JURNAL PENELITIAN PROGRESSIF
VOL 3 NO 2 | AGUSTUS 2024 | DOI: https://doi.org/10.61992/jpp.v3i2.170|E-ISSN: 2963-4369

THE EFFECT OF THE CONTEXTUAL TEACHING AND LEARNING APPROACH ON STUDENTS' PHYSICS LEARNING OUTCOMES STATE JUNIOR HIGH SCHOOL 2 KUTACANE

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Abstract

The Contextual Teaching And Learning approach is a learning concept that helps teachers relate the material taught to students' real-world situations and encourages the knowledge they have with its application in their daily lives. The main objective of this study was to obtain data on physics learning outcomes and to determine the effect of the Contextual Teaching And Learning approach on students' physics learning outcomes in class VIII semester II of SMP Negeri 2 Kutacane. This study was conducted in class VIII semester II of SMP Negeri 2 Kutacane on the subject of Sound. The population of this study was all 200 class VIII students, while the research sample was 40 people. In this study, the normality test of the scores of the student groups who received the Contextual Teaching And Learning approach each obtained a price of L_o = 0.1179 , while L = 0.190 and the Direct Instruction learning model (Direct Learning) L_o = 0.9871, L = 0.190 means that the two sample groups above come from a normally distributed population. For the F test, the F_{count} value = 4.28 and F table = 18.05 or $F_{count} < F_{table}$ means that both samples are homogeneous. From the calculation results, t_{count} = 5.47 and t_{table} = 1.68 means $t_{count} > t_{table}$, so the hypothesis is accepted. In other words, the data shows that the learning outcomes of students from the group that received teaching with the Contextual Teaching And Learning approach were better than the learning outcomes given Direct learning.

Keywords : CTL, physics learning outcomes, influence of CTL

INTRODUCTION

Natural Sciences (IPA) is the result of human activities in the form of knowledge, ideas and organized concepts about the surrounding environment, obtained from a series of scientific processes. The subject of physics studied in junior high school is part of the subject of science. Physics as one of the branches of science which is one of the sciences that studies parts of nature and the interactions within it and can be explained using simple concepts. In studying physics, it is not only memorizing the existing formulas, but also understanding the basic concepts. In reality, the problem faced today is the low ability of students in difficult subjects so that physics scores are always low compared to other subjects. From the results of initial observations at SMP Negeri 2 Kutacane, the following data were obtained: (1) Physics is a subject that is considered difficult by most students so that students are less interested in Physics subjects, this can be seen from the low average value of the previous daily test of the main material, which is 63.00. (2). The teaching system still tends to be traditional, namely by emphasizing memorization so that students tend to get bored more quickly and forget easily. (3). Students rarely practice in the laboratory due to time constraints, teaching materials, and inadequate facilities and infrastructure.

From several factors, it can be seen that the learning model has a very important role. A poor learning model will affect students' learning outcomes which are also not good. The poor learning model can occur, for example, because the teacher is not prepared and does not

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master the learning material so that the teacher presents it unclearly. As a result, students are lazy to learn. To achieve student learning outcomes, teachers have a very important role. According to Kunandar (2007: 54) Teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students in early childhood education, formal education, basic education, and secondary education. In a special sense, it can be said that in each teacher lies the responsibility to bring their students to improve learning outcomes. In this case, teachers are not merely teaching but also as educators and at the same time as mentors who provide direction and guide students in learning.

In this case, teachers must be able to choose a learning model that is appropriate to the subject matter. With the right learning model, students will be more motivated, more active in learning and students will gain better understanding, knowledge and comprehension so that learning activities become more successful which of course will provide a positive contribution to efforts to improve the quality of education. These problems cause less than optimal physics learning outcomes which result in the failure to achieve learning completion both classically and individually. To minimize and anticipate these problems, other learning strategies are needed that are more empowering for students and in accordance with the applicable curriculum, namely CTL. A strategy that encourages students to construct knowledge in their minds. The CTL approach is a learning concept that helps teachers link the material they teach with students' real-world situations and encourages the knowledge they have with its application in their lives as family members and society. The CTL approach has seven main components that must be applied in its learning, namely: building (Constructivism), asking (Questioning), finding (inquiry), learning community (Learning Community). Modeling, reflection, and authentic assessment (Riyanto, 2009 : 159).

With the concept of Contextual Teaching and Learning (CTL), learning outcomes are expected to be more meaningful for students. The learning process takes place naturally in the form of activities. Students work and experience, not a transfer of knowledge from teacher to student. Students need to understand the meaning of learning, what its benefits are, and how to achieve it. They realize that what they learn is useful for their future lives. With that, they position themselves as themselves who need provisions for their future lives. Based on the problems above, the author wants to conduct research on the effect of learning outcomes in physics on the subject of sound with the CTL (Contextual Teaching and Learning) approach on class VIII students of SMP Negeri 2 Kutacane in the 2023/2024 academic year . To see the effect of the CTL approach compared to direct learning.

LITERATURE REVIEW

According to various perspectives, learning can be defined in various ways. According to Dimyati (2009: 18), learning is a complex internal process. Involved in the internal process are all mental aspects that include cognitive, affective, and psychomotor domains. Walker in Riyanto (2002: 5), states that learning is a change in the implementation of tasks that occurs as a result of experience and has nothing to do with spiritual maturity, fatigue, motivation, changes in stimulus situations or other vague factors that are not directly related to learning. According to Mulyono (2012: 19), learning is a process of an individual who tries to achieve learning goals or what is commonly called learning outcomes, namely a form of relatively permanent behavioral change. According to Makmum (2013: 3), learning is an important activity that must be carried out by everyone to the maximum in order to master or obtain something. Based on these opinions, it can be concluded that learning is a change in a person (the formation of new associations) in the form of behavior, knowledge,

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understanding, skills and values-attitudes due to experience or interaction with the environment. Darsono (2000:30-31) states that the characteristics of learning include :

1. Learning is done consciously and has a goal as a direction for activities and as a measure of success.
2. Learning is an individual experience and cannot be represented by other people.
3. Learning is an interactive process between individuals and the environment, meaning that individuals must be active in using the various potentials they have to learn, for example attention, interest, thoughts, emotions, motivation, and so on.
4. Learning results in internal changes in the cognitive, affective and psychomotor aspects which are separate from each other in the person who is learning.

In student learning, teachers can use various learning methods, but it should be noted that affective learning begins with a student-centered learning environment, active students, and teachers as facilitators. The essence of learning is an activity that expects behavioral change in the individual who is learning. Behavioral change occurs because of the efforts of the individual concerned (Sanjaya, 2011: 326). According to the traditional opinion, learning is only considered as the addition and collection of a number of scientific knowledge. This opinion is too narrow and simple and only focuses on periodic subjects. Learning is not just about collecting knowledge, but learning emphasizes more on changes in the individual who is learning. This is as stated by Lester D. Crow et al. in Mulyasa (2005), that learning is an individual change in habits, knowledge, and attitudes. (Kunandar, 2007: 325)

Learning is a process of interaction between students and their environment so that behavioral changes occur towards the better. In learning, the teacher's main task is to condition the environment to support the behavior of students. (Kunandar 2007). Therefore, learning aims to help students gain various experiences and with that experience, students' behavior increases, both in quantity and quality. The behavior in question includes knowledge, skills, and values or norms that function as controllers of students' attitudes and behavior. (Riyanto, 2009: 131-134). Learning outcomes are a process to determine students' learning values through assessment activities or measuring learning outcomes. Learning outcomes can be in the form of knowledge, attitudes and skills that can be classified into cognitive, affective, and psychomotor aspects. The cognitive aspect includes thinking skills, including the ability to understand, memorize, apply, analyze, synthesize, and evaluate. The affective aspect includes behavioral traits such as feelings, interests, attitudes, emotions, and values. Psychomotor aspects include imitation, manipulation, prissification, articulation and naturalization (Damyati et al., 2009: 200-201).

Learning outcomes or learning achievements in the teaching and learning process depend on various factors as follows:

a) Internal factors (originating from the student themselves), include:
   1) Physical conditions
   2) Psychological factors, which include : intelligence, talent, interest, motivation and attention.

   External factors (originating from outside the student), include:
   3) Environmental factors, including: natural environment and social environment.
   4) Instrumental factors, namely factors whose existence and use are designed according to the expected results. These instrumental factors include: curriculum, facilities and infrastructure and teachers.

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Learning outcomes are also influenced by children's intelligence and initial mastery of the material to be learned. This means that teachers need to set learning objectives according to the child's intelligence capacity and the achievement of learning objectives needs to use apperception, namely the material that has been mastered by the child as a stepping stone to mastering new lessons. Learning outcomes are also influenced by the opportunities given to children. This means that teachers need to design and manage learning that allows children to freely explore the environment (Sudijono, 2003: 27-28). There are 5 types of learning outcomes, namely (Syaripuddin, 2005: 5)

1. Intellectual skills, or procedural knowledge that includes learning concepts, principles and problem solving acquired through the presentation of material in school.
2. Cognitive strategy, namely the ability to solve new problems by regulating each individual's internal processes in paying attention, learning, remembering and thinking.
3. Verbal Information, namely the ability to describe something in words by organizing relevant information.
4. Motor skills, namely the ability to carry out and coordinate movements related to muscles.
5. Attitude, namely the internal ability that influences a person's behavior based on emotions, beliefs and intellectual factors.

The principle of learning is the concepts or principles (basic rules) that must be applied in the teaching and learning process. This means that educators will be able to carry out their duties well (Riyanto, 2009: 62). To obtain good learning outcomes, it is necessary to understand the principles or principles of learning that can lead to efficient learning methods . According to Harmalik in (Damyati, 2009: 27), these learning principles include:

a. Learning is most effective when it is based on pure motivation (intrinsic motivation) and comes from within oneself.
b. Learning must be purposeful, directed and clear for students.
c. Learning requires guidance
d. Learning requires practice and repetition so that what has been learned can be mastered.
e. Learning must be accompanied by a strong desire and will to achieve results or goals.
f. Learning is considered successful if students are able to transfer or apply it to everyday life.

Contextual Approach (Contextual Teaching And Learning)

The CTL (Contextual Teaching And Learning) approach is a learning concept that helps teachers relate the material they teach to students' real-world situations and encourages the knowledge they have with its application in their daily lives (Riyanto, 2009: 163). The application of CTL in the classroom is quite easy, in general the steps are as follows:

a. Developing the idea that children will learn more meaningfully by working independently, discovering for themselves, and constructing their own new knowledge and skills.
b. Carry out as far as possible inquiry activities for all topics.
c. Develop students' curiosity by asking questions.
d. Creating a learning community (learning in groups).
e. Presenting models as examples of learning
f. Conduct reflection at the end of the meeting.
g. Conduct actual assessments in various ways .

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Contextual Approach (CTL) in Physics Learning

One of the learning approaches that is built on the principles and implementation efforts in real life is the Contextual Teaching and Learning (CTL) learning approach. Contextual learning is learning that tries to remind the subject contest with real-world situations and motivate students to connect the knowledge they have with everyday life Sanjaya (2006: 173). Authentic learning, namely learning that allows students to learn in the real context, namely everyday life inquiry-based learning , namely a learning strategy that is patterned on the scientific method, observations are made, problems are found, so that conclusions are obtained. Problem-based learning , namely learning that uses real-world problems as a context for students to think and practice problem-solving skills. Work-based learning, namely learning that allows students to use the workplace context for learning the content of the subject and vice versa. In contextual learning, conditions that activate students can be found by students themselves from their daily lives or created by teachers so as to help make the subject matter meaningful and motivate students. The syntax of contextual teaching and learning is:

Contextual Teaching And Learning Syntax			
No	**Teacher Activities**	**No**	**Student Activities**
1	Teachers direct students to work independently and construct their own knowledge and abilities.	1	Students work independently and construct their own knowledge and abilities.
2	Teachers motivate students to discover for themselves the knowledge and skills they will learn.	2	Students discover their own knowledge and skills
3	The teacher gives students the opportunity to ask questions about things that they do not understand in the learning process.	3	Students ask the teacher about things they don't understand in the lesson.
4	The teacher asks students to form study groups whose members are heterogeneous.	4	Students join together to form groups
5	Teachers present models as learning media	5	Students show examples that exist around the school environment
6	The teacher guides students to reflect on the learning that has been done.	6	Students make connections between lessons learned and their real lives.
7	Teachers assess students' learning outcomes to determine each student's learning outcomes.	7	Students work on questions

Direct Learning Model

Direct learning is a teacher-centered learning model. According to Arends in Trianto (2009:41), the direct learning model is a teaching approach that is specifically designed to support the student learning process related to declarative knowledge and structured procedural knowledge that is taught with a gradual, step-by-step activity pattern. The role of the teacher in question, namely Riyanto (2009: 281)

a. The teacher explains the competencies that students want to master and the learning objectives as well as information about learning exercises, the importance of lessons, and student preparation for learning.

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b. The teacher demonstrates knowledge/skills correctly, or presents information step by step.
c. The teacher plans and provides guidance for initial practice.
d. Check whether students have successfully completed the task, provide feedback.
e. Teachers prepare opportunities for further training, with special attention to application to more complex situations and everyday life.

Advantages and Weaknesses of the Direct Learning Model

Direct teaching according to Kardi in Trianto (2009: 43), can be in the form of lectures, demonstrations, training or practice, and group work. Direct pursuit is used to convey learning that is delivered directly by the teacher to students. According to Sanjaya (2007: 187) there are three weaknesses of the learning model, namely only for good listening and listening skills, cannot serve differences in student abilities, only emphasizes one-way communication.

The syntax of the direct learning model is presented in 5 stages, such as:

Phase	The Role of Teachers
Phase 1 Conveying objectives and preparing students	The teacher explains the material, prepares students to learn.
Phase 2 Demonstrate knowledge and skills	The teacher demonstrates the skill correctly, or presents information step by step.
Phase 3 Guiding training	Teachers plan and provide initial training guidance
Phase 4 Checking understanding and providing feedback	Checking whether students have successfully completed the task.
Phase 5 Providing opportunities for further training and application	Teachers prepare opportunities for further training.

RESEARCH METHODS

This research is an experimental research, namely to determine whether or not there is an influence of the CTL approach with a direct learning model. The research design used is a design that uses a post-test. This quantitative data is useful for finding student learning outcomes in the form of numbers, namely student learning outcome tests. This can be described as in Figure 1 below:

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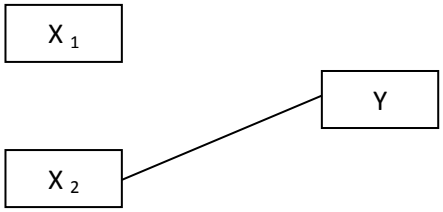

Information :
X_1 = Contextual Teaching and Learning (CTL)
X_2 = Direct Learning (Direct Instruction)
Y = Student learning outcomes on the subject of geometric optics

Population and Sample

The population in this study were all students of class VIII of SMP Negeri 2 Kutacane consisting of five classes totaling 200 people in the 2023/2024 academic year . The sample in this study consisted of two classes determined by simple random sampling, namely randomly taken from five classes, one for the CTL learning class and the other for direct learning.

Variables and Indicators

The variables in this study consist of two types, namely independent variables and dependent variables:

a. The independent variable ($X1_{\ )}$ in this study is learning that uses the Contextual Teaching and Learning (CTL) approach.
b. The independent variable (X_2) is the direct learning model
c. The dependent variable (Y) is the result of learning physics on sound material

Indicators are descriptions of conditions that indicate to explain variables. In this case, indicators help provide a description of variables so that the collected data is information about the variables, so in this study the indicators are:

a. The independent variable indicator ($X1_{\ )}$ is the RPP which uses the CTL approach.
b. The independent variable indicator ($X2_{\ )}$ is the RPP which uses a direct learning model.
c. The variable indicator (Y) is the physics learning outcome test score.

Research Instruments

To collect data on student learning outcomes on the subject of sound, a test is used. The test used is in the form of multiple choice consisting of 30 items with 4 options. Each student has the same value , namely one if they answer correctly and zero if they answer incorrectly, so the maximum value obtained is 30.

Table I Learning Outcome Test Grid

No	Test indicators	Cognitive Domain						Amount
		C1	C2	C3	C4	C5	C6	
1.	Define The concept of sound	1.2						2
2.	Distinguishing the speed of		3,		23,			4

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	sound and vibration		13		8			
3.	Give examples of sounds in everyday life			7, 29		20.28		4
4.	Analyze types of sounds		11, 14			4.9		4
5.	Determining the speed of sound				5, 25		21.27	4
6.	Compare between tone and sound		17.18				30.24	4
7.	Determine the wavelength of sound	15,16		6, 22		19, 10		6
8.	Formulating the concept of sound						12, 26	2
Amount		4	6	4	4	6	6	30

Information :

C1: Knowledge C4 :Analysis
C2: Understanding C5: Evaluating
C3: Application C6: Creating

Test Validity Test

Test validity is the degree to which a test is able to measure what is intended to be measured. The formula used to test the validity of test instrument items is the *Product Moment* correlation formula (Arikunto, 2005:72) as follows:

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{(N\sum X^2) - (\sum X)^2\}\{(N\sum Y^2) - (\sum Y)^2\}}}$$ (Arikunto , 2005 : 213)

Where :

r_{xy} : Correlation coefficient between score and total score
X : Item score
Y : Total score
N : Lots of questions

Table II VALIDITY CORRELATION COEFFICIENT

No	Criteria	Number
1	Very Low	0.00 – 0.20
2	Low	0.21 – 0.40
3	Enough	0.41 – 0.60
4	Tall	0.61 – 0.80
5	Very high	0.81 – 1.00

From the trial results, valid and invalid questions were obtained. The calculations can be seen in Appendix 5.

Test Reliability Test

To determine the reliability of the test, the KR 20 formula is used, namely:

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$r_{11} = \left(\frac{k}{k-1}\right)\left(\frac{Vt-\Sigma pq}{Vt}\right)$ (Arikunto 2005 : 231)

Where :

r $_{11}$: Instrument reliability

k : Many questions

Vt : Total variance

p : the proportion of subjects who answered correctly on an item

q :$1 - p$

To interpret a reliability coefficient, the following provisions are used:

Table III Reliability Coefficient

No	Criteria	Number
1	Low	0.00 – 0.40
2	Currently	0.41 – 0.70
3	Tall	0.71 – 0.90
4	Very high	0.91 – 1.00

From the calculation results, the reliability is 0.70. So the question falls into the High criteria. The calculation can be seen in Appendix 7.

Data collection technique

To obtain data on student learning outcomes, researchers use tests. Before the test/evaluation is carried out, all sample students, namely students of class VIII of SMP Negeri 2 Kutacane who are present at the implementation, are given an explanation first. After the students in the room are orderly, the researcher immediately distributes the test in the form of questions that have been prepared, then the researcher directly supervises the implementation of the test assisted by the subject teacher so that the validity of the test results is well maintained. After the specified test time ends, the question sheets are collected, corrected and then scored or assessed and the values or scores are entered in the table list.

Data Analysis Techniques

Normality Test

The normality test is used to see whether there are samples taken from each group of a normally distributed population or not.

Sudjana's steps (2005: 466) are as follows:

a. This observation dataX_1 ,X_2 ,X_3 ,..... X_n , made into standard numbersZ_1 ,Z_2 , Z_3 ....Z_n by using the formula: $Z_i = \frac{xi-\overline{Z_1}}{s}$

   Where : $\bar{x}$ = average

   s = standard deviation

b. For each standard number using the standard normal distribution list, then calculate the probability F(Z_i) = P (Z≤ Z_i)

c. Next , the proportion is calculatedZ_1 ,Z_2 ,Z_3 , ...Z_n which is less than or equal toZ_i, if the proportionZ_1 ,Z_2 ,Z_3 , ...Z_n which is less than or equal toZ_i if this proportion is expressed by S(Z_i) so,

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$S\ (Z_i) = \frac{Z_1, Z_2, Z_3, \ldots Z_n\ yang \leq Z_i}{n}$

d. Calculate the difference $F(Z_i) - S\ (Z_i)$ then determine the absolute price
e. Take the largest price among the absolute prices of the difference. Call this the largest price.L_O. Then compareL_O with the critical value L taken from the list of critical values. If the priceL_O < L table then the sample is normally distributed. IfL_O > L table then the sample is not normally distributed.

Homogeneity Test

Homogeneity test to determine whether the two groups of research data are homogeneous, tested using the F statistical test , namely:

$$F = \frac{Varians\ Terbesar}{Varians\ Terkecil}$$ Usman, (2006 : 113)

The test criteria are, both groups have the same variance (homogeneous), if F <$F_{(1-\alpha)(n-1)}$ where is the price$F_{(1-\alpha)(n-1)}$ obtained from the F distribution list with probability 1– α and degrees of freedom dk = n-1 and significance level α = 0.05 .

Hypothesis Testing

To find out whether there is an influence on students' physics learning outcomes, a one-sided "t" test is carried out using the formula:

$t_{hitung} = \frac{\bar{X}_1 - \bar{X}_2}{S_{gab}\sqrt{\frac{1}{n_1} - \frac{1}{n_2}}}$ (Sudjana, 2005: 239)

Where :

$\bar{X}_1$ = Average CTL value
$\bar{X}_2$ = Average direct learning value
S_{gab}= Combined standard deviation
n_1 = number of CTL samples
n_2 = Number of direct learning samples

With the combined standard deviation is:

$s^2 = \frac{(n_1-1)\ s^2{}_1 + (n_2-1)s^2{}_2}{n_1+n_2-2}$ (Sudjana, 2005: 239)

The test criteria are as follows: if -$t_{tabel} \leq t_{hitung} \leq +t_{hitung}$, then the hypothesis is accepted.

Ha : $\bar{x}_1 > \bar{x}_2$: There is a significant influence of the CTL approach on the learning outcomes of students at SMP Negeri 2 Kutacane.

Hey : $\bar{x}_1 = \bar{x}_2$: There is no significant influence on the learning outcomes of students at SMP Negeri 2 Kutacane.

RESEARCH RESULTS AND DISCUSSION

The data of this study were analyzed descriptively and inferentially. Descriptive analysis of the calculation of the average and standard deviation , while inferential analysis includes the calculation of normality, homogeneity and testing of research hypotheses. The final test of the teaching results of the material on the subject of Sound in the classroom$VIII_1$ namely the Contextual Teaching and Learning approach class, while in the class$VIII_2$ namely the Direct Instruction class (Direct Learning). The analysis data are:

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Contextual Teaching and Learning Class

a. Range (R) = Largest data - smallest data
= 20 – 9
= 11

b. Number of classes (b) = 1 + 3.3 log n
= 1 + 3 ,3 log 20
= 1 + 3 ,3 (1,30)
= 1 + 4 ,29
= 5 ,29 ≈ 6

Class length (P) = $\frac{R}{b} = \frac{11}{5,29} = 2.07 \approx 2$

So, the length of the interval class is rounded to: 2

Table IV Frequency Distribution of Learning Outcome Scores of Student Groups Who Received Instruction Using the CTL Learning Approach

No	Interval Class	X_i	f_i	X_i^2	$f_i X_i$	$f_i X_i^2$
1.	9-10	9.5	4	90.25	38	361
2.	11-12	11.5	3	132.25	34.5	396.75
3.	13-14	13.5	3	182.25	40.5	546.75
4.	15-16	15.5	3	240.25	46.5	720.75
5.	17-18	17.5	4	306.25	70	1225
6.	19-20	19.5	3	380.25	58.5	1140.75
Σ		—	20	—	288	4391

- The average calculation of learning outcomes for the subject of sounds using the Contextual Teaching and Learning (CTL) approach is:

$$\bar{X} = \frac{\Sigma f_i X_i}{\Sigma f_i}$$
$$= \frac{288}{20}$$
$$= 14 ,4$$

- Standard deviation

$$S_1^2 = \frac{n\Sigma f_i X_i - (\Sigma f_i X_i)^2}{n(n-i)}$$
$$= \frac{20(4391) - (\Sigma f_i X_i)^2}{20(20-1)}$$
$$= \frac{87820 - 82944}{380}$$
$$= \frac{4876}{380} = \sqrt{12,8315}$$
$$S_1^2 = 3.5821$$

Derect Instruction Class (Direct Learning)

a. Range (R) = Largest data – smallest data
= 15 – 5 = 10

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b. Number of classes (b) = 1 + 3.3 log n
= 1 + 3 ,3 log 20
= 1 + 3 ,3 (1,30)
= 1 + 4 ,29
= 5 ,29

c. Class length (p) $= \frac{R}{b}$
$= \frac{10}{5,29}$
= 1 ,89 ≈ 2

So, the length of the interval class is rounded to 2.

Table V Frequency Distribution of Learning Outcome Scores of Student Groups Who Received Instruction Through Direct Learning

No	Interval Class	X_i	f_i	$f_i X_i$	X_i^2	$f_i X_i^2$
1.	5-6	5.5	5	30.25	27.5	151.25
2.	7-8	7.5	6	56.25	45	337.5
3.	9-10	9.5	4	90.25	38	361
4.	11-12	11.5	2	132.25	23	264.5
5.	13-14	13.5	2	182.25	27	364.5
6.	15-16	15.5	1	240.25	15.5	240.5
Σ		—	20	—	176	1719

- The average calculation of learning outcomes for the subject of sound using Direct Instruction learning is:

$$\bar{X} = \frac{\Sigma f_i X_i}{\Sigma f_i} = \frac{176}{20} = 8,8$$

- Standard deviation:

$$S_2^2 = \frac{n\Sigma f_i X_i^2 - (\Sigma f_i X_i)^2}{n(n-1)}$$
$$= \frac{20(1719) - (176)^2}{20(20-1)} = \frac{34380 - 30976}{380}$$
$$= \frac{3404}{380} = \sqrt{8,9578}$$
S2 = 2.9929

To calculate the combined standard deviation of the group of students who received instruction using the Contextual Teaching and Learning (CTL) and Direct Instruction (direct learning) approaches, the following formula is used:

$$S_{gab} = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}} = \sqrt{\frac{(20-1)12,831 + (20-1)8,9575}{20+20-2}}$$
$$= \sqrt{\frac{19(12,8315) + 19\,(8,9575)}{38}} = \sqrt{\frac{243,865 + 170,1925}{38}}$$
$$= \sqrt{\frac{414,0575}{38}} = \sqrt{10,89626}$$
S_{gab} = 3.3009

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Normality Test

To test the normality of the student group taught using the Contextual Teaching and Learning (CTL) approach, the calculation can be seen below, and then it can be seen in Table VI.

$$Z_i = \frac{X_i - \bar{X}}{S}$$
$$= \frac{9{,}5 - 14{,}4}{3{,}5821} = -1{,}36$$
$$F(Z_i) = Z_i - 0{,}5$$
$$= 0.4131 - 0.5$$
$$= -0{.}0869$$
$$S(Z_i) = \frac{fk}{n}$$
$$= \frac{2}{20} = 0{,}1$$

Table VI Helper Table for Normality Test of Students Who Received Teaching with Contextual Teaching and Learning

No.	X_i	f_i	f_{cum}	Z_i	$f(Z_i)$	$S(Z_i)$	$\lvert f(Z_i)-S(Z_i)\rvert$
1.	9.5	4	2	− 1.36	0.0869	0.1	0.0131
2.	11.5	3	6	− 0.80	0.2119	0.3	0.0881
3.	13.5	3	8	− 0.25	0.4013	0.4	0.013
4.	15.5	3	10	0.30	0.3821	0.5	**0.1179**
5.	17.5	4	14	0.86	0.194	0.7	0.506
6.	19.5	3	20	1.42	0.0778	1	0.922

The largest price among the absolute prices in the table above is L_O means in the table L_O = 0.1179 , while the critical value of L for the Liliefors test for n = 20 and the level of significance α = 0.05 is 0.190. Therefore L> L_O price α = 0.05 then the sample comes from a normally distributed population. To find out the normality test for students in the Direct Instruction learning group (direct learning) can be seen in the calculation below, for the next number can be seen from table VII.

$$Z_i = \frac{X_i - \bar{X}}{S}$$
$$= \frac{5{,}5 - 8{,}8}{2{,}9929} = -1.10$$
$$F(Z_i) = Z_i - 0{,}5$$
$$= 0{.}3643 - 0.5 = -0.1357$$
$$S(Z_i) = \frac{fk}{n} = \frac{5}{20} = 0.25$$

Table VII Helper Table for Normality Test of Students Who Receive Instruction with Direct Learning

No.	X_i	f_i	f_{cum}	Z_i	$f(Z_i)$	$S(Z_i)$	$\lvert f(Z_i)-S(Z_i)\rvert$
1.	5.5	5	5	− 1.10	− 0.357	0.25	0.107
2.	7.5	6	11	− 0.43	− 0.3336	0.55	0.2164

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3.	9.5	4	15	0.23	− 0.409	0.75	0.341
4.	11.5	2	17	0.90	− 0.1841	0.85	0.6659
5.	13.5	2	19	1.57	− 0.0582	0.95	0.8918
6.	15.5	1	20	2.23	− 0.0129	1	**0.9871**

The largest price among the absolute difference prices in the table above is $L_o = 0{,}9871$. This means that in the table above n = 20 with a real level. α = 0.05 is 0.190. Therefore $L_o < L$ For α = 0.05 , then the sample comes from a normally distributed population.

Homogeneity Test

To find out whether the two groups of research data are homogeneous, they are tested using the F statistical test , namely:

$F_{count} = \frac{Varians\ terbesar}{Varians\ terkecil} = \frac{12{,}8315}{2{,}9929}$

$= 4{,}28$

$F_{table} = F_{1/2}\ \alpha$ (dk Largest variance -1; dk smallest variance -1)

$= F_{1/2}\ 0{,}10\ (20\text{-}1\ ;\ 20\text{-}1)$

$= F\ 0.05\ (19\ ;\ 19) = 18.05$

So, the $_{calculated}$ F value is 4.28 , while the F_{table} value is 18.05. If the $_{calculated}$ $F \leq F_{table}$ then Ho is accepted (homogeneous). $4.28 \leq 18.05$, So Ho is accepted (Homogeneous).

Hypothesis Testing

After it is known that both learning models are normally distributed and have the same variance (homogeneous), thus the hypothesis testing is carried out by testing the difference and average. Before the test is carried out, the combined standard deviation is first sought, namely:

$$S^2 = \frac{(n_1-1)S_1^2+(n_2-1)S_1^2}{n_1+n_2-2}$$

$$= \frac{(20-1)12{,}8315+(20-1)8{,}9578}{20+20-2}$$

$$= \frac{243{,}79+170{,}19}{38}$$

$$S^2 = \frac{413{,}79}{38} = 10{.}89$$

$$= \sqrt{10{,}89}$$

$$S = 3.3$$

So the test of two average differences between the learning outcomes of students using the Contextual Teaching and Learning (CTL) and Direct Instruction (Direct Instruction) approaches on the subject of sound uses the following t-test formula:

$$t = \frac{\bar{X}_1-\bar{X}_2}{S\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} = \frac{14{,}4-8{,}8}{3{,}3\sqrt{\frac{1}{20}+\frac{1}{20}}}$$

$$= \frac{5{,}6}{3{,}3\sqrt{0{,}05+0{,}05}} = \frac{5{,}6}{3{,}3\sqrt{0{,}1}}$$

$$t = \frac{5{,}6}{3{,}3\ x\ 0{,}31} = \frac{5{,}6}{1{,}023} = 5.47$$

$t_{count} = 5.47$

In accordance with the rules for using the t test, it can be formulated as follows: Accept the hypothesis if the $_{calculated}$ $t > t_{table}$ where t (1-α) is obtained from the t distribution list with

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dk = (n $_1$ + n $_2$ – 2). Note dk = (n $_1$ + n $_2$ – 2) at the real levelα = 0.05 because the value is not listed in the table, it will then be found by using the t-list for a significance level of 38 with degrees of freedom of 38 with the following interpolation:

Df : 40 in the t distribution table is = 1 .68
Df : 30 in the t distribution table is = 1 .70
Df : 38 =……..??
(40 − 38) : (30 − 38) = (x − 1.68) : (1.68 – 1.70)
$\frac{2}{-10} : \frac{x-1,68}{-0,02}$
−10x + (−1 .68) = −0.04
−10x = −16.8 + (−0.04)
−10x = −16 .84
x = $\frac{-16,84}{-10}$ = t $_{table}$ = 1 .68
So, where t count 5.47 $_>$ t table $_{1.68}$ then the hypothesis is accepted.

DISCUSSION

Research result

From the results of data processing and data analysis that the author has carried out, the following findings were obtained :

- Average valueX_1 those given CTL approach learning had an average of 14.4 and a standard saving of 3.5821.
- Average valueX_2 those given Direct Instruction learning had an average of 8.8 and a standard deviation of 2.9929.
- The results of the combined t-test show$t_{hitung} = 5,47 > t_{tabel} = 1,68$. So there is a significant difference between the learning outcomes of students who use the CTL and Direct Instruction learning approaches.

Discussion

This study starts from the question of whether there is a significant influence between the learning outcomes of students taught with the Contextual Teaching and Learning (CTL) approach and the learning outcomes of students taught with Direct Instruction (Direct Learning) on the subject of sound in class VII of SMP Negeri 2 Kutacane in the 2023/2024 Academic Year . To answer the question above, it can be seen from the findings in this study that the learning outcomes of students taught with the CTL approach are better than the learning outcomes of students taught with direct learning. This can also happen because student learning outcomes are not only influenced by the teacher's teaching method but are influenced by other factors outside this study, both from the students themselves (internal factors) which include motivation, attitude, intelligence, and from outside the students (external factors) which include the student's learning environment or social, facilities and infrastructure, economic status, and family. Of course, all of that can affect what students get.

According to Bahri (2006: 180) in Dimyati, "if the teacher in the learning process does not use variations, it will bore students, students' attention will decrease, they will be sleepy as a result the learning objectives will not be achieved". In other words, the CTL approach learning model will generate and increase students' attention, curiosity, and the teaching and learning aspects will be higher. The reasons that can be given about the influence of the Contextual Teaching and Learning (CTL) approach learning can provide good results are:

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1. Experimental activities carried out involve students actively involved in the learning process.
2. Experimental activities make students think critically and become fully involved in ensuring an effective learning process.
3. Experimental activities stimulate students' curiosity to prove the laws of physics through experiments.

However, in addition to the advantages, findings in field observations indicate that there are obstacles to the implementation of this learning, including : The implementation of this learning takes a lot of time while the time allocation is very limited, and the limited experimental equipment used. Based on the results of the study, the learning outcomes of students taught with the CTL approach are better than the learning outcomes of students taught with Direct Learning on the subject of sound. So it can be concluded that there is a significant influence of the CTL learning model on the learning outcomes of class VII students of SMP Negeri 2 Kutacane in the 2023/2024 Academic Year .

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