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THE EFFECT OF CONTEXTUAL TEACHING AND LEARNING MODEL THROUGH ENERGY IN LIVING SYSTEMS VIDEO ON STUDENTS' ACHIEVEMENT

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Abstract

This study aims to determine students' achievement after applying the Contextual Teaching and Learning (CTL) learning model with the SETS approach through Energy-in-Living Systems video. The method was pre-experimental with one-group pretest-posttest design. The sampling method was purpose sampling involving class VII-H students at SMPN 26 Surabaya as many as 22 people. Data was collected through observation sheets (student activities and learning implementation), learning outcomes tests, and response questionnaires. Observation sheets were analyzed using a Likert scale (score range 1-4), learning outcomes tests included pretest and posttest (15 questions each) which were analyzed using the N-Gain test, and the response questionnaire using the Gutmann scale (Yes and No). The results of student activities and the implementation of learning in two meetings were categorized very well. The learning outcomes of 15 students reached a percentage of 68% (criteria: high) and 7 students reached a percentage of 32% (criteria: moderate). The increase in the N-Gain score was obtained by 0.76 which was categorized as high and a total of 22 students completed so that the classical mastery of learning reached 100%. The responses of students who are interested in the application of the CTL model through video obtained an average percentage of 91.6%. It is concluded that the application of the CTL learning model with the SETS approach through Energy-in-Living Systems video was appropriate and succeeded in improving students' achievement.

Keywords: Contextual Teaching and Learning Model, Energy in living systems

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INTRODUCTION

Science is one of the fields that has a characteristic that explores real natural events in the form of events and causal relationships (Graduates & Sulistyowati, 2015). According to Permendikbud No.58 2014 concerning the 2013 curriculum, science learning is integrated all concepts of Biology, Physics, Chemistry, Earth and Space Sciences into one subject. Therefore, the scope of the material discussed is very broad and students tend to find it difficult to understand concepts well, which affects the learning achievement. In this case the role of the teacher is very important to achieve learning objectives.

The teacher is the main actor who can plan and shape the learning environment and motivate students so that they can improve student achievement (Hornstra et al., 2015). The task of a teacher is not only required to be able to carry out his duties as a planner, implementer, or teaching evaluator. However, teachers must also become professional teachers who are able to modify designs, choose appropriate methods and models and play an active role in improving student learning outcomes.(Sulfemi & Yuliani, 2019). In addition, it is also influenced by the availability of adequate facilities and infrastructure (Ansori et al., 2020). But in reality, there are still some schools whose facilities and infrastructure are inadequate so that teachers are less varied in using approaches, methods, models and learning media.

Previous research conducted by Wahyuni et al. (2015), it was found that the level of understanding of students at SMPN 2 Sulang in Rembang on Energy in Living Systems topic was still relatively low with a percentage of only 45% of the 132 students who graduated from the Minimum Completeness Criteria, which was 75. This was apparently due to the use of a teacher-centered lecture model and textbooks so that the material explained is still abstract. As a result, students lack enthusiasm for learning, do not understand concepts correctly and the learning outcomes achieved are still relatively low.

Learning outcomes are the results achieved by a person after carrying out a learning activity and gaining experience, which is written in letters, numbers or sentences (Soleha et al., 2021). According to Wahyuningsih (2020), Learning outcomes represent the quality of individual activities in certain processes. Given the low value of learning outcomes for understanding the concepts that have been obtained from the observation activities above, it must be addressed immediately so that students do not experience misunderstandings in subsequent concepts that are increasingly complex and still interrelated. The most effective method is to use the CTL model (Soleha et al., 2021).

According to Sulfemi & Yuliani (2019)The CTL model is most effective because it has advantages, including: prioritizing real experience, critical thinking, student-centered, and requiring students to participate actively, be creative, and be able to measure learning outcomes without only going through a written test. As for Ansori et al. (2020), The CTL learning model itself is a learning model that aims to form meaningful learning. In other words, linking concepts between materials and examples of applications in everyday life. The CTL learning model has seven main characteristics, including: 1) constructivism; 2) discovery; 3) questions; 4) learning community; 5) modeling; 6) reflection; and 7) evaluation (Soleha et al., 2021).

Considering that the application of the CTL model is able to make learning meaningful, of course this requires students to be able to relate and implement science material that has been studied in real life by using technology that has developed to benefit society. This relationship is known as SETS (Science, Environmental, Technology, and Society) (Rini, 2017). According to Hakim et al. (2021), SETS is an approach that aims to make students able to observe, identify, understand, demonstrate and improve learning outcomes and the mindset of the material being studied becomes comprehensive. This is in accordance with the opinion Fitria et al. (2016)from the results of his research, the use of the CTL model with the SETS approach was able to improve students' conceptual understanding with a percentage difference of 17% and improve student character which includes tolerance, curiosity, discipline, environmental care and honesty.

In optimizing the implementation of learning using the CTL model with the SETS approach, it is necessary to have the right supporting media. According to Wulandari et al. (2013), Media is a means of distributing messages about concepts conveyed by a teacher so that students can easily understand the concept. By using the right learning media, students can be motivated and interested in continuing to learn. This makes it easier for students to understand the concepts that have been learned and improve learning outcomes (Ms, 2019). Currently, the learning media that are often used are visual media, audio media and audio visual media, such as interactive video.

Interactive video is one of the learning media that includes a combination of elements of text, sound, images and graphics that allow direct interaction between the material and the user (Wardani & Syofyan, 2018). According to Yasa et

al. (2017), Interactive videos make it easier for students to catch material that is explained easily because it is accompanied by animations that allow students to be able to get a clear picture of the concept. The use of interactive video media is expected to increase the interactivity of students so that they have the potential to motivate students and increase learning effectiveness. Other studies also show that using animation media during learning process can increase students' learning motivation (Rosdiana & Sari, 2017).

Based on the interview, several teachers stated that there was a decrease in students' learning motivation and only some of them were still following the learning process. Whereas a learning climate that can make students comfortable and fun is very important to form. So, learning media is needed to help students understand and focus on the lesson.

The aims of this study is find out the results of student learning after applying CTL learning model with the SETS approach through Energy in Living Systems video. It is hoped that it can be used as a reference to improve students' achievement in science class.

METHOD

The method was pre-experimental with one-group pretest-posttest design as shown in Figure 1 (Sugiyono, 2015). The purpose is to see the comparison of students' cognitive learning outcomes both before and after being given CTL model learning with learning videos.

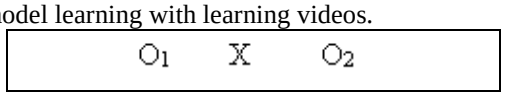

Figure 1. One-Group Pretest-Posttest Design (Source: Sugiyono, 2015)

Note: O1 = the initial ability of the experimental group, O2 = the final ability of the experimental group, X = the provision of application.

The sampling method uses purpose sampling, which is one class that is targeted considering the learning outcomes are still low. The research subject is class VII-H at SMPN 26 Surabaya (Public Junior High School) with a total of 22 students. Meanwhile, the data collection method was carried out through observation sheets, learning outcomes tests, and response questionnaires. The observation sheet instrument includes an assessment of student activities and the implementation of learning carried out by science teachers at SMPN 26 Surabaya. The instrument was prepared using a Likert scale with a scale of 1-4 which aims to measure the achievement of the implementation of learning activities using the CTL model.

The research instrument is pretest and posttest instruments, which consists of 15 multiple choice questions for each test. Pretest is given to assess the initial ability before applying CTL model and Energy in Living Systems Video in learning process. The Posttest is to assess students' achievement after the application. The response questionnaire was prepared using the Gutmann scale which aims to assess students' attitudes or opinions regarding the application of the CTL model.

Learning instruments, observation sheets and learning outcomes tests were first tested for validity by one Science Education Lecturer at Universitas Negeri Surabaya and one science teacher at SMPN 26 Surabaya. The results of the instrument validation from the two validators were declared very valid with the value of the Learning Implementation Plan of 90%, the value of the observation sheet on the implementation of learning by 94%, the value of the questionnaire 92%, the value of the Student Worksheet of 88%. The instrument categorization is declared valid based on the criteria in Table 1.

Table 1. Interpretation of Validity Score Results

Percentage (%)	Score Interpretation Criteria
≤ 20	very small
21 – 40	Small
41 – 80	Currently
61 – 80	Valid
≥ 81	Very valid

(Riduwan & Akdon, 2013)

The next step is to do a reliability test. The way to calculate it is by using Cronbach's Alpha correlation (r_{11}) and the mean value of r_{count} is 0.598 with an r_{table} of 0.3598 at a significance level of 0.05. These results indicate that the value of rcount > rtable so that the instrument is declared reliable (Arikunto, 2016).

The results of the validity and reliability test resulted in very valid and reliable questions for the pretest and posttest with a total of 15 items each. Thus, the test instrument was suitable to be used

for testing on 22 students of class VII-H at SMPN 26 Surabaya. Furthermore, from the results of the trial, the value of learning outcomes will be obtained both during the pretest and posttest.

The data analysis technique used quantitative descriptive methods. Analysis of student activity observation sheets includes curiosity, cooperation and responsibility. Meanwhile, the analysis of the learning implementation observation sheet includes opening, core and closing activities. The results obtained from the student activity observation sheet are calculated using Equation (1). Furthermore, it is interpreted based on the criteria in Table 2.

$$\bar{x} = \frac{\sum X}{N} X\ 100\% \quad (1)$$

Information: $\bar{x}$ = Percentage of mean value; x = total acquisition score; N = Total aspects studied (Arikunto, 2013).

Table 2. Interpretation Criteria for Student Activity Score

Percentage (%)	Criteria
≥ 26	Very good
20 - 25	Well
16 – 19	Enough
≤ 15	Not good

(Arikunto, 2013)

Analysis of the results of observing the implementation of learning is calculated using Equation (2). Furthermore, the calculation results are interpreted based on the criteria contained in Table 3.

$$S = \frac{\bar{s}}{Sm} X\ 100\% \quad (2)$$

Description: S = Percentage value; $\bar{s}$ = Average score; Sm = Maximum score (Arikunto, 2013).

Table 3. Interpretation Criteria for Learning Implementation Score

Percentage (%)	Criteria
≥ 76	Very good
51 - 75	Well
26-50	Enough
≤ 25	Not good

(Arikunto, 2013)

Analysis of student response questionnaires of 10 questions was calculated using Equation (3). The purpose of the questionnaire was to find out the attitudes or opinions of students after being given the application of the CTL cooperative model using video.

$$P = \frac{A}{B} X\ 100\% \quad (3)$$

Description: P = Percentage of responses; A = Number of students who voted; B = Total students.

The analysis of the learning scores that have been obtained is calculated using the N-gain test with Equation (4). Furthermore, the results of the N-gain test will be interpreted based on the criteria contained in Table 4. The purpose of the N-gain test is to obtain an average increase in student learning outcomes between the pretest and posttest.

$$g = \frac{skor\ post\ test - skor\ pretest}{skor\ ideal - skor\ pretest} \quad (4)$$

Description: g= gain score; ideal score = 100% (Sugiyono, 2015).

Table 4. N-Gain test results criteria

Score Range	Criteria
g > 0.70	Tall
0.30 (g) < 0.70	Currently
g < 0.30	Small

(Sugiyono, 2015)

Analysis of learning outcomes can also be calculated using the classical completeness percentage formula. The purpose of the analysis is to obtain the classical learning completeness criteria of students in a class based on the Minimum Completeness Criteria which is 70 (Kamila & Julianto, 2022).

RESULT AND DISCUSSION

Research related to the application of the CTL model through Energy in Living Systems video at SMPN 26 Surabaya obtained data including the results of student activity observation sheets, results of learning implementation sheets, learning test results and student response questionnaire results.

Student Activity Observation

At this stage of observing student activities, the author filled out the observation sheet for two meetings and the results are given in Figure 2.

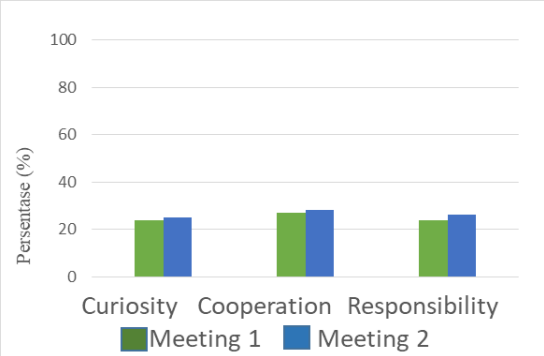

Figure 2. Diagram of the results of observing student activities

Figure 2 shows that the aspects assessed from the student activity observation sheet during learning activities include curiosity, cooperation and responsibility. The highest percentage value is found in the aspect of cooperation. This can be seen when the teacher gives instructions to all groups to solve problems in the student worksheet that have been given correctly and quickly. All groups discussed and cooperated very well after being given direction by the teacher. The teacher's role in providing direction and problems is very important in improving aspects of cooperation in a group (Hyun et al., 2020). This is in accordance with the opinion Anggraeny & Rosdiana (2019) from his research activities that student skills learning outcomes increased by 100% with the use of student worksheet on Energy in Living Systems material because there were direct observation activities.

Aspects of curiosity and responsibility at the first meeting obtained the same percentage of 24% and included in the good criteria. Meanwhile, at the second meeting it was 25% and 26%. As for the aspects of cooperation in the two meetings, the percentages of 27% and 28% were stated very well according to the criteria in Table 2. In general, the three aspects studied increased from the first meeting to the second meeting. The increase in the aspect of curiosity can be seen from observation activities, namely when the teacher conveys material using media in the form of interesting videos and provides several questions on the sidelines of the explanation of the material that can spur students to be active in asking questions about concepts that are still unknown and have not been understood properly.

Previous research conducted by Juriah & Juanengsih (2016) stated that the learning media in the form of videos was able to increase student interest in learning so that curiosity about the material being studied also increased. This is because the learning media in the form of videos is able to display material in the form of text, images and videos so that it can accommodate all student learning styles and all material in concrete form (Mu'minah, 2021). In addition, according to the results of research conducted by Asmoro & Mukti (2019)explained that the application of the video-assisted CTL model was able to increase students' curiosity at the second meeting by 87.5% which was categorized as very good. Meanwhile, the first meeting only obtained a percentage of curiosity results of 45% which was included in the fairly good category.

The increase in student activity from the three aspects above can occur because of the application of the CTL model which can encourage students to actively ask questions, foster learning curiosity, solve problems and discuss problems in a lesson (Asmoro & Mukti, 2019). This is in accordance with research conducted by Utami et al. (2018), it was found that the use of the CTL model in the form of videos was able to improve students' affective aspects which included students' interest in learning, actively asking questions, discussing and working together in solving problems, taking full responsibility for the solutions or findings provided, and being able to improve students' achievement who have exceeded the minimum completeness criteria average of 76.00.

Observation of Learning Implementation

The results of observing the implementation of the CTL model learning were obtained from filling out the observation sheet by the science teacher at SMPN 26 Surabaya which is given in Figure 3.

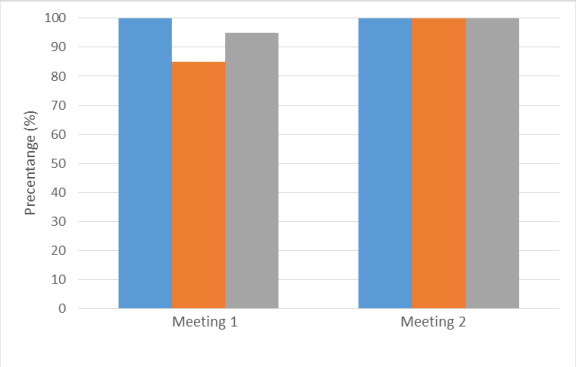

Figure 3. Diagram of the results of observing the implementation of learning

Figure 3 shows that the results of observing the implementation of learning using the CTL model consist of three stages, namely the preliminary, core and closing stages. The preliminary stage includes activities when the teacher checks the completeness of learning (readiness of learning tools and media), says greetings, prays before the lesson starts, checks student attendance, relates previous material and provides motivation.

The core stage includes teacher activities when reminding students' worksheet assignments, inviting group representatives to present the results of the practicum, explaining the photosynthesis sub-material, accompanying students to discuss student worksheets, distributing posttest questions, asking students to collect answers from posttest questions and accompanying practical activities. The closing stage includes the teacher's activities when evaluating the learning outcomes together, providing a response questionnaire regarding the implementation of learning, delivering learning materials that will be discussed at the next meeting and ending the learning with prayers and greetings.

In Figure 3, it can be seen that there is a difference between the first meeting and the second meeting in the core activities and closing activities. However, in general, the implementation of learning activities in the three stages is stated very well according to the criteria in Table 3. This shows that all learning activities run effectively in accordance with the lesson plans that have been validated by the two validators. Thus, the teacher's role is very important in realizing effective learning with interesting media and the right model (Indrastuti et al., 2017). As opinion Rahmawati & Amah (2018) from the results of his research stated that the learning outcomes of science subjects using the CTL model with media were able to increase very significantly.

Student learning outcomes

Student learning outcomes were obtained from filling in the pretest and posttest questions by class VII H students at SMPN 26 Surabaya. From filling in the questions, the percentage increase in learning outcomes through the N-Gain test will be obtained which is given in Figure 4.

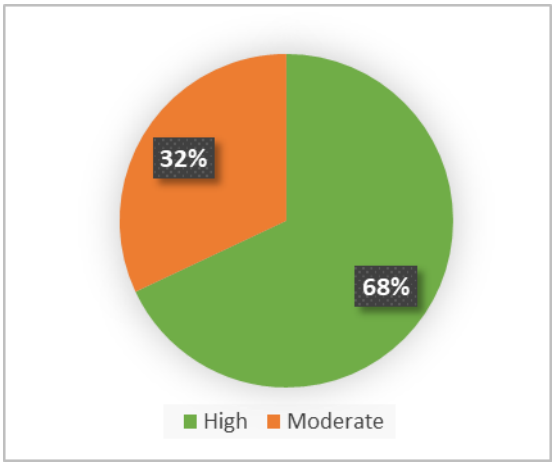

Figure 4. Diagram of the percentage increase in learning outcomes using the N-Gain test

Figure 4 shows that the learning outcomes of 15 students with a percentage of 68% are categorized as high. Meanwhile, the learning outcomes of 7 students were 32% categorized as moderate and there were no learning outcomes categorized as low. The difference between the high and medium categories is based on the results of observations during the learning process. At the first meeting, students still tend to not pay attention to the teacher's explanation seriously and are still reluctant to participate in activities both asking questions and expressing opinions. However, at the second meeting, students were more active in asking questions, expressing opinions, conducting discussions and collaboration in solving problems and actively asking questions during the presentation session.

The difference in the categories of learning outcomes above is due to internal factors such as student learning readiness, persistence and student activity in participating in learning activities (Alfiyana et al., 2018). This is in accordance with the opinion Permatasari et al. (2019) that the factors that greatly influence the learning outcomes obtained are internal factors which include psychological factors, psychological factors and fatigue factors (physical fatigue and spiritual fatigue).

The results of the detailed recapitulation of learning outcomes data are given in Table 5.

Table 5 shows that the increase in the N-Gain score was obtained by 0.76 which was categorized

as high according to the criteria in Table 4. The recapitulation results were obtained from the calculation of the questions tested before being given the application of the CTL model (pretest) and the questions tested after being given the application (posttest). As can be seen in Table 5, the average posttest score is higher than the average pretest score. Thus, the application of the CTL model through video on Energy in Living Systems has succeeded in improving student learning outcomes. This is in accordance with the opinion Rahman & Putra (2020) from his research activities that the learning outcomes of 27 students after applying the CTL model through video increased and only 5 students did not complete so that their classical learning completeness reached 84.37%. In addition, the results of teacher and student activities also increased in the third cycle by 69% and 81.81% in both categories.

Table 5. Recapitulation of student learning outcomes

Pretest Average	Posttest Average	N-Gain Score	Category
40.9	86.7	0.76	High

The increase in learning outcomes above is due to the implementation of the CTL model through videos according to the validated lesson plans. Considering the CTL model with the SETS approach is a learning concept that links the subject matter with real life (Gayatri et al., 2018). According to Rahmawati (2018), learning process activities that use the CTL model are carried out actively because students are required to be creative, critical, productive through discussion activities, presentations, working on student worksheets, able to relate learning material in everyday life and able to understand concepts contextually with fun learning situation and media. With the help of media, especially videos, it is able to make the application of the CTL model more leverage. One of the benefits of videos is that they are able to explain abstract material into reality with explanations in it using easy-to-understand language so that students are able to master the concepts that are taught well (Sarwinda et al., 2020).

Student learning outcomes can also be seen from the classical completeness scores given in Table 6.

Table 6. Recapitulation of classical learning completeness

Criteria	Total students	Classical Learning Completeness
Complete	22	100%
Not Complete	0	0%

Table 6 shows that the achievement of classical learning completeness for class VII H students at SMPN 26 Surabaya reaches 100% with a KKM of 70. This shows that all students have understood and mastered the concept very well. Thus, the CTL model with the SETS approach through video is said to be appropriate for learning about Energy in Living Systems. This is in accordance with the opinion of Hakim et al. (2021) from his research activities, that all 22 students were very enthusiastic in participating in learning activities after being given treatment in the form of using the SETS-based CTL model. Therefore, the posttest average score is 71.28 and the pretest average score is 64.98.

Student Response

The results of the responses were obtained from filling out questionnaires by students at the end of the learning activity using the CTL model through the video given in Table 7. The purpose of the response questionnaire was to find out students' interest and interest in learning using the CTL model.

Table 7. Student response record

No	Rated aspect	Total students		Percentage (%)	
		Yes	Not	Yes	Not
1	The science learning process became very interesting, not boring and student was more active during learning	21	1	95	5
2	It is easier for student to understand the material by conducting experiments	22	0	100	0
3	The science learning process can improve student's ability to make observations	19	3	86	14

4	The science learning process can improve student's ability to formulate problem formulations	18	4	82	18
5	The science learning process can improve student's ability to formulate hypotheses	19	2	86	9
6	The science learning process can improve student's ability to analyze data	19	3	86	14
7	The science learning process can improve student's ability to conclude data	19	3	86	14
8	Teachers can communicate well with students	22	0	100	0
9	The teacher gives students the freedom to ask questions and discuss	21	1	95	5
10	The teacher guides the practicum activities well	22	0	100	0
	Amount			916	79
	Average			91.6	7.9

Table 7 shows that the aspects that were assessed were 10 items, the average percentage of student responses who were interested in learning with the CTL model through video reached 91.6%. Based on the results of student responses obtained, it shows that all students are interested in all indicators which are stated to be very good. This interest can be seen especially from the results of filling out the questionnaire with the highest percentage found in aspects no 2, 8 and 10, namely when the teacher is able to explain the material through videos, and holding practical activities in which all instructions and various questions have been provided on the student worksheets and the role of the teacher who is able to guide students when practicum very well. This increases the enthusiasm of students in participating in learning activities. As opinion Suniana et al. (2016) that when there are more positive responses given by students, it shows that more and more students are interested and interested in the learning activities carried out. In addition, the positive response was also due to the teacher's role as a maximum facilitator and the interest and enthusiasm of students that emerged after the implementation of the right learning model (Ningtyas & Rosdiana, 2019).

CONCLUSION AND SUGGESTION

Conclusion

It is concluded that the CTL learning model using Energy in Living Systems video can improve students' achievement. The learning outcomes of 15 students reached a percentage of 68% which was categorized as high, while 7 other students with a percentage of 32% were categorized as moderate. The increase in the N-Gain score is obtained by 0, 76 who were categorized as high and the classical mastery of learning reached 100%. As for the responses of students who are interested in the application of the CTL model through video, the average percentage is 91.6%.

Suggestion

In further research, it is hoped that the researcher will be able to expand the scope such as indicators of motivation and interest as well as add aspects of the student activities being studied. In addition, researchers are also expected to be able to examine more topics so that the information regarding the research data obtained will be more complete.

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