



The Effect of Implementing Practicum-Based Contextual Teaching and Learning Models to Improve Learning Outcomes on the Subject of Colloids



Anna Juniar, Chatrine Monalisa Br Tarigan *

Jurusan Kimia, FMIPA, Universitas Negeri Medan (UNIMED)

*Email: monalisachatrine0@gmail.com

DOI: <https://doi.org/10.33369/pendipa.8.1.57-64>

ABSTRACT

This research aimed to (1) know the influence of implementing the practicum-based CTL model in learning on the cognitive learning outcomes of students studying colloids in class XI SMA Swasta Bersama Berastagi (2) determine the correlation between affective scores and student learning outcomes in the application of the CTL model based on colloid subject matter practicum for class XI SMA Swasta Bersama Berastagi; (3) determine the correlation between psychomotor scores and student learning outcomes in the application of the CTL model based on colloid subject matter practicum for class XI SMA Swasta Bersama Berastagi. The research used a pretest-posttest control group design. Based on research that has been carried out, the average score obtained by experimental class students in the initial test (pretest) was 59 and the final test (posttest) was 86.13. The average score of experimental class students at the beginning (pretest) was 53.92 and the final test (posttest) was 75.25. Student learning outcomes using learning models Contextual Teaching and Learning Practicum Based experienced an increase of 67% in the medium category. This increase can be proven by the results of the hypothesis test which obtained $t_{count} > t_{table}$, namely $5.58 > 1.72$, which proves that student learning outcomes by applying the CTL model based on class XI colloid practicum subject matter are not the same as student learning outcomes who apply the conventional model.

Keywords: Learning Models, Contextual Teaching and Learning, Colloids, Learning Outcomes.

ABSTRAK

Penelitian ini bertujuan untuk (1) mengetahui pengaruh penerapan model CTL berbasis praktikum dalam pembelajaran terhadap hasil belajar kognitif siswa pokok bahasan koloid kelas XI SMA Swasta Bersama Berastagi. (2) mengetahui korelasi antara skor afektif terhadap hasil belajar siswa pada penerapan model CTL berbasis praktikum pokok bahasan koloid kelas XI SMA Swasta Bersama Berastagi. (3) mengetahui korelasi antara skor psikomotorik terhadap hasil belajar siswa pada penerapan model CTL berbasis praktikum pokok bahasan koloid kelas XI SMA Swasta Bersama Berastagi. Populasi penelitian ini adalah siswa kelas XI SMA Swasta Bersama Berastagi dengan menetapkan 2 kelas sebagai sampel penelitian yaitu kelas XI Mipa 1 dan XI Mipa 2 masing-masing berjumlah 24 peserta didik. Penelitian ini menggunakan *pretest-posttest control group design*. Berdasarkan penelitian yang telah dilaksanakan, diperoleh nilai rata-rata siswa kelas eksperimen pada tes awal (pretest) sebesar 59 dan tes akhir (posttest) sebesar 86,13. Nilai rata-rata siswa kelas eksperimen pada awal (pretest) sebesar 53,92 dan tes akhir (posttest) sebesar 75,25. Hasil belajar peserta didik menggunakan model pembelajaran *Contextual Teaching And Learning* Berbasis Praktikum mengalami peningkatan sebesar 67% masuk kategori sedang. Peningkatan tersebut dapat dibuktikan dengan hasil uji hipotesis yang memperoleh $t_{hitung} > t_{tabel}$ yaitu $5,58 > 1,72$ yang membuktikan hasil belajar siswa dengan menerapkan model CTL berbasis praktikum pokok bahasan koloid kelas XI tidak sama dengan hasil belajar siswa yang menerapkan model konvensional.

Kata kunci: Model Pembelajaran, Contextual Teaching And Learning, Koloid, Hasil Belajar.

PENDAHULUAN

The world of education is still surrounded by many problems, one of the problems lies in the application of learning models that tend to be ineffective. Most educators still use old methods when teaching. Educators tend to train students to remember the materials. However, this method is less effective because students can easily forget what they have learned at any time. Educators should be able to create a fun learning process and train students' thinking processes (Nurhuda, 2018).

The results of the researchers' initial observations at Berastagi Joint Private High School were that teachers tended to use learning models that were less interesting and ineffective during class. Based on the results of interviews, researchers found that students' chemistry subject scores tended to be low or mostly below the KKM score. It can be seen from the cognitive aspect that there are 46% of students whose scores are within the KKM score. Then in the affective aspect where students are still less proficient in operating practical equipment in the laboratory. And finally, the psychomotor aspect is the students' skills when carrying out practicums, there are still those who are less proficient in analyzing the properties of colloids.

The learning model is a description of the learning activities that a teacher will carry out when carrying out learning in the classroom. Choosing and using the right model for students' conditions is an action that teachers must take to create interesting learning activities.

The contextual teaching and learning (CTL) learning model is a learning model that brings students' reasoning to be able to relate learning material to their environment (Rusman, 2013). This model will stimulate students' thinking patterns through experience and then link it to the learning material. In fact, the aim of this model is to motivate students, the teacher only directs and focuses on the students.

It can be concluded that the contextual teaching and learning (CTL) model is effective for use on colloidal materials. It is proven from the results of Winarti's (2018) research entitled "The Influence of the Contextual Teaching and Learning (CTL) Learning Model on Chemistry Learning Outcomes in Colloidal Materials in Class student. Likewise, the results of research (Zhafirah and

Utami, 2019) in their research entitled "The Effect of Applying the CTL Learning Model with Environmental Media on Student Learning Motivation in Colloidal Materials" showed that student learning motivation in experimental class 1 was higher than experimental class 2, namely with an average of average value $77.04 > 67.47$.

Research by (Andini, 2021) entitled "Application of Practicum-Based CTL on Environmental Pollution Material on Student Motivation and Learning Outcomes" showed that the application of the practicum-based CTL learning model was very good. The results of research conducted by (Simangunsong et al, 2023) with the title "Application of Practicum-Based CTL Strategies to Improve Student Biology Learning Outcomes" concluded that the use of this strategy can improve student learning outcomes with an average score of 82.

Based on this description, the researcher provides a solution to the problems described above. Researchers conducted research with the title "The Effect of Implementing Practicum-Based Contextual Teaching and Learning (CTL) Learning Models to Improve Learning Outcomes on the Subject of Colloids".

LITERATURE REVIEW

Study

Theory learning emphasizes learning as an active process characterized by students in a way actively constructing their knowledge, skills and behavior based on the experiences they receive and the results of the situations they face. (Sunismi, Werdiningsih, & Wahyuni, 2022).

This is in line with learning objectives, which increases student learning efficiency. Learning media is interesting and meets students' needs, thereby helping them stay engaged. High interest in learning media also increases students' learning motivation. By following and participating in the learning process, students have the opportunity to be creative and develop their potential (Nurita Teni, 2018).

If students do not consider these situations and circumstances, then what the teacher teaches will not necessarily bring change. Change occurs when we react to existing situations (Suardi, M, 2018)

Difficulty learning

Learning difficulties are a situation where a

student is unable to withstand the demands that must be met in the learning process, so that the process and results are unsatisfactory. Learning difficulties have problems when there is a break in the learning process, the cause can come from within the student or from outside the student, and there are various types of learning difficulties themselves, which must always be the teacher. This is the challenge we face. (Utami, F, N, 2020).

Learning outcomes

Learning outcomes are results that student learning outcomes are academic results achieved by students through exams and assignments, as well as question and answer activities that support the achievement of these learning outcomes. An idea that often appears in the academic world is that educational success is not determined by students' grades on certificates or diploma, but the measure of cognitive success can be determined by student learning outcomes. The desired learning outcomes are the learning outcomes achieved by students based on specified standards or values. Cognitive relates to intellectual learning outcomes and consists of six aspects: knowledge or memory, understanding, application, analysis, synthesis and evaluation. This field places more emphasis on the ability to think logically and rationally. (Dakhi, 2020).

Learning outcomes are skills obtained by students after going through a learning process, which includes cognitive, emotional and psychomotor skills. Learning outcomes are the results given to students in the form of assessments that show changes in student behavior after going through a learning process by assessing knowledge, attitudes, and skills (Nurrita, 2018).

Learning outcomes refer to learning activities because learning activities are a process. Learning outcomes cover all psychological areas. This occurs as a result or influence of students' experiences and learning processes in school classes.

CTL (Contextual Teaching and Learning) Model

The Contextual Teaching and Learning (CTL) model is used by teachers in teaching and learning activities to help build meaningful relationships with real life. The CTL learning model is a learning model that motivates students to connect material concepts with real life. Contextual Learning Philosophy (CTL) is constructivism, namely a learning philosophy that emphasizes that learning is not just memorizing, but building or constructing

new knowledge and skills based on facts experienced in life. Between knowledge and its application in life as a family, citizen and worker. (Nababan, et al, 2023).

The Contextual Teaching and Learning (CTL) model is used by teachers in teaching and learning activities to help build meaningful relationships with real life. The CTL learning model is a learning model that motivates students to connect material concepts with real life. The CTL learning model encourages students to understand the importance and benefits of learning. This can make students more involved and improve their learning outcomes, because the concepts in the learning material come from students' real experiences (Lestari, et al, 2023)

Practical Method

The application of simple practical methods in learning is considered quite effective in increasing students' interest in learning, especially in chemistry subjects. Teachers are expected to be more creative and innovative in choosing learning processes or methods to support successful learning. Student activities in the experimental class show that the learning process is going well and increase students' interest in learning. The learning process is said to be successful if there are changes within the students, both regarding changes in knowledge, attitudes and skills, which in the process involve interaction between students and teachers and between students. (Yunita, et al, 2023).

Factors that cause practicums to be rarely carried out include the relatively long time required to prepare practicums, the lack of availability of practicum equipment, the high cost of chemicals and other consumables, the high level of risk from chemistry practicums in laboratories (such as explosions or chemical poisoning) and obstacles to managing waste resulting from practicum. (Al Idrus, 2020).

Colloid

In 1907, Ostwald proposed the terms dispersed phase and dispersion medium. The colloidal system consists of a dispersed phase of a certain size in a dispersing medium. The substance being dispersed is called the dispersed phase, while the medium is the dispersion medium. Analogy in solution. the dispersed phase is the solute while the dispersion medium is the solvent.

A German chemist named Richard Zsigmondy, in 1912 designed an ultra microscope to observe dissolved particles including colloidal

particles. From this experience it turns out that the colold particles have a molecular diameter of 10- 7cm- 10-5cm.

In everyday life, we often encounter substances that are classified as solutions, cololds and suspensions. Examples of solutions: sugar solution, table salt solution, vinegar solution, alcohol solution and air. Examples of colloids: milk, coconut milk, soap foam, salad cream, margarine, latex, and smoke. Examples of suspensions: turbid river water, clay with water and lime water.

METHOD

The population of this research was classTwo classes were selected from the sample population, one class served as a control class by applying a traditional learning model, and the other class as an experimental class by implementing learning using a practice-based CTL model. The sampling method was carried out using a random sampling method using a simple random sampling method.

This research uses a pretest-posttest control group design. In this design, two groups are selected using a purposive sampling technique and tested first to determine the initial conditions and whether there are differences between the experimental and control groups.

The experimental class was treated with a practical situated teaching and learning (CTL) learning model, while the control class used a traditional learning model supported by student textbooks. After the treatment, both classes took a posttest. Details of the research plan are presented in Table 1.

Table1 Pretest-Posttest Group Design

<u>roup</u>	<u>nitial Test</u>	<u>reatment</u>	<u>inal Test</u>
xperiment	1		3
ontrol	2		4

Information:

T1: Observation values/results of the experimental group and control group on beginning of research

T2: Observation values/results of the experimental and control groups at the end study

X: learning using the Practicum-based CTL method

Y: learning using conventional methods

The research instrument used by researchers is a test instrument consisting of multiple choice questions which are first tested for validity, level of difficulty, differentiation and reliability. The number of questions provided before validation is 40

will be given a pretest and posttest with similar test instruments.

The first stage carried out for both classes was to give a pretest as a first step to determine students' abilities. The next stage in the experimental class was given treatment using a practicum-based Contextual Teaching and Learning (CTL) learning model on colloid material, while in the control class the treatment was given a conventional learning model assisted by student textbooks. After learning ends, students will be given a final test (posttest).

questions. Questions that are valid will be used for the pretest and posttest. The pretest is given to students before the treatment to determine the student's initial abilities, and the posttest is given after the treatment to determine the student's learning outcomes.

RESULTS AND DISCUSSION

Student learning outcomes

This research uses a pretest-posttest control group design consisting of two classes. Both classes

Table 2 Student Cognitive Learning Outcomes

Data	Statistics	Class	
		Experiment	Control
Pretest	Average	59	86.13
	Standard	7.53	6.41
	Deviation		
	Standard	7.53	6.41
	Deviation		
	Smallest value	45	75
Posttest	Greatest value	73	98
	Total value	1416	2067
	Average	53.92	75.25

Deviation		
Smallest value	30	60
Greatest value	75	88
Total value	1294	1806

In accordance with Table 2 above, the differences in the results of the average pretest scores and posttest scores for the experimental class and control class can be illustrated through the diagram in Figure 1 below:

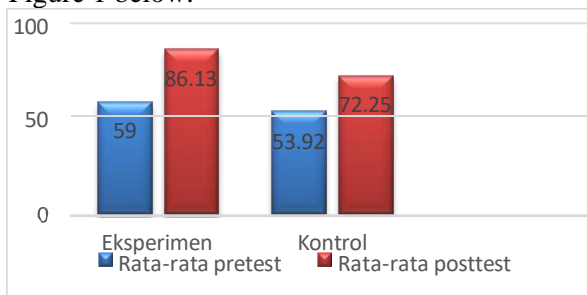


Figure 1 Average Student Cognitive Learning Outcomes

Based on Figure 1 above, the average score for the experimental class for the pretest was 59 and the posttest was 86.13, while the average score for the control class for the pretest was 53.92 and posttest was 72.25. It can be seen in Figure 4.1 that the experimental class and control class experienced an increase in learning outcomes. However, the experimental class obtained a higher score.

Table 3 Student Psychomotor Learning Outcomes

Class	Total Score	Category
-------	-------------	----------

Experiment	3.35	Good (B)
Control	2.9	Enough (C)

Table 3 shows that the psychomotor skills of students in the experimental class are in the good category (B), namely 3.35, while the students in the control class are in the adequate category (C), namely 2.9.

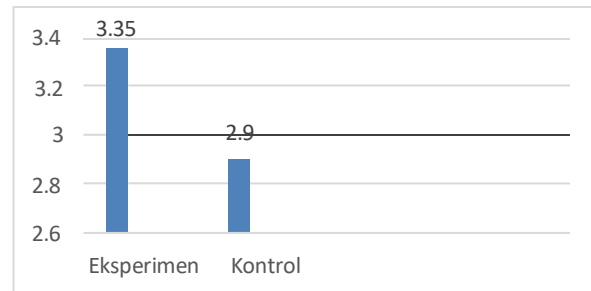


Figure 2 Student Psychomotor Learning Outcomes

Based on Figure 2, it can be concluded that the psychomotor learning outcomes of experimental class students are greater than the psychomotor learning outcomes of control class students.

Table 4 Student Affective Learning Outcomes

Class	Total Score	Category
Experiment	3.1	Good (B)
Control	2,4	Enough (C)

Table 4 shows that the effectiveness of students in the experimental class is in the good category (B), namely 3.1, while the students in the control class are in the sufficient category (C), namely 2.4.

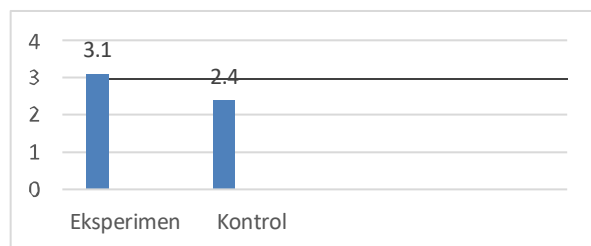


Figure 3 Student Affective Learning Outcomes

Normality test

Calculation of the normality test for pretest and posttest data in the experimental class and control class using the Chi Square test at the real level $\alpha = 0.05$ with the Chi Square criterion $X^2_{count} < X^2_{table}$, it is stated that the data is normally distributed which can be seen in table 5 as follows.

Table 5 Normality Test Results

Class	Data Source	X ² _{count}	X ² _{table}	A	Information
Experiment	Pretest	8.67	11.07	0.05	Normal Distribution
	Pretest	9.46	11.07	0.05	
Control	Posttest	9.75	11.07	0.05	

Based on the table above, the experimental class pretest X² count was 8.67 and posttest 8.79. Then X²_{count} posttest control class 9.46 and posttest 9.79 while X²_{table} with $\alpha = 0.05$, $df = 5$ is 11.07. From the results obtained, it can be concluded that the calculated Chi Square < Chi Square table means that the data from the pretest and posttest results in the experimental class and control class are normally distributed.

Homogeneity Test

This test is carried out to determine whether the data being analyzed is homogeneous or not. According to the calculations that have been carried out, the following data is obtained:

Table 6 Homogeneity Test Results

Data Source	Class	F _{count}	F _{table}	A	Information
Pretest	Experiment	56.70	2.44	4.28	Homogenous
Pretest	Control	138.43	4.28		
Posttest	Experiment	41.07	1.22		

In accordance with table 4.8, the F_{count} < F_{table} value is obtained, namely pretest F_{count} = 2.44, posttest F_{count} = 1.22 with a real level of $\alpha = 0.05$ and N = 24, so F_{table} = 4.28. It can be concluded that the data is homogeneous.

Hypothesis testing

With the criteria if the value of $t_{count} > t_{table}$ then H_a is accepted and H₀ is rejected. After carrying out the calculations, it was obtained that $t_{count} = 5.58$ and then compared with t_{table} with significant level $\alpha = 0.05$ with $df = nk = 24 - 2 = 22$ and obtained $t_{table} = 1.72$. It can be concluded that $t_{count} > t_{table}$, namely $5.58 > 1.72$, meaning that H₀ is rejected and H_a is accepted.

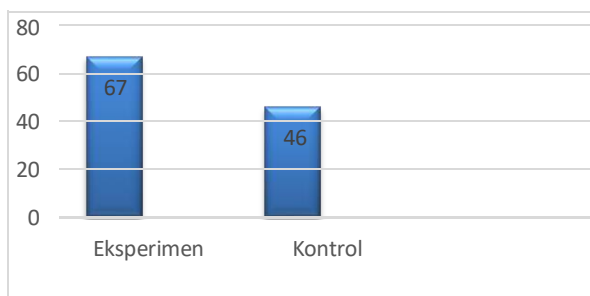
N-Gain Test

Gains in improving student learning outcomes can be sought by carrying out the N-Gain test. Based on the calculations that have been made, the increase in student learning outcomes is summarized in table 7 below.

Table 7 Student learning outcomes

Class	Criteria	N-Gain	%N-Gain	Criteria
Experiment	%g < 30 = Low	0.67	67%	Currently
Control	30 < %g < 70 = Medium %g > 70 = High	0.46	46%	Currently

Based on the table above, it can be seen the difference in the increase in learning outcomes of experimental class and control class students through the diagram in Figure 4 below:



Picture 4 Gains Student learning outcomes

From Figure 4 above, it can be seen that the increase in learning outcomes for the experimental class was higher (67%) compared to the learning outcomes for the control class (46%). It can be concluded that the application of the learning model *Contextual Teaching and Learning* Practicum-based (CTL) can improve student learning outcomes. This research was conducted to determine the influence of practicum-based Contextual Teaching and Learning (CTL) learning model. After conducting research, namely by giving an initial test (pretest), then treatment is carried out, namely applying the practical-based Contextual Teaching and Learning (CTL) learning model to colloidal material. After the learning ends, the final test (posttest) is carried out again. From the results of the initial and final tests, the average experimental class score for the pretest was 59 and the posttest was 86.13. It can be seen that there has been an increase in the learning outcomes of class XI Mipa

1 students before and after the implementation of the Contextual Teaching and Learning (CTL) learning model. The calculation of student psychomotor aspect learning outcomes in the experimental class was 3.35 while the control class was 2.9. The calculation of students' affective aspect learning outcomes in the experimental class was 3.1 while the control class was 2.4.

CONCLUSION

In line with the research that has been carried out, it can be concluded that:

1. There is an influence of implementing the learning model *Contextual Teaching and Learning* (CTL) on student learning outcomes for colloid materials as evidenced by the average score of the experimental class increasing from 59 to 86.13 with an increase of 67%.
2. Student learning outcomes by applying the CTL model based on class XI colloids practicum are not the same as student learning outcomes who apply the conventional model.

REFERENCE

Al Idrus, S. W., Purwoko, A. A., Hadisaputra, S., & Junaidi, E. (2020). Pengembangan Modul Praktikum Kimia Lingkungan Berbasis Green Chemistry Pada Mata Kuliah Kimia Lngkungan. *Jurnal Pijar Mipa*, 15(5), 541-547.

Andini, V. (2021). Penerapan model pembelajaran ctl (contextual teaching and learning) berbasis praktikum pada materi pencemaran lingkungan terhadap motivasi dan hasil belajar peserta didik di kelas X (Doctoral dissertation, IAIN Palangka Raya).

Annisa, F., Annisa, R. N., Yunita, T., Rafifah, T., & Vichaully, Y. (2023). Peran Mata Kuliah Microteaching dalam Mengembangkan Keterampilan Guru Mengajar di Kelas. *Journal on Education*, 5(2), 1564-1569.

Anwar, S. (2018). Model Pembelajaran Contextual Teaching And Learning (Ctl) Dalam Pembelajaran Inklusi. *Jurnal Ilmiah*

Azila, S. N., Laila K. M., Wiwin P. H., & Fatimatul M. (2019). Penerapan Model Pembelajaran CTL (*Contextual Teaching and Learning*) Berbantuan Wayang dalam Pembelajaran IPA terhadap Hasil Belajar Siswa. *Natural Science Education*

- Research*. 1(2), 155-162.
- Cahyono, H. (2019). Faktor-faktor kesulitan belajar siswa MIN Janti. *Jurnal Dimensi Pendidikan dan Pembelajaran*, 7(1), 1-4.
- Dakhi, A. S. (2020). Peningkatan hasil belajar siswa. *Jurnal Education and development*, 8(2), 468-468.
- Damanik, R., Sagala, R. W., & Rezeki, T. I. (2021). *Keterampilan dasar mengajar guru* (Vol. 1). umsu press.
- Darimi, I. (2016). Diagnosis kesulitan belajar siswa dalam pembelajaran aktif di sekolah. *JURNAL EDUKASI: Jurnal Bimbingan Konseling*, 2(1), 30-43.
- Lestari, W. P., Ningsih, E. F., Choirudin, C., Sugianto, R., & Lestari, A. S. B. (2023). Efektivitas Model Pembelajaran Kooperatif Dengan Pendekatan Contextual Teaching and Learning (CTL) Terhadap Hasil Belajar Matematika. *Jurnal Penelitian Tindakan Kelas*, 1(1), 28-33.
- Mudatsir, M., Ramli, R. B., & Mustakim, M. (2023). Optimalisasi Keterampilan Mengajar Guru Melalui Supervisi Klinis Kepala Sekolah Pendekatan Kolaboratif Era Merdeka Belajar. *ARSEN: Jurnal Penelitian Pendidikan*, 1(1), 39-49.
- Muharmansyah, R., Rahmi, U., Imamuddin, M., & Rahmat, T. (2023). Pengaruh Persepsi Siswa Tentang Keterampilan Dasar Mengajar Guru terhadap Hasil Belajar Matematika. *Journal on Education*, 5(3), 6986-6993.
- Muhartini, M., Mansur, A., & Bakar, A. (2023). Pembelajaran Kontekstual Dan Pembelajaran Problem Based Learning. *Lencana: Jurnal Inovasi Ilmu Pendidikan*, 1(1), 66-77.
- Nababan, D., & Sipayung, C. A. (2023). Pemahaman Model Pembelajaran Kontekstual Dalam Model Pembelajaran (Ctl). *Jurnal Pendidikan Sosial dan Humaniora*, 2(2), 825-837.
- Nabillah, T., & Abadi, A. P. (2020). Faktor penyebab rendahnya hasil belajar siswa. *Prosiding Sesiomadika*, 2(1c).
- Naik, G., Chitre, C., Bhalla, M., & Rajan, J. (2020). Impact of use of technology on student learning outcomes: Evidence from a large-scale experiment in India. *World Development*, 120(1).
- Nurrita, T. (2018). Pengembangan media pembelajaran untuk meningkatkan hasil belajar siswa. *Jurnal misykat*, 3(1), 171-187.
- Nurrita, T. (2018). Pengembangan media pembelajaran untuk meningkatkan hasil belajar siswa. *Jurnal misykat*, 3(1), 171-187.
- Prasetya, D., Rasmawan, R., & Hadi, L. (2021). Pengembangan chemistry quartet card (chemqurca) pada materi sistem koloid di SMA Negeri 8 Pontianak. *Jurnal Education and Development*, 9(2), 36-41.
- Simangunsong, A., Mege, R. A., & Lihiang, A. (2023). Penerapan Strategi Pembelajaran Contextual Teaching And Learning (CTL) Berbasis Praktikum Untuk Meningkatkan Hasil Belajar Biologi Siswa. *JSPB BIOEDUSAINS*, 4(1), 83-88.
- Suardi, M (2018). *Belajar & Pembelajaran*. Deepublish.
- Sunismi, Werdiningsih, D., & Wahyuni, S. (2022). Pembelajaran berbasis proyek (project based learning). CV Literasi Nusantara Abadi. Malang.
- Utami, F. N. (2020). Peranan Guru Dalam Mengatasi Kesulitan Belajar Siswa SD. *Edukatif: Jurnal Ilmu Pendidikan*, 2(1), 93-101.
- Yunita, H., Sesunan, F., Maulina, H., & Suana, W. (2023). Pembelajaran blended learning dengan metode praktikum untuk meningkatkan hasil belajar fisika siswa SMK. *Physics Education Research Journal*, 3(2), 133-140.