan Diantoro, M. 2018. Analisis Kemampuan Berpikir Kritis Siswa SMP. *Jurnal Pendidikan*. 3 (2): 155-158.
- [16] OECD . 2016. *PISA 2015 Results (Volume 1): Excellence and Equity in Education, PISA*. OECD Publishing: Paris.
- [17] OECD . 2017. *PISA 2015 Results (Volume III): Student's Well-being, PISA*. OECD Publishing: Paris.
- [18] Olyvia, S. 2015. Analisa Kemampuan Berpikir Tingkat Tinggi Siswa Kelas XI SMA Negeri Kota Padang dalam Pembelajaran Biologi. *Tesis*. Padang. Pascasarjana. UNP.
- [19] Osborne, J. 2007. Science Education for the Twenty First Century. *Eurasia Journal of Mathematics, Science & Technology Education*, 3(3): 173-184.
- [20] Pamungkas, Z. S., Aminah, N. S., & Nurosyid, F. 2018. Students Critical Thinking Skill in Solving Scientific Literacy using a Metacognitive Test Based on Scientific Literacy. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 7(2), 161-169.
- [21] 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), 1-4.
- [22] Rachmatullah, A., Diana, S., & Rustaman, N. Y. 2016. Profile of Middle School Students on Scientific Literacy Achievements by Using Scientific Literacy Assesments (SLA). In *AIP Conference Proceedings*. 1708(1), 1-5.
- [23] Rahmadani, Y., Fitakurahmah, N., Funky, N., Prihatin, R., Majid, Q., dan Prayitno B.A. Profil Keterampilan Literasi Sains Siswa Sekolah Menengah Atas (SMA) di Karanganyar. *Jurnal Pendidikan Biologi*. 7 (3). 183-190.
- [24] Ridho, S., Aminah, N.S., & Supriyanto, A. 2018. The Profile Students Scientific Literacy Competence Skill at SMA Batik 2 Surakarta. *Jurnal Penelitian dan Pengembangan Pendidikan Fisika*. 4(2), 47-54.
- [25] Ristina, H., Linuwih, S., & Nuswowati, M. 2019. SETS Learning Efficacy to Improve Students Science Literacy Skills. *Journal of Innovative Science Education*, 8(1), 427-433.
- [26] Rizkita, L. 2016. Analisis Kemampuan Awal Literasi Sains Peserta Didik SMA Kota Malang. *Jurnal Pendidikan Biologi*. 1 (1), 771-781.
- [27] Roberts, D.A. 2007. Scientific Literacy/ Science Literacy. In S.K. Abell, and N.G. Lederman (Eds). *Journal of Science Education*. 1(3), 729-780.
- [28] Rukman, H.V. 2015. Analisis Literasi Sains Peserta Didik Kelas X SMA Negeri 1 Padang Panjang dalam Merespon Soal-soal Biologi PISA. *Tesis*. UNP.
- [29] Rusilowati, A., Kurniawati, L., Nugroho, S. E., & Widiyatmoko, A. 2016. Developing an Instrument of Scientific Literacy Assessment on the Cycle Theme. *International Journal of Environmental and Science Education*, 11(12), 5718-5727.
- [30] Rusilowati, A., Nugroho, S. E., Susilowati, E. S. M., Mustika, T., Harfiyani, N., & Prabowo, H. T. 2018. The Development of Scientific Literacy Assessment to Measure Student's Scientific Literacy Skills in Energy Theme. *Journal of Physics: Conference Series*, 983(1), 1-6.
- [31] Rustaman, N. 2005. *Strategi Belajar Mengajar Biologi*. Malang: Universitas Negeri Malang.
- [32] Siagian, P., Silitonga, M., & Djulia, E. 2017. Scientific Literacy Skills of Seventh Grade Junior High School (SMP Negeri) Students in North Labuhanbatu Regency. *International Journal of Humanities, Social Science and Education*, 4(11), 176-182.
- [33] Singh, S. dan Singh S. 2016. What is Scientific Literacy. *International Journal of Academic Research and Development*. 1(2), 15-20.
- [34] Sloman, A. 2001. What are the Aims of Science?. *Journal of Science*. 13(1), 1-26.
- [35] Situmorang, R.P. 2016. Integrasi Literasi Sains Peserta Didik dalam Pembelajaran Sains. *Jurnal Satya Widya*. 32 (1), 49-56.
- [36] Sudarisman, S. 2015. Memahami Hakikat dan Karakteristik Pembelajaran Biologi dalam Upaya Menjawab Tantangan Abad 21 serta Optimalisasi Implementasi Kurikulum 2013. *Jurnal Florea*. 2(1): 29-35.
- [37] Udompong, L., & Wongwanich, S. 2014. Diagnosis of the Scientific Literacy Characteristics of Primary Students. *Procedia-Social and Behavioral Sciences*, 116, 5091-5096.
- [38] Wijaya, Y., Sudjimat, D.A dan Nyoto. 2016. Transformasi Pendidikan Abad 21 sebagai Tuntutan Sumber Daya Manusia di Era Global Estetika. *Jurnal Pendidikan Matematika*. 1 (2), 263-278.
- [39] Winata, A., Cacik, S., dan Seftia, I. 2018. Kemampuan Awal Literasi Sains Peserta Didik Kelas V SDN Sidoarjo I Tuban pada Materi Daur Air. *JTIEE*. 2(1): 58-64.

- [40] Yulianda, A. 2016. Analisis Literasi Sains *Programme for International Student Assessment* (PISA) Biologi kelas X SMA Negeri di Kabupaten Lima Puluh Kota. *Tesis*. Padang. Pascasarjana. UNP.
- [41] Zahara, O. 2012. Analisis Capaian Literasi Sains Siswa SMA pada Konsep Biologi dalam PISA dihubungkan dengan Penalaran. *Tesis*. Bandung. Universitas Pendidikan Indonesia.