BioEdu
Berkala Ilmiah Pendidikan Biologi
Vol. 12 No. 3 Tahun 2023 Hal: 765-772
https://ejournal.unesa.ac.id/index.php/bioedu

THE IMPLEMENTATION OF STUDENT WORKSHEET BASED ON CONTEXTUAL TEACHING LEARNING ON ECOSYSTEM MATERIALS TO TRAIN SCIENTIFIC PROCESS SKILL FOR STUDENTS OF GRADE X SENIOR HIGH SCHOOL

Ardhita Filja Nurismawati
Biology Education, Mathematics and Natural Sciences, Surabaya State University
email: ardhita.19043@mhs.unesa.ac.id

Sunu Kuntjoro
Biology Education, Mathematics and Natural Sciences, Surabaya State University
email: sunukuntjoro@unesa.ac.id

Abstract

The worksheet that commond used in schools only refers to cognitive assessment, especially at SMAN 2 Lamongan. In the independent learning curriculum, it is not enough to only required knowledge and attitude competencies, but skill competencies. Therefore, alternative learning that can solve the problem is learning by applying Contextual Teaching Learning-based worksheets to train students science process skills in Ecosystem material for grade X SMAN 2 Lamongan, which is adapted from the worksheet developed by Rosa (2020). This study aims to describe 1) the implementation of learning, 2) students science process skills, and 3) student responses. This research is a type of pre-experimental design research. The research target is 116 students of grade X SMAN 2 Lamongan. The parameters measured were 1) the implementation of learning, 2) students science process skills, and 3) student responses. The research data were analyzed according to the descriptive quantitative analysis method. The results showed 1) the implementation of learning carried out by the teacher was very good, 99.44%, 2) 93.75% of students had carried out science process skills very well and achieved completeness indicators, 3) student responses to worksheets were 97.22 % or very positive.
Keywords: the implementation of Student worksheets based on contextual teaching learning, science process skills, and Ecosystem material.

Abstrak

Selama ini LKPD yang digunakan di sekolah-sekolah hanya mengacu pada kompetensi kognitif, terutama di SMAN 2 Lamongan. Dalam kurikulum merdeka belajar tidak cukup penguasaan kompetensi pengetahuan dan sikap saja, melainkan keterampilan. Oleh karena itu, alternatif pembelajaran yang dapat diterapkan yaitu pembelajaran dengan menerapkan LKPD berbasis Contextual Teaching Learning untuk melatihkan keterampilan proses sains siswa pada materi Ekosistem kelas X SMAN 2 Lamongan yang diadaptasi dari LKPD yang dikembangkan Rosa (2020). Penelitian ini bertujuan untuk mendeskripsikan 1) keterlaksanaan pembelajaran, 2) keterampilan proses sains siswa, dan 3) respon siswa. Penelitian ini termasuk jenis penelitian penerapan dengan desain Pre-eksperimental, sasaran penelitian 116 siswa kelas X SMAN 2 Lamongan. Parameter yang diukur adalah 1) keterlaksanaan pembelajaran, 2) keterampilan proses sains siswa, 3) respon siswa. Data hasil penelitian dianalisis dengan metode analisis deskriptif kuantitatif. Hasil penelitian menunjukkan 1) keterlaksanaan pembelajaran yang dilakukan oleh guru sangat baik, 99,44%, 2) 93,75% siswa telah melaksanakan keterampilan proses sains dengan sangat baik dan mencapai ketuntasan indikator, 3) respon siswa terhadap LKPD sebesar 97,22% atau sangat positif.
***Kata kunci**: penerapan lembar kegiatan siswa berbasis contextual teaching learning, keterampilan proses sains, materi ekosistem.*

INTRODUCTION

Learning Biology in the 21st century requires students to master science process skills in order to be able to work and innovate in facing global challenges. Four characteristics of 4C learning are communication, collaboration, critical thinking and problem-solving, and creativity and innovation (Burhanudin, 2021). Science process skills are essential for students because they make humans intelligent, creative, have high social abilities, and can face the current era of globalization.

Science process skills are applying the scientific method and developing and discovering knowledge. Science process skills are divided into two: basic process skills, including observing, classifying, asking, measuring, and integrated science process skills, consisting of the scientific method. Science process skills can be improved using constructivism and inquiry

abilities learning strategies. The learning strategy that can be applied to improve science process skills is Contextual Teaching Learning (CTL).

Contextual Teaching and Learning (CTL) is an approach that connects the material being studied with real-world situations to encourage students to connect the material being studied and its application in everyday life (Kurniasih, 2021). Learning that can train students to build concepts based on everyday life can use the Contextual Teaching and Learning approach (Elista & Kuntjoro, 2020). The Contextual Teaching and Learning (CTL) approach has seven components: constructivism, inquiry, questioning, learning community, modeling, reflection, and authentic assessment. Contextual Teaching and Learning (CTL) learning involves students in the process of observing and learning experiments so that students' abilities will be formed naturally, this is because students have been trained independently in constructing the experiences and problems they face (Tamam, *et al*., 2021)

Contextual Teaching and Learning based learning can be applied in learning using student worksheets. Student worksheets contain learning guides that can train science process skills. Based on the results of a field study of Introduction to Schooling Fields and interviews with Biology teachers in class X at SMAN 14 Surabaya, it can be seen that during the Biology learning process, they still use student worksheets from school. The student worksheets on ecosystem material only contain essential information and questions related to ecosystem concepts, but they have been unable to practice science process skills. In the student worksheets, no practicum activities can train scientific process skills, so it is crucial to do practicum so that students can train and demonstrate the skills they have mastered. In addition, they have yet to be trained in solving ecosystem problems, so it is essential to train critical thinking skills and solve ecosystem problems in the surrounding environment, such as the problem of water pollution due to waste which can be solved with eco enzymes. During the implementation of PLP in class XII MIA also showed low science process skills from students; this was indicated by the common understanding of students when formulating problems, creating variables, designing experiments, and drawing conclusions. This shows that students have not mastered science process skills, meaning the material has not been fully mastered.

Ecosystem material contains many concepts that students must understand independently because they are closely related to everyday life. This ecosystem material requires students to know their surroundings more closely to understand Ecosystem material. Thus the science process skills need to be mastered by students to achieve learning outcomes.

One of the LKPDs developed regarding ecosystems is the LKPD developed by Rosa (2020), which produces LKPDs suitable for use in learning with validation results of 3.63. The level of validity obtained is reviewed based on several criteria, such as the feasibility of content, presentation, and language. Here the researcher wants to conduct further research by adapting the LKPD that has been developed and adjusting the circumstances or conditions of SMAN 2 Lamongan. Here the researcher developed a teaching module that contains Contextual Teaching and Learning (CTL) features and indicators of science process skills; besides that, the teaching module is in accordance with the current independent curriculum. Furthermore, the researchers developed a science process skills test instrument consisting of pretest and posttest questions to measure cognitive learning outcomes and questions on the achievement of science process skills. The questions were developed according to indicators of science process skills. Based on the explanation that has been explained, the researcher wants to conduct research with the title: "Implementation of Contextual Teaching Learning (CTL) Based Worksheets on Ecosystem Materials to Train Scientific Process Skills for Class X High School."

METHODS

This research includes Pre-Experimental Design research. This research consists of three stages: preparation, implementation, and data analysis. Analysis methods include implementing teaching modules, science process skills, and student responses. This research was conducted in March-April 2023 and was conducted in three classes, namely, X 3, X 10, and X 12, with class X 3 consisting of 38 students, X 10 consisting of 38 students, and X 12 consisting of 40 students in the even semester of the year teaching 2022/2023. Implementing learning processing is likely good if it obtains a 61-80% percentage. Process skills are said to be well-trained if they get a percentage of 61-80%. Process skills are said to be complete if the analysis of the results of the pretest and post-test through the N-gain test shows an increase and obtains a score exceeding the minimum completeness criteria, namely ≥80; the

student's response is positive if the percentage gets ≥75%.

RESULTS AND DISCUSSION

The results obtained during this research were as follows:

Implementation of Learning Activities

Observation of the implementation of learning was observed by one observer, namely the Biology subject teacher at SMAN 2 Lamongan. Learning implementation data is presented in Table below:

Table 1. Results of Implementation of Learning Activities using student worksheet one based on Contextual Teaching Learning

No	Aspect	X 3 %	X 10 %	X 12 %	Average	category
1	Introduction	100	83,3	100	94,43	VP
2	Core activities	100	100	100	100	VP
	Constructivism	100	100	100	100	VP
	Inquiry	100	100	100	100	VP
	Questioning	100	100	100	100	VP
	Learning Community	100	100	100	100	VP
	Modelling	100	100	100	100	VP
	Reflection	100	100	100	100	VP
	Authentic Assesment	100	100	100	100	VP
3	Closing	100	100	100	100	VP
Total					994,43	
Average					99,44	
Category					VP	

Information:
VP: Very Practical

Table 2. Results of Implementation of Learning Activities using student worksheet two based on Contextual Teaching Learning

No	Aspect	X 3 %	X 10 %	X 12 %	Average	category
1	Introduction	83,3	100	100	94,43	VP
2	Core activities	100	100	100	100	VP
	Constructivism	100	100	100	100	VP
	Inquiry	100	100	100	100	VP
	Questioning	100	100	100	100	VP
	Learning Community	100	100	100	100	VP
	Modelling	100	100	100	100	VP
	Reflection	100	100	100	100	VP
	Authentic Assesment	100	100	100	100	VP
3	Closing	100	100	100	100	VP
Total					994,43	
Average					99,44	
Category					VP	

Information:
VP: Very Practical

Based on Tables above, the results of observations of the implementation of learning show that the average percentage of all aspects observed includes the introduction, the core activities including the constructivist stage, inquiry, questioning, learning community, modeling, reflection, authentic assessment, and closing obtain a percentage of 99.44 % with efficient category. In the preliminary aspect, the whole class obtained an average of 94.43%, categorized as very good. This shows that the teacher has conveyed the learning objectives and prepared students. Regarding core activity aspects, the two classes' entire Contextual Teaching Learning stage has an average of 100% and is categorized as very good. This is because the teacher can guide students in working on the constructivist, inquiry, questioning, learning community, modeling, reflection, authentic assessment, closing stages, and practical work on student worksheets 1 and 2. In the closing aspect, the class averages 100% (Excellent). The teacher can guide students to conclude a lesson correctly. The way to develop student interest and motivation is to use exciting learning media (Febrita & Ulfah, 2019).

The analysis results show that, in general, the teacher's ability to carry out learning with the Contextual Teaching Learning learning model has been carried out well. Learning activities in the form of experiments, besides being able to help students play an active role in learning, can also help improve students' understanding of concepts and high-level abilities (Fanani, 2018). The implementation of Contextual Teaching and Learning can activate students more, train students to be able to exchange ideas with their group mates, help each other in completing assignments given by the teacher, and provide freedom of thought to students (Indriani, 2017). This opinion shows that the Contextual Teaching Learning learning model can make students more active and increase their understanding of knowledge.

Scintific Process Skills

Four observers assessed the scientific process skills of UNESA FMIPA Biology students. The results of observations of students' science process skills during learning activities carried out by Observer 1, Observer 2, Observer 3, and Observer 4. The overall average percentage of science process skills from the three classes, namely X 3, X 10, and X 12, is shown in Table 3 following.

Table 3. Observation Results of Students' Scientific Process Skills Activities

No	Scintific Process Skills	X 3 %	X 10 %	X 12 %	Average %	Category
1	Observing	100	100	100	100	E
2	Collecting	94,7	94,0	93,7	94,18	E
3	Measuring	90,1	93,4	92,5	92,01	E
4	Questioning	90,7	97,3	95	94,38	E
5	Predictioning	99,3	93,4	95	95,92	E
6	Communication	94,0	96,0	93,7	94,62	E
7	Formulate a problem	85,5	94,7	93,1	91,11	E
8	Formulate Hypotheses	88,8	94,0	91,8	91,58	E
9	Identifying Variables	90,1	92,7	92,5	91,25	E
10	Collecting data	98,0	95,3	96,2	96,55	E
11	Analyzing Data	88,1	95,3	91,2	91,59	E
12	Concluding	90,1	94,0	93,7	92,64	E
Total		1109	1140	1128	1125	E
Average		92,4	95	94	93,75	E
Category		E	E	E	E	E

Information:

E: Excellent

Students' science process skills are trained by involving students' mental, physical, intellectual, and social abilities to build cognitive abilities so they can master knowledge competencies, skills, and attitudes that can be applied in everyday life (Zamista, 2015). Based on Table 3 regarding the percentage of students' science process skill observation, the highest average percentage is in the observing aspect and is categorized as very good. This is because all students observe activities well during the learning process, especially at the constructivist stage in student worksheets. Unlike the Inquiry stage, it tends to get a low percentage because students still need helpmate problems, making hypotheses, determining variables, analyzing data, and making conclusions. The inquiry component in LKPD directs students in conducting investigations, observing, conducting experiments, analyzing data, and making conclusions (Lestari, 2017) The inquiry component involves students in intellectual activity so that science process skills are related to motivation in the learning process (Maison, 2019). However, overall, in each class, there has been an increase in all aspects, categorized as very good.

The difference in the average percentage value indicates that students can follow and understand the learning process using Contextual Teaching Learning-based worksheets. When working on LKPD, apart from being active students, the researcher as a teacher also explained classically previous explanations by giving examples in the surrounding environment. So that students can work on the constructivist and inquiry stages in student worksheets one regarding the pollution of water ecosystems and student worksheets two regarding the carbon cycle. This shows that students have experienced the learning process shown by differences in scores caused by differences in the abilities of each student while participating in learning. The completeness of students' science process skills is known by giving a Pretest and Posttest. Data on the results of the completeness of students' science process skills will achieve completeness if they reach the minimum standard of completeness set by SMAN 2 Lamongan, which is ≥80. The data on the results of learning completeness are shown in Table 4.

Table 4. Results of the Completeness Analysis of Pretest and Posttest Indicators

No	X 3		X 10		X 12	
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*
1	23,6	86,84	15,38	92,2	17,5	90
2	34,21	81,57	38,46	82,5	32,5	87,5
3	5,26	89,47	2,5	89,5	2,5	87,5
4	34,21	86,84	23,07	84,61	17,5	80,0
5	39,47	84,21	48,71	94,87	20	80,0
6	18,42	84,21	20,51	87,17	2,5	95,0
7	26,31	89,47	15,38	92,30	12,5	87,5
8	7,89	89,47	5,12	92,30	10	90,0
9	10,52	84,21	12,82	84,61	12,5	82,5
T	22,21	85,78	20,21	88,89	14,75	86,7
C	L	E	L	E	L	E

Information:

1: Observing
2: Collecting
3: Measuring
4: Questioning
5: Formulate problem
6: Formulate Hypotheses
7: Identifying Variable
8: Analyzing Data
9: Prediction
T: Total
C: Category
L: Lower
E: Excellent

Data from Table 4 the results of the analysis of the completeness of the science process skills indicators, obtained from the pretest and posttest can be seen that the average percentage of mastery of the class X 3 posttest indicators is 63.57% of the average percentage of completeness of the pretest indicators. In class X 10, mastery indicators increased by 68.68% from the average pretest mastery indicator previously. In class X, 12, mastery indicators increased by 61.95% from the average percentage of pretest mastery indicators. The low learning outcomes are due to many factors, especially teacher and student factors. As an essential component in the teaching and learning process (Sulfemi, 2019). The highest completeness indicator is 100% in the indicators of formulating problems, formulating hypotheses, and determining variables. This is because when learning uses student worksheets based on Contextual Teaching Learning, before students learn to formulate practical problems, formulate hypotheses, and determine the variables in the experiment to be carried out, the teacher first explains and gives classic examples of correct problem formulation sentences and types of hypotheses, and various variables. Laili and Kuntjoro (2021) state that the knowledge students acquire by exploring and constructing the knowledge themselves will be easy to remember and keep in mind because, generally, students will remember things they find independently for longer. The lowest average percentage in class X 3 is an indicator of grouping, and in class, X 10 is an indicator of analyzing data. Students still need to understand the biotic and abiotic components and their roles when they classify. In the indicators of analyzing data, students still need to be skilled at composing sentences, so the data presented has deficiencies. The low level of student's mastery of concepts and learning materials results in low learning outcomes obtained, the use of books and teacher-focused learning methods makes students' mastery of science tend to be lower, so they cannot link the material being studied with everyday life (Siregar, 2020)

An N-gain test was then carried out with data analysis of the results of the Pretest and Posttest to find out whether science process skills had been trained, from the calculation of N-gain in each class, there was an increase in the high category. This is shown in the posttest scores obtained after applying the Contextual Teaching Learning-based student worksheets, which is more improved than the pretest obtained by students before applying the student worksheets. Based on the specified minimum completeness criteria, namely ≥80%, the three classes have fulfilled the minimum criteria of 100% obtained from the Posttest results and the average percentage of observations of science process skills. This is relevant to research conducted by Riska (2017) that Contextual Teaching and Learning learning can show good learning outcomes. The research results by Nurhidayati (2016) also show that applying CTL learning can improve student learning outcomes. This shows that the application of learning using Contextual Teaching Learning-based student worksheets can train students' science process skills.

Student Response

Student response questionnaires were given to each class X 3, X 10, and X 12 SMA Negeri 2 Lamongan. Contains 15 questions. The following are the results of student responses to learning using Contextual Teaching Learning-based worksheets.

Table 5. Student response data to learning using Contextual Teaching Learning-based student worksheet

No	Statement	Prosentase Class (%)			Average
		X 3	X 10	X 12	
Language Aspect					
1	The language used in this student worksheet is easy to understand	100	100	100	100
Presentation Aspects					
1	Learning objectives in student worksheet are written clearly.	100	100	100	100
2	The time allocation provided is sufficient to	86,84	89,47	90	88,77

	work on the student worksheet.				
3	The instructions for working on the student worksheet are clear	97,36	100	97,5	98,28
4	The activity steps in this student worksheet are easy to implement	94,73	84,21	100	92,98
5	This practice of formulating problems in student worksheet is easy to do	100	100	97,5	99,16
6	The practice of formulating hypotheses in this student worksheet is easy to do	97,36	100	100	99,12
7	The practice of designing experiments in this student worksheet is easy to do	97,36	94,73	100	97,36
8	The practice of doing experiments in this student worksheet is easy to do	100	86,84	97,5	94,78
9	This exercise in collecting data in student worksheets is easy to do	97,36	92,10	92,5	93,98
10	This exercise in analyzing data in student worksheets is easy to do	97,36	97,36	95	96,57
11	This drawing of conclusions in the student worksheet is easy to do	100	100	100	100
12	This student worksheet helps your understanding of concepts about Ecosystem material	100	100	100	100
Display Aspect					
1	The appearance of this student worksheet is interesting	100	100	100	100
2	The pictures on this student worksheet are straightforward and add to the understanding.	100	92,10	100	97,36
Total					1.458,36
Average					97,22
Category					Very Positive

Based on Table 5, the students' responses after treatment showed that out of 116 students in classes X 3, X 10, and X 12, the positive response was 97.22%, with a very positive category. Regarding some of the statement items that were considered to show the most responses, namely the items "The learning objectives in the student worksheets are written clearly, "This practice of concluding student worksheets is easy to do," "This student worksheet helps your understanding of concepts about Ecosystem material," and "Appearance of student worksheets this is interesting." This shows that the appearance of these student worksheets attracts students' interest in learning the material. Dinantia & Amran (2017) state that the LKPD is presented non-monotonously, namely by having pictures and a pretty good design so that students can understand the material. These student worksheets also help students understand ecosystem learning material. Student worksheets are a supporting tool in the teaching and learning process to attract more student attention (Zulaicha, *et al*., 2016).

ACKNOWLEDGEMENT

The researcher would like to thanks Dr. Tarzan Purnomo, M.Si and Dra. Herlina Fitrihidajati, M.Si. as examiners and validators. Remember to thank the biology teacher at SMA 2 Lamongan and all students who have participated in this research.

CONCLUSION

Implementation of learning with Contextual Teaching Learning-based LKPD in training science process skills on ecosystem material, as a whole in all classes, can be implemented in an outstanding category reaching 99.44% in all aspects that have been observed.

Students' science process skills in all classes, 93.75%, are included in the excellent category. Data on indicators of students' science process skills are shown from the

results of the pre-test and post-test in class X 3 85.78% complete. In class X 10, 88.89% were complete. In class X 12, 86.7% were complete. Based on the results of the N-gain test in three classes, it can be seen that there is an increase in students' science process skills which is known through the pre-test and post-test at the beginning and end of learning using Contextual Teaching Learning-based worksheets.

The responses given by students included very positive responses (97.22%) towards learning using Contextual Teaching Learning-based worksheets.

SUGGESTION

Researchers need to discuss scientific procedures and practicum activities with students regarding the science process skills that will be studied; this aims to make it easier for students to complete activities in LKPD during the learning process.

During the learning and practicum process, the teacher should divide the learning time well so that working on the LKPD can be completed correctly and quickly.

In practicum activities, the teacher should guide students in doing practicum so that students work together and discuss with groups. It is better if the validation is carried out by more than one validator so that the results are more valid.

BIBLIOGRAPHY

Burhanudin, A. (2021). Penggunaan Sim-Rosi Berbasis PjBL dan Steam untuk Meningkatkan Keterampilan Abad 21 Bagi Peserta Didik Sekolah Dasar. Jurnal Didaktika Pendidikan Dasar, 5(1), 47-70

Dinantia, D. & Amran, E. Y. (2017). Pengembangan Lembar Kegiatan Peserta Didik (LKPD) berbasis Hirearki Konsep pada Pokok Bahasan kelarutan dan hasil kali kelarutan. Jurnal Online Mahasiswa (JOM) Bidang Keguruan dan Ilmu Pendidikan, 4(2):1-10

Elista, Cindi Evang & Kuntjoro, Sunu. (2020). Validitas LKPD Perubahan Lingkungan Berbasis Contextual Teaching and Learning Untuk Melatihkan Keterampilan Proses Sains Peserta Didik Kelas X SMA. *BIOEDU. Vol.9, No. 3.*

Fanani, Riski Dwi. (2018). Keefektifan LKS Berbasis *Contextual Teaching Learning* (CTL) Untuk Meningkatkan Keterapilan Proses Sains Siswa Pada Materi Pesawat Sederhana. *Pensa E-jurnal*, 6(2), 252-256

Febrita, Yolanda, and Maria Ulfah. (2019). Peranan Media Pembelajaran Untuk Meningkatkan Motivasi Belajar Siswa.‖ Diskusi Panel Nasional Pendidikan Matematika 0812 (2019): 181–87.

Indriani, R. (2018). Aktivitas guru dan siswa dalam pembelajaran matematika menggunakan *contextual teaching and learning* (CTL) di sekolah dasar. Pendas: Jurnal Ilmiah Pendidikan Dasar, 2(2), 261-267.

Kurniasih, D. (2021). Implementasi Model Pembelajaran *Contextual Teaching And Learning* (CTL) Dalam Pelajaran IPA Di Sekolah Dasar. Social, Humanities, and Educational Studies (SHEs): Conference Series, 3(4), 285.

Laili, Ilvi, & Kuntjoro, Sunu. (2021). Validitas LKPD Pencemaran Berbasis Contextual Teaching and Learning Untuk Melatihkan Keterampilan Berpikir Kritis. *BIOEDU. Vol.10, No. 1.*

Lestari, Y. (2017). Pengembangan Lembar Kegiatan Siswa (LKS) Berbasis *Contextual Teaching and Learning* (CTL) pada Materi Perubahan Lingkungan. *BIOEDU. Vol.6, No. 3.*

Maison, Darmaji, Astalini, Kurniawan, dan Indrawati. (2019). "Science Process Skills and Motivation". *Humanities and Social Science Review*. 7(5), 48-56

Nurhidayati, Evi. (2016). Pengaruh Model CTL terhadap Hasil Belajar Siswa pada Materi Suhu dan Kalor X di SMA Negeri 5 Banda Aceh. Banda Aceh : UIN Ar-Raniry Darussalam

Riska, Kamalia. (2017). Pengaruh Penerapan Contextual Teaching and Learning terhadap Hasil Belajar dan Aktivitas Siswa Pada Materi Keanekaragaman Hayati. Jurnal Ilmiah 2(2)

Rosa, W. F. (2020). Validitas Pengembangan LKS Berbasis CTL Pada Materi Ekosistem Untuk Melatihkan Keterampilan Proses Sains Siswa Kelas X SMA. *Jurnal BioEdu*, 9 (3): 397-405.

Siregar, Misrawati. (2020). Pengaruh Model Pembelajaran CTL Terhadap Hasil Belajar Kognitif Pada Materi Biologi SMA Negeri 6 Padangsidimpuan. *Jurnal PhysEdu Pendidikan FISIKA IPTS*, 2 (1); 64

Sulfemi, W. B. (2019). Model pembelajaran *contextual teaching and learning* (CTL) berbantu media miniatur lingkungan untuk meningkatkan hasil belajar IPS. Edunomic: Jurnal Ilmiah Pendidikan Ekonomi Fakultas Keguruan Dan Ilmu Pendidikan, 7(2), 73-84

Tamam Syaifuddin, Luthfiyah Nurlaela, & Sukma Perdana P. (2021). *Contextual Teaching and Learning* (CTL) Model to Students Improve Learning Outcome at Senior High School of Model Terpadu Bojonegoro. *IJORER: International*

Journal of Recent Educational Research, *2*(5), 528-535

Zamista, A. A., & Kaniawati, I. (2015). Pengembangan Tes Keterampilan Proses Sains Materi Fluida Statis Kelas X SMA/MA. Prosiding Seminar Nasional Fisika (E-Journal),4

Zulaicha, A. S., Fadiawati, N., Tania, L. (2016). Pengembangan Lembar Kerja Siswa Berbasis Pendekatan Saintifik Pada Materi Termokimia. *Jurnal Pendidikan dan Pembelajaran.*