The Effect of Search, Solve, Create and Share (SSCS) Learning Model on Students' Scientific Literacy

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Abstract

In this study, we looked at how students' scientific literacy was affected by the Search, Solve, Create, and Share (SSCS) learning approach. This study employed a non-equivalent control group and a quasi-experimental design as its methodology. All of the XI science students made up the study's population. Purposive sampling was used to obtain the sample, which consisted of two classes: XI science 1 and 2, which served as the experimental and control groups, respectively, and each of which included a total of 28 students. 20 items on a multiple-choice exam with a focus on scientific literacy were used to obtain the data. Independent sample t-test was used to assess the data that was acquired. H1 is approved if the independent sample t-test result is sig (2-tailed) 0,05 at significance level 5%, then H_1 is accepted. The result indicated that Search, Solve, Create, and Share (SSCS) a significance effect on student's scientific literacy on colloid system concepts.

Keywords: Search, Solve, Create and Share (SSCS) Learning Model, Scientific Literacy, Colloid System

INTRODUCTION

In the 2015 PISA (Program for International Student Assessment), scientific literacy is one of the domains. According to PISA, scientific literacy is the capacity to engage with issues relating to science, scientific concepts, and technology. This capacity calls for the ability to explain phenomena using scientific methods, as well as to evaluate and design scientific investigations and interpret data and evidence in a scientific manner (OECD, 2018). According to this concept, students need to have a strong foundation in scientific literacy in order to solve real-world problems.

According to the OECD report, Indonesian students' levels of scientific literacy have been relatively low over the past 18 years in comparison to those of other countries: in 2000, they were ranked 38th out of 41 countries, in 2003, they were in the 38th place out of 40 countries, in 2006, they were in the 50th place out of 56 countries, in 2009, they were in the 60th place out of 65 countries, in 2012, and in 201, they were in the 64th place out of 65 countries. Indonesia's score is still much below the global average for scientific literacy, according to survey results (OECD, 2019). As a result, Indonesia's education system today has low standards and is a major issue. This could lead to Indonesia's complete failure and financial ruin (Toharudin et al., 2011).

The reason Indonesia has a low ability of student literacy is because their learning system is different from today's conditions; the education system in the 21st century must be up to date with current developments. (Arohman et al., 2016). In the 21st century, science and technology expertise is an important key to achieving a successful nation. Science education is responsible and important in developing and shaping student character and student who has global competitiveness (Abidin et al., 2017). Science education's goal is to help students develop the necessary skills to meet their needs in a

variety of contexts. As a result, it's crucial for students to master scientific literacy so they can comprehend the issues that modern society faces in areas like the environment, health, and the economy because these areas heavily rely on technology, advancement, and scientific development (Toharudin et al., 2011).

The low ability of scientific literacy in Indonesia is a concern of the government. It's shown by the presence of the curriculum 2013, which provides hope for realizing a society of scientific literacy. The competence in the curriculum 2013 is very relevant to scientific literacy. This hope is also clarified by Rahayu (2014), who states that opportunities in creating a society encrusted with science are very large but accompanied by a greater challenge: the demands of 21st Century skills, which are science and technology era. Therefore, cooperation between the dimensions of education is needed to respond to these challenges. The enactment of the curriculum 2013 can pursue these challenges (Abidin et al., 2017). Things that can be sought are the Strengthening Character Education movement (PPK), Science Literacy Movement (GLS), Communication, Collaboration, Creativity, and Critical Thinking (4C), and the Higher Order of Thinking Skills (HOTS) (Prayitno, 2019).

The teacher's role is needed in improving students' scientific literacy. The teacher needs to choose the most appropriate form of activity based on the instructional objectives of the activities that have been set (Siregar & Hara, 2010). Teachers are required to make changes, one of which is by using appropriate learning models in the learning process. The learning model is a comprehensive learning approach (Fathurrohman, 2015). These changes will streamline and direct students to achieve increased scientific literacy. One learning model that can bring up scientific literacy is the Search, Solve, Create, and Share (SSCS) learning model (Mursyidah et al., 2019).

Students play a significant role in enhancing learning activities in the Search, Solve, Create, and Share (SSCS) learning paradigm, which is particularly effective (Susanto & Komalasari, 2015). The SSCS learning model's goal is to help students learn more by having them solve problems (Pizzini et al., 1988). According to Chin (1997), the Search, Solve, Create, and Share (SSCS) model is a learning paradigm having four stages of learning in its application. The SSCS learning model is a problem-solving-based learning model by design, making it a particularly effective tool for the learning process.

The Search, Solve, Create, and Share (SSCS) learning model was studied by Maulana et al. (2015), and the results showed that applying the SSCS learning model could improve student learning outcomes. According to the findings of a different study by Annurdin (2014) that had class X as its subject, pupils who used the SSCS learning model were more interested than those who used traditional learning models. The experimental class had an engagement rate of 85.30%, compared to 77.08% for the control group.

Based on interviews with chemistry teachers at a Senior High School in Depok, Indonesia, the colloid system material was considered less interesting and tended to be memorized, so it did not

involve students in class learning. The result is that the majority of students struggle to connect what they study to how that knowledge is used to solve issues and apply it in daily life. Students must be able to classify and understand how colloidal systems can be applied in daily life before they can create colloidal system products from already existing materials. This is covered in the basic colloid system on basic competence 3.15 and basic competence 4.14 in the 2013 curriculum. In order to solve difficulties relating to a colloidal system, which is a subject that demands skills, high concept knowledge, and critical thinking abilities, teachers are required to enhance the quality of learning. Based on this background explanation, research has not been conducted on the effect of the SSCS learning model on students' scientific literacy on colloid system concepts. So, the aim of the study is to investigate the effect of the SSCS learning model on students' scientific literacy.

METHOD

The study employed a non-equivalent control group quasi-experimental design. The research was carried out at a senior high school in Depok, Indonesia, from July 30 to August 14, 2019, during the academic year 2019/2020.

The population of this study consisted solely of Depok high school pupils. Purposive sampling was used to collect the research sample, yielding two classes of XI IPA, one serving as the experimental class and the other as the control class. The two classrooms are Class XI Science Class 2 and Science Class 1, each of which has 28 pupils. Science Class 1 serves as the experimental class. The instruments used in this study were the multiple choice test and the Student Worksheet. The instrument was empirically tested using validity, reliability, different power, and difficulty levels and was tested by two expert lecturers. The result is that 20 out of 25 questions are valid and can be used in research.

A significant level t-test and one-way ANOVA test were used to examine the research hypothesis. According to Purwanto (2010), the percentage of ability is divided into five categories: very good (86–100), good (76–85), sufficient (60–75), less (55–59), and very less (0–54). Table 1 displays the results of the pretest and posttest for the Experiment and Control classes.

Table 1. Pretest-Posttest Results in the Experiment Class and Control Class

Data	Pretest		Postest	
	Experiment	Control	Experiment	Control
n	28	28	28	28
Max	55	55	100	90
Min	25	25	75	75
Varians	50.66	64.12	39.55	40.21
SD	7.12	7.68	6.29	6.34
$\bar{x}$	41.1	41.3	87	79

Overall, it can be seen that the experimental class's outcomes are better than the control classes', which are 87% and 79%, respectively, after receiving different treatments from the control and experimental classes. This demonstrates that the experimental class's learning outcomes, in this case

using the SSCS learning model, are higher than those of the control class, in this case using the traditional learning model. Increasing student scientific literacy has the same effect as raising learning results. According to the findings of a study carried out at MAN 11 Jakarta by Milama, B., et al. (2017), there was an improvement in student learning outcomes on hydrocarbon and petroleum content thanks to the SSCS learning paradigm.

Table 2. Pretest-Posttest Results Based on Aspects of Scientific Literacy

Aspect	Experiment		Control	
	Pre	Post	Pre	Post
Content	45	87	41	79
Context	40.8	86.4	38.5	80
Competence	40	87	43	79
Attitude	38	86.4	43	76

Table 2 shows students' average percentage of aspects of scientific literacy based on the pretest and posttest percentages. The aspect of science context tends to be higher than the other three aspects, namely 86.4% in the experimental class and 80% in the control class. In implementing the SSCS learning model, students are asked to describe products in everyday life related to the colloidal system. According to Sulfia & Habibati (2010), this is supported by the fact that colloidal system material has a very close relationship with everyday life.

Based on the PISA 2015 results, this study assesses four dimensions of scientific literacy, including context, competency, content, and attitude toward science (OECD, 2018). The experimental and control courses' percentages of students who successfully completed the indicators of scientific literacy in each area vary greatly.

1. **Aspect of Context**

The aspect of science context that is measured is in the context of applying the colloid itself from 8 indicators, namely smog, tofu *Sumedang*, ice cream (AICE), air pollution, kidney failure, norit, puyer, and cheese. The average percentage of aspects of the scientific context was 86.4% (very good category). The percentage of 8 indicators of the context of science applications can be seen in Table 3.

Table 3. Percentage of Achievement of Aspects of the Science Context

Context	Experiment	Control
Smoke	82.1	79.8
Tofu	92.9	78.6
Ice Cream	87.5	80.4
Pollution	85.7	78.6
Kidney Failure	89.3	75
Norit	89.3	83.9
Puyer	82.1	79

Cheese	82.1	79.8

When viewed from each indicator, the percentage of the context indicator "Know" tends to be higher with an average of 92.9% compared to 7 other indicators, inversely proportional to the smog, puyer and cheese indicators tend to be lower with an average of 82.1% compared to the other four indicators, this is because in the process of implementing the SSCS learning model students find it difficult to analyze colloidal products that are very diverse, and tend to be able to analyze colloidal products that are very or closest to daily life such as the context of "Know", following the statement of Sulfia & Habibati (2018) that the colloidal system material is material that has a very close relationship with everyday life.

2. Aspect of Competency

The aspect of science competency measured is the scientific literacy competency, which consists of 3 indicators: identifying scientific issues, explaining scientific phenomena, and interpreting data or using scientific evidence. The average percentage of aspects of science competence is 87% (very good category). The percentage of 3 competency indicators can be seen in Figure 1.
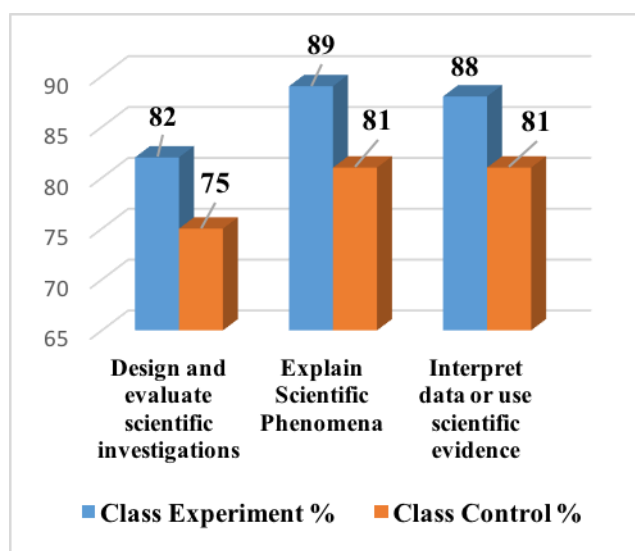

Figure 1. Percentage of Achievement of Competency Aspects

When viewed from each indicator in Figure 1, the percentage of indicators explaining scientific phenomena tends to be higher with an average of 90% compared to the other two indicators, inversely proportional to the indicators identifying designing and evaluating scientific investigations tend to be lower with an average of 82% compared with two other indicators. The high percentage of scientific phenomena is caused when learning occurs in groups in the Search and Solve stages. The instructor motivates students to gather precise, reliable information, perform experiments, and seek for

explanations and solutions throughout these stages (Toharudin et al., 2011). According to research by Wulandari & Solihin (2016), students' conceptual knowledge affects their capacity to explain or comprehend scientific occurrences. This is also the case because, in order to fulfill the goals of the SSCS learning model, students are required to broaden their knowledge by solving a problem, which piques their interest in learning more about the phenomena connected to the colloidal system (Pizzini et al., 1988).

3. Aspect of Content

The aspect of scientific content measured is the colloidal content, which consists of 4 indicators: the types of colloids, colloidal properties, colloid production, and the role of colloids in daily life. The average percentage of aspects of science content is 87% (very good category). Percentage 4 indicators of science content can be seen in Figure 2.
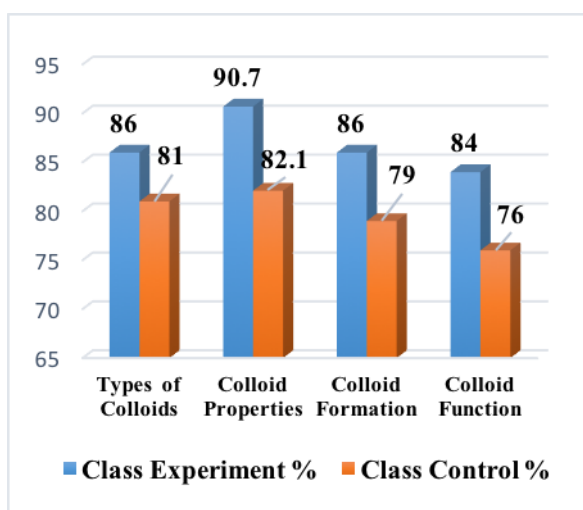

Figure 2. Percentage of Achievement in Aspects of Science Content

When viewed from each indicator in Figure 2, the percentage of indicators of colloidal properties tends to be higher with an average of 90.7%, compared to the other three indicators, inversely proportional to the indicator of the role of colloids tends to be lower with an average of 84% compared to other indicators. This is because in implementing the SSCS learning model, students are asked to conduct experiments and analyze the facts found about the properties of colloids based on experiments conducted.

4. Aspect of Attitude

The aspect of science attitude measured is the attitude of scientific literacy, which consists of 3 indicators, namely showing a sense of responsibility with oneself, showing an interest in science, and supporting scientific inquiry. The average percentage of aspects of science attitudes was 86.4% (very good category). The percentage of 3 indicators of science content can be seen in Figure 3.
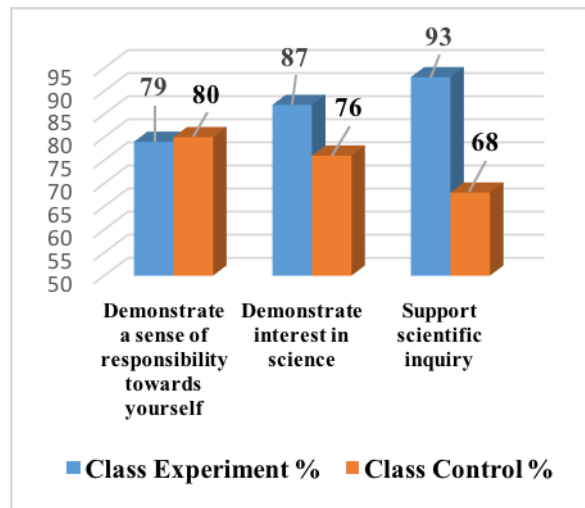
Figure 3. Percentage of Achievement of Aspects of Science Attitudes

When viewed from each indicator in Figure 3, the percentage of indicators supporting scientific inquiry tends to be higher with an average of 93% compared to the other two indicators, inversely proportional to the indicator showing a sense of responsibility towards oneself tends to be lower with an average of 79% compared to the other two indicators. This is because, in the process of implementing the SSCS learning model, students are asked to do a simple experiment at the beginning of learning and make students interested in investigating problems scientifically, according to the statement of Maulana et al. (2015) that the SSCS learning model is a learning model using a problem-solving approach or scientific problem-solving. The attitude aspect needs to be assessed because there is a study of the relationship between students' attitudes towards science conducted by Holden (2012), concluding that most students who have very positive attitudes and personalities are those who choose to study science.

Hypothesis testing uses the independent sample test. The results of hypothesis testing of pretest and posttest data in the experimental and control classes can be seen in Tables 4 and 5.

Table 4. Pretest Test Results of the Control and Experiment Class

Statistic	Pretest	Conclusion
α	0,05	Sig > α (there is no significant difference)
Sig (2-tailed)	0,234	

Based on Table 4, Sig> α is obtained, so that H0 is accepted, thus the pretest results of students between the control class and the experiment show that there is no difference in the average results of tests of scientific literacy.

Table 5. Posttest Test Results of Control and Experiment Classes

Statistic	*Posttest*	Conclusion
α	0,05	Sig < α (there is a significant difference)
Sig (2-tailed)	0,000	

Based on Table 5, Sig <α is obtained, that is 0,000 <0.05 so H0 is rejected and H1 is accepted. Thus it can be concluded that there are differences in students' posttest results between the experimental and control classes so that there are differences in the average results of tests of scientific literacy.

Table 6. One Way Anova Test Results

Statistic	*Class*	Conclusion
α	0,05	Sig < α (the average value is significantly different)
Between Groups	0,000	

Based on Table 6, Sig <α is obtained, that is, 0.000 <0.05. Thus it can be concluded that the average of the four values, namely the control pretest class, the experimental pretest, the posttest control, and the posttest experiment, significantly differ.

The SSCS learning paradigm, which uses a problem-solving approach, has an impact on students' scientific literacy as evidenced by the difference in the average posttest scores between the control and experimental classes. This is in line with Fitriani et al.'s (2015) assertion that problem-based learning approaches enhance students' capacity for scientific literacy.

The SSCS learning model puts forward the side of the process from the search stage, solve, conclude (create), and communicate (share) stages that are employed in the effective learning process. Learning using the SSCS learning model is proceeding effectively, as shown by the average % at each level of the SSCS on the worksheet, which averages 85.4 and falls under the "good" category. According to Pizzini's (1991) theory, the SSCS learning model is better for students when used in the classroom because it involves them in problem-solving, strengthening science concepts, processing information, having high thinking skills, developing scientific methods, and having a variety of other activities. From these advantages, the SSCS learning model leads to the improvement of scientific literacy.

This study measures the ability of scientific literacy based on four aspects of scientific literacy: scientific content, the context of scientific application, scientific competence, and scientific attitudes. The scientific literacy assessment consists of 20 multiple-choice questions with a filling time of about 90 minutes. It makes classroom conditions conducive to avoiding cheating in filling in the questions; according to research by Farwati et al. (2017), filling out the assessment must be made comfortable

and conditioned so that the assessment can work independently. Thus, the percentage of indicators of achievement of scientific literacy in each aspect of the experimental and control classes varies greatly.

The results of scientific literacy in the control class are lower than in the experimental class. This is because the learning methods are only lectures, questions, and answers. Students are not confronted with the problem presentation and the process of building knowledge because more emphasis is placed on lecture methods that make students passive in class (Hapsari et al., 2016).

According to PISA 2015, this research assesses four dimensions of scientific literacy, including context, competence, content, and attitude toward science (OECD, 2018). The experimental and control courses' percentages of students who successfully completed the indicators of scientific literacy in each area vary greatly.

Based on the aspects of the scientific literacy ability of the experimental class and the control class, it can be concluded that the experimental class after the posttest is higher than the control class. That is because in the experimental class, students do active and systematic learning according to the SSCS learning model phase and by involving experiments directly by correlating experiments with colloidal system material content so that it can strengthen the concepts of science; this is in accordance with Eliza & Aulia (2017) which states that the SSCS model has advantages in designing students to use simple, practical tools or tools to obtain observational data or facts. With this, it can be concluded that students in the experimental class have higher scientific literacy than the control class with either category.

The findings of this study are supported by research by Milama et al. (2017) on the impact of the SSCS learning model on students' critical thinking skills on hydrocarbon and earth material material, which had very significant findings, and research by Bahriah (2015) entitled Enhancing Science Literacy of Prospective Chemistry Teachers in the Context Aspects of Application and Science Processes, which came to the conclusion that problem-based learning can enhance students' capacity for scientific inquiry. The study "The Effect of Using Activities Improving Scientific Literacy on Students' Achievements in Science and Technology Lessons" by Gucluer & Kesercioglu (2012) found a strong connection between scientific literacy and technology learning.

CONCLUSION

It might be said that there are disparities between the experimental and control courses' posttest scores for the pupils. As a result, there are variations in the mean outcomes of the scientific literacy examinations. The difference between the control and experimental classes' average post-test scores demonstrates the impact of the SSCS learning paradigm on students' scientific literacy.

The SSCS learning model is suggested as an alternate learning model for chemistry learning based on the research that has been done. Furthermore, it takes a lot of time to implement the SSCS learning paradigm. The SSCS learning paradigm requires teachers to effectively manage their time in

order for all stages to proceed smoothly. Additionally, various materials can be used with the SSCS learning approach to increase students' scientific literacy.

REFERENCES

Abidin, Y., Mulyati, T., & Yunansah, H. (2017). Pembelajaran Literasi Strategi Meningkatkan Kemampuan Literasi Sains. Bumi Aksara.

Annurdin, A. F. (2014). Pengaruh Model Pembelajaran Problem Solving Search, Solve, Create, and Share terhadap Hasil Belajar Siswa SMK pada Mata Pelajaran Teknik Elektronika Dasar. Jurnal Pendidikan Teknik Elektro, 3(3), 441-448.

Arohman, M., Saefudin, & Priyandoko, D. (2016). Kemampuan Literasi Sains Siswa pada Pembelajaran Ekosistem. Proceeding Biology Education Conference, 13(1), 90–92.

Bahriah, E. S. (2015). Kajian Literasi Sains Calon Guru Kimia Pada Aspek Konteks Aplikasi Dan Proses Sains. Edusains, 7(1), 11–17.

Chin, C. (1997). Promoting Higher Cognitive Learning Problem-solving Approach Review by Christine Chin. React, 1997(1), 7–11.

Eliza, R., & Aulia, F. (2017). Pembelajaran Matematika dengan Model Search, Solve, Create and Share (SSCS) di MAN 1 Muara Labuh Rivdya. Math Educa, 1(2), 200–210.

Farwati, R., Permanasari, A., Firman, H., & Suhery, T. (2017). Potret Literasi Lingkungan Mahasiswa Calon Guru Kimia Di Universitas Sriwijaya. Journal of Science Education and Practice, 1(1), 1–8.

Fathurrohman. (2015). Model-model Pembelajaran Inovatif. AR-Ruzz Media.

Fitriani, D., Milama, B., & Irwandi, D. (2015). Pengaruh model pembelajaran berbasis masalah terhadap kemampuan literasi sains siswa pada materi laju reaksi. In EDUSAINS, 9(2), 117-126.

Gucluer, E., & Kesercioglu, T. (2012). The Effect of Using Activities Improving Scientific Literacy on Students' Achievement in Science and Technology Lesson. IOJPE, 1(1), 8–13.

Hapsari, D. D., Lisdiana, & Sukaesih, S. (2016). Pengaruh Pembelajran Berbasis Proyek Berbantuan Modul Daur Ulang Limbah Pada Literasi Sains. Journal of Biology Education, 5(3), 302–309.

Maulana, A., Wancik, K., & Sofia, S. (2015). Penerapan Model Pembelajaran Search Solve Create and Share (Sscs) Untuk Meningkatkan Hasil Belajar Siswa Di Kelas XI Ipa Sma. Jurnal Penelitian Pendidikan Kimia: Kajian Hasil Penelitian Pendidikan Kimia, 1(1), 9–17.

Milama, B., Bahriah, E. S., & Mahmudah, A. (2017). The Effect of Search, Solve, Create, And Share (SSCS) Learning Model towards Student's Critical Thinking Skills. Jurnal Penelitian Dan Pembelajaran IPA, 3(2), 112.

Mursyidah, R., Muharrami, L. K., Rosidi, I., & Hadi, W. P. (2019). Pengaruh Model Pembelajaran Search, Solve, Create, and Share (SSCS) terhadap Keterampilan Generik Sains Peserta Didik. Natural Science Education Reseach, 2(1), 85–96.

OECD. (2018). PISA for Development Assessment and Analytical Framework: Reading, Mathematics and Science.

OECD. (2019). PISA 2018 insights and interpretations. OECD Publishing, 64.

Pizzini, E. L. (1991). SSCS Implementation Handbook. The University of Lowa.

Pizzini, E. L., Abell, S. K., & Shepardson, D. S. (1988). Rethinking in The Science Classroom. The Science Teacher.

Pratiwi, I. (2019). Efek Program Pisa Terhadap Kurikulum Di Indonesia. Jurnal Pendidikan Dan Kebudayaan, 4(1), 51.

Prayitno, W. (2019). Bahan Ajar Pengenalan Pembelajaran dan Penilaian Kurikulum 2013 (Terintegrasi PPK, Literasi, HOTS, 4cs).

Purwanto, Ngalim. (2010). Prinsip-Prinsip dan Teknik Evaluasi Pengajaran. Remaja Rosdakarya

Rahayu, S. (2014). Menuju Masyarakat Berliterasi Sains: Harapan dan Tantangan Kurikulum 2013. In Prosiding Seminar Nasional Kimia dan Pembelajarannya (SNKP).

Siregar, E., & Hara, H. (2010). Teori Belajar dan Pembelajaran. Ghalia Indonesia.

Sulfia, U., & Habibati, H. (2018). Penerapan Media Teka-Teki Silang Pada Materi Koloid Untuk Meningkatkan Hasil Belajar Peserta Didik. Jurnal IPA & Pembelajaran IPA, 1(1), 6–15.

Susanto, E., & Komalasari, K. (2015). Pengaruh Pembelajaran, Habituasi Dan Ekstrakurikuler Terhadap Pembentukan Civic Disposition Siswa Sma Negeri Se-Kota Bandar Lampung. Jurnal Ilmiah Mimbar Demokrasi, 15(1), 60-86.

Toharudin, Hendrwati, & Rustaman. (2011). Membangun Literasi Peserta Didik. Humaniora.

Wulandari, N., & Solihin, H. (2016). Analisis Kemampuan Literasi Sains Pada Aspek Pengetahuan Dan Kompetensi Sains Siswa Smp Pada Materi Kalor. Edusains, 8(1), 66–73.