
Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Materials

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ABSTRACT

KEYWORDS:

*Leaflet,
Indigenous Knowledge,
Learning Outcomes,
Global Warming.*

This study aims to examine the Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Material. This study used a quasi-experimental method with a Nonequivalent control group design. This study used classes XA, XD, XE and XF, each class consisting of 36 students. In the class there is a selection of criteria, for class XA with high class criteria, class XD with medium class criteria, class XE with low class criteria, and class XF as a control class (Biology Teacher document). The research instrument is in the form of cognitive, affective, and psychomotor results. Data analysis of learning outcomes using one way anova test with normality test and homogeneity test. The results of the calculation of learning outcomes with one way anova test obtained a significance value (2-tailed) of $(0.000) < (0.050)$ then the null hypothesis (H_0) is rejected. And then the further test obtained a significance probability value of $(0.917) > (0.050)$, therefore (H_0) is accepted. This means that the treatment has an effect on student learning outcomes and the results of further tests have no effect on the learning outcomes of experimental classes (high, medium, and low clas)

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1. INTRODUCTION

Biology learning is part of natural science, where biology is basically not a difficult science to learn, learning biology means learning about yourself and the environment (Harefa et al. 2022). The important task of learning biology is to develop the ability to think creatively, critically and innovatively, so that students are able to face the increasing development of science and technology in this era (Setiawan 2019). When studying biology, problems that arise during learning include the ability to identify problems by asking the teacher, students find it difficult to express their opinions. In addition, it is difficult for students to actively participate in learning due to poor classroom conditions. For example, students pay less attention to learning through conversation, so that the teacher's teaching strategy does not get feedback from (Hariyatmi et al. 2020). Students are not able to develop their thinking skills, instead students memorize information or memorize material and collect various information that can be remembered. Therefore, students are unable to connect what has been learned (Gita Lestari et al. 2020). Therefore, the application of models in biology learning can be the right choice to develop students' thinking skills, and it is good to learn biology with the help of learning models so that it helps deliver learning well (Agnesa and Rahmadana 2022).

Learning models can be called plans or models that can be used to plan, design materials and guide learning in the classroom or elsewhere. The learning model can be used as a selection model, meaning that teachers can choose the right and effective learning model to achieve their educational goals (Mirdad, 2020). Therefore, there are different learning models, namely constructivism model, inquiry-based learning model, problem solving model, problem-based learning model, cooperative learning model, project-based learning model, case-based learning

model, flipped classroom model. Master learning model, simulation-based model and gamification-based model. The success of teachers in implementing learning is supported by several things, namely the teacher's ability to manage and implement learning models that are in accordance with the characteristics of the material (Fakhrizal and Hasanah 2021).

The problem-solving learning model (PS) is a learning approach that presents a problem as a context in which students can learn critical thinking and problem-solving skills as well as obtain important information and concepts from the learning material. Problem solving is the study of solving real-world problems in a scientific, rational, and systematic way (Ahmad 2023). In problem solving the process mainly lies within the learner which can be seen as a process where the learner finds a combination of rules that he has learned first which he uses to solve new problems (Suhadah 2023). Problem solving learning aims to foster students' abilities by using the widest possible thinking to the maximum of their capacity. To train students' thinking skills, students will generally use the principles of rational thinking as a reference to gain understanding in answering questions and problems (Diva and Purwaningrum 2023). For this reason, this learning model was chosen as one of the solutions to develop students' problem solving skills by using learning media (Zendrato et al. 2022).

Learning media is useful to support learning activities so that it makes the learning environment more lively, innovative and creates a learning spirit in students. Even the material presented is clear and easy for students to understand so that in the end it improves learning outcomes (Rosanaya and Fitrayati 2021). Leaflets are printed or graphic media that can be used as learning materials, information sources such as pages that are equipped with images to generate more interest in readers than seeing them (Wahyuni et al. 2022). Leaflets as teaching aids can make it easier for teachers to convey subject matter to students. Magazines have advantages and disadvantages. The advantage is being able to visualize messages, information and concepts and present images that make it easier for students to explain the material. The disadvantages are that making brochures requires language and illustration skills, the process of making magazines is quite long and easy to tear (Yusandika et al. 2018).

Biology learning leaflets can be used as an alternative to interesting learning materials so that students are not bored, and have a positive effect on student learning outcomes, and the content is a summary of the subject matter (Sari et al. 2021). The leaflet contains a summary of educational material collected from various learning sources, both books and the internet, which is compiled into a leaflet (Darsad 2020). The nature of biological material usually involves understanding various aspects of life, including the structure and function of organisms, ecosystems, genetics, evolution, and more. Biology course materials may include concepts such as cells, metabolism, reproduction, adaptation, and interactions between organisms. In addition, biology teaching materials often include a scientific approach, the use of research methods and an understanding of environmental impacts (Puspitasari and Purbosari 2021).

Current biology teaching materials that include indigenous knowledge include environmental protection. Teachers can use the context of local wisdom in teaching materials to make it easier for students to acquire their knowledge (Ilhami et al. 2021). Local wisdom or indigenous knowledge (IK) is local local knowledge owned by a certain community or culture, which is formed over a long period of time as a result of processes and mutual relationships between the community and its environment, and becomes a cultural norm. then expressed in the form of mythology, rituals, art and other livelihood activities of indigenous peoples (Priyambodo et al. 2023). Therefore, biology teaching materials now have provisions to integrate local wisdom in the classroom, especially in biology subjects, and require teachers to identify local wisdom in their area that can be used for learning (Muchsin et al., 2023).

The application of local wisdom in biology education to support value conservation and natural resource conservation through school biology education in the form of *mantenan*. Through the creative hands of biology teachers, local wisdom integrated in student learning can make children literate, ie. students not only understand biology material, but use their knowledge and

skills to solve everyday life problems that come from local wisdom (Alimah 2019). To realize local wisdom material, knowledge related to biodiversity, ecosystems and global warming dominates the Sasaki tribe on Lombok Island (Muchsin et al., 2023). And for the implementation of the learning environment itself, there is a local wisdom-based brochure, where this media is compiled based on the needs of teachers and students regarding plant learning materials (Melati et al. 2020).

The learning material chosen in this study is solutions to overcome global warming. The selection of this material is very important to be understood and applied by students because it is closely related to environmental problems that can cause many causes and impacts of global warming. the surrounding environment (Wahdaniyah et al. 2024). The global warming solution material is material that contains problems related to the students' environment (local wisdom) is believed to be able to build science concepts and will apply them in problem solving to reduce the effects of global warming so that it will also have an impact on students' learning outcomes (Putra et al. 2023). From the previous statement, it can be concluded that if learning uses a model such as problem solving, learning media such as brochures should also be used so that students can get more information, are interested in learning, increase activity and improve student learning outcomes (Panjaitan et al., 2021). However, in reality, there are still many teachers who only explain the material without any intermediary in delivering the material in the form of educational media, so that students do not understand the teaching given by the teacher (Abdullah, 2017).

According to the results of observations of biology teachers at Sman 1 Gondang, they have not implemented problem solving learning aided by leaflets containing indigenous knowledge. In sman 1 gondang itself, the learning media still often uses power point with a lecture delivery method conducted by the teacher. Therefore, based on the description above, a study will be conducted entitled implementation of indigenous knowledge-laden leaflets on student learning outcomes on global warming materials. Which aims at Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Materials.

2. MATERIALS AND METHODS

2.1. Types and Research Design

The research design used in this study was non-equivalent control group (Hotman et al. 2018). In this design, the experimental and control groups were not randomly selected because the selection was determined by the teachers of SMAN 1 Gondang itself. this study involved 4 classes, namely for the experimental class had 3 classes and for the control only 1 class.

Table 1. Nonequivalent control group

Class	Pretest	Treatment	Posttest
High ability class	O ₁ Pretest	P ₁ Leaflet	O ₅ Posttest
Medium ability class	O ₂ Pretest	P ₂ Leaflet	O ₆ Posttest
Low ability class	O ₃ Pretest	P ₃ Leaflet	O ₇ Posttest
Control	O ₄ Pretest	P ₄ Non Leaflet	O ₈ Posttest

Note:

O₁ : Pretest for experimental groups that have not been given treatment

P₁ : Leaflet-assisted PS model that contains IK

O₅ : Pretest for the control group that has not been given treatment

O₂ : Posttest for the experimental group that has been given treatment

P₂ : Leaflet-assisted PS model that contains IK

O₆ : Posttest for the experimental group that has been given treatment

O₃ : Pretest for experimental groups that have not been given treatment

P₃ : Leaflet-assisted PS model that contains IK

O₇ : Pretest for the control group that has not been given treatment

O₄ : Pretest for the experimental group that has not been given treatment

P₄ : Giving the PS model without the help of leaflets containing IK

O₈ : Pretest for the control group that has not been given treatment

2.2. Population, sample, and research sampling

In this study, the population was all students in class X SMA N 1 Gondang even semester of the 2023/2024 academic year consisting of 10 classes, each class consisting of 36 students. The samples used in this study were students in classes XA, XD, XE and XF, each class consisting of 36 students. In the class there is a selection of criteria, for class XA with high class criteria, class XD with medium class criteria, class XE with low class criteria, and class XF as a control class (Biology Teacher document). In this study, purposive sampling was used because it can select samples that are specifically relevant in the population and can provide deep insights related to the objectives of the study.

Table 2. Data and Data source

Data	Source	Method	Instrument
Cognitive outcomes	Class student X	Pre-test dan post-test	Cognitive outcome measurement sheet through multiple choice questions
Affective outcomes	Class student X	Observation	Affective outcome measurement sheet
Psychomotor outcomes	Class student X	Presentasi report	result Presentation

2.3. Research Procedures

The research begins with observations of the school location regarding the number of students, the learning schedule (to determine the learning material taught in this study). then Determination of the class to be used by discussing the class X biology teacher. After that, the preparation of the global warming teaching module and its devices (global warming teaching materials, learning media in the form of leaflets containing Indigenous knowledge, cognitive assessment instruments (pretest-postest), Affective (attitude), Psychomotor (skills) Problem Solving learning and consulted to the supervisor, learning scenarios in accordance with the Problem Solving learning model. The implementation of learning begins with teaching in the classroom using teaching media in the form of leaflets containing Indigenous Knowledge in experimental classes and conventionally in control classes and conducting pretests. Then deliver the material to be taught to experimental and control class students. After finishing delivering the material, students can immediately discuss in groups and make LKPD assignments that are presented. Furthermore, experimental and control class students take a post test. then close the learning activities and collect the data that has been obtained. The next stage is to analyze the data with data analysis techniques for learning outcomes in this study using a prerequisite test consisting of normality test and homogeneity test, then hypothesis testing using One Way Anova and then further tests are carried out, namely LCD (Least Significant Different).

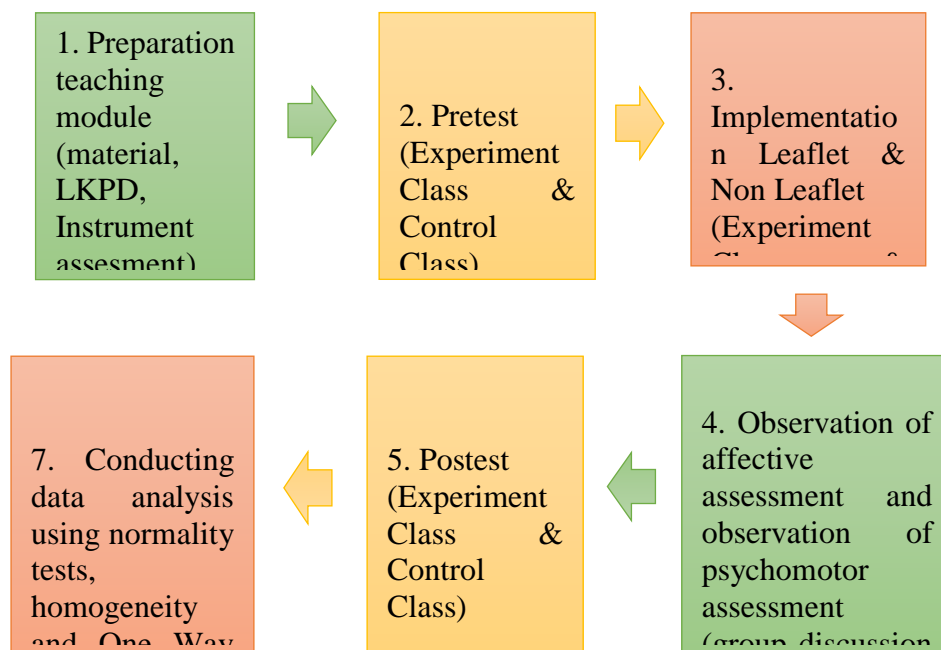


Fig. 1 Research Procedures.

3. RESULTS AND DISCUSSION

3.1. Result

This study is to examine the implementation of PS assisted by leaflets containing Indigenous Knowledge on the learning outcomes of Class X even semester students of SMA N 1 Gondang TA 2023/2024, on the material of solutions to overcome global warming. This research is an experimental research using leaflets and control without using leaflets. For the experiment, 3 classes were used with the criteria of good class XE, medium class XA, weak class XD, and for the control class XF (Biology Teacher document).

Based on table 3 above, it can be seen that the average value on the pretest and posttest cognitive assessment that gets the biggest value is class XD (low ability) with a pretest of (73.6) and a posttest of (81.4). Meanwhile, for the pretest and posttest cognitive assessment, the smallest score was in class XF (control) with a pretest of (62.3) and a posttest of (72.12). In the affective assessment, the largest get an average value in class XF (control) of (86) and the smallest assessment gets an average value in class XD (low ability) of (79.7). And in the psychomotor assessment, the largest get an average value in class XE (high ability) of (87.2) and the smallest assessment gets an average value in class XD (low ability) of (73.2).

Table 3 Data on The Results of The Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Materials

Data	Hasil Belajar				
		Cognitive		Affektive	Psychomotor
		Pretest	Posttest		
Class XE (Kemampuan Tinggi)	Max	90	90	100	100
	Min	40	70	66,6	66,6
	Mean	69,12±9,32	79,7±4,03	85,2±10,3	87,2±10
Class XA (Kemampuan Sedang)	Max	90	100	100	100
	Min	45	45	55,5	55,5
	Mean	70,14±7,51	79,12±7,18	83,8±11	84,8±9,6
Max	90	90	100	100	

Class XD	Min	55	65	55,5	44,4
(Kemampuan Rendah)	Mean	73,6±4,56	81,4±3,73	79,7±10,3	73,2±13,8
Kelas XF	Max	85	85	100	100
Konrol	Min	25	50	66,6	55,5
	Mean	62,3±6,65	72,12±4,51	86±10,5	79,5±7,6

To determine the effect of the implementation of PS assisted by leaflets containing indigenous knowledge on the learning outcomes of class X students of SMA N 1 Gondang in the 2023/2024 academic year on the material of solutions to overcome global warming, hypothesis testing was carried out with One Way Anova. Before hypothesis testing, the data obtained must be prerequisite tested first using the normality test and homogeneity test.

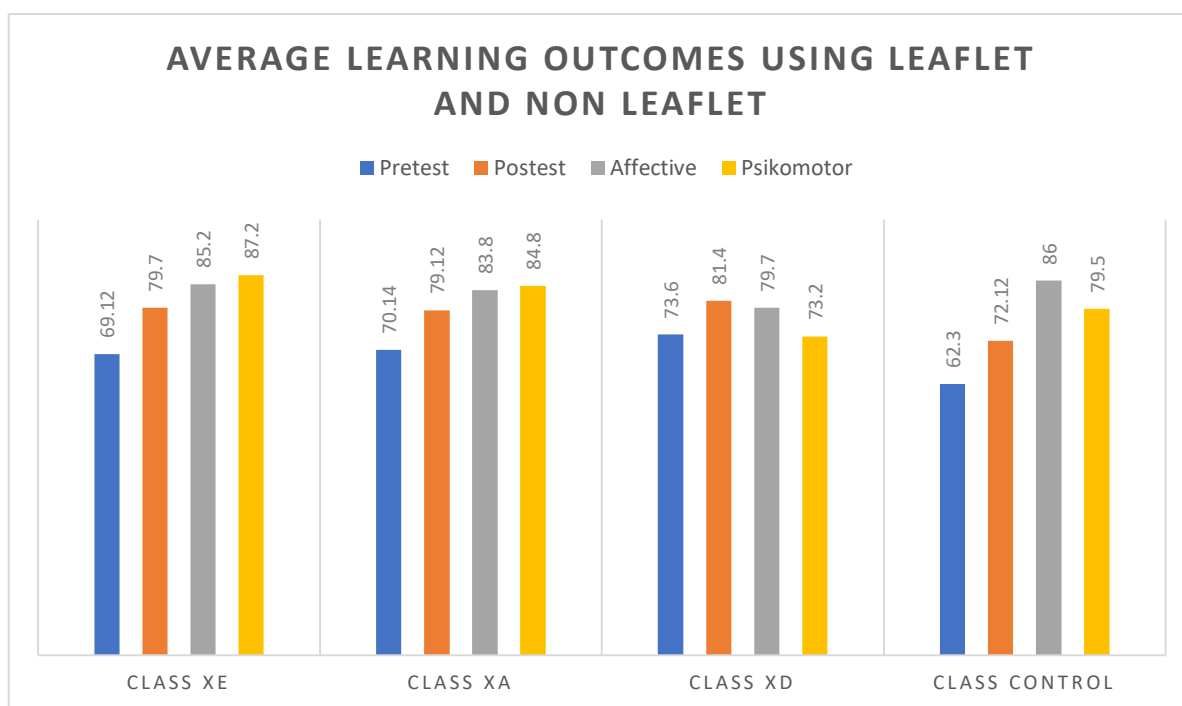


Figure 2 Analysis of the Average results of learning outcomes on cognitive, affective, and psychomotor aspects

3.1.1. Normality Prerequisite Test

The normality test serves to determine whether the data obtained is normally or abnormally distributed. The normality test in this study used the Kolmogorov-Smirnov test, the results of which are presented in table 4.

Table 4. Normality Test of Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Materials.

Group	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTest Eks1	.076	32	.200*	.984	32	.902
PosTest Eks1	.137	32	.130	.951	32	.155
PreTest Eks2	.051	32	.200*	.987	32	.964
PostTest Eks2	.062	32	.200*	.990	32	.987
PreTest Eks3	.089	32	.200*	.961	32	.292
PosTest Eks3	.129	32	.189	.957	32	.233
PreControl	.109	32	.200*	.946	32	.108
PosControl	.108	32	.200*	.971	32	.522

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on table 4 above, the data on the learning outcomes of students in the pretest and posttest of leaflet treatment 1 obtained a significance value of (0.200) and (0.130), in leaflet treatment 2 obtained the same significance value (0.200), and in leaflet treatment 3 obtained a significance value of (0.200) and (0.189), while in the pretest and posttest control class treatment obtained the same significance value (0.200). The significance value of all treatments is greater than the significance setting (0.05), so it can be concluded that the data above is included in normal data.

3.1.2. Homogeneity Prerequisite Test

The homogeneity test serves to determine the variants of several populations are the same or not. For this reason, the calculation results are presented in table 5.

Table 5. Homogeneity Test of Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Materials.

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Learning outcomes	Based on Mean	1.237	1	264	.267
	Based on Median	.518	1	264	.472
	Based on Median and with adjusted df	.518	1	263.958	.472
	Based on trimmed mean	.982	1	264	.323

Based on table 5 above, it can be seen that in the homogeneity test of the four classes, the significance value (0.267) > (0.050) is obtained, it can be concluded that the data on learning outcomes based on teaching methods have the same variance or can be called this data homogeneous.

3.1.3. Test One Way Anova

Hypothesis testing in this study uses the One Way Anova test, the requirements of this test are that the data is normally distributed and homogeneous. From the data that has been tested, it shows that the data is normally distributed and homogeneous, so the next stage of data can be analyzed using the One Way Anova test. The data from the calculation of the hypothesis test is presented in table 6.

Table 6. Hypothesis Test Results of Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Materials

ANOVA					
Learning Outcomes					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3788.123	3	1262.708	8.386	.000
Within Groups	39448.719	262	150.568		
Total	43236.842	265			

Table 6 shows that the mean of the above categories obtained a significance value (2-tail) (0.000) < (0.050), so the null hypothesis (H₀) is rejected. Therefore, it is concluded that there is an influence on the average learning outcomes taught with the help of leaflets 1, 2, 3 and the control class. So this treatment has an effect on student learning outcomes.

To determine which treatment affects which class (research class), the LSD (Least Significant Different) further test was conducted (Table 7).

Table 7. Advanced Test Results of Implementation of Indigenous Knowledge-Laden Leaflets on Student Learning Outcomes on Global Warming Materials

Multiple Comparisons						
Dependent Variable: Learning Outcomes						
LSD						
(I) Kelas	(J) Kelas	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Kelas Leaflet1	Kelas Leaflet2	-.221	2.104	.917	-4.36	3.92
	Kelas Leaflet3	-3.088	2.137	.150	-7.30	1.12
	Kelas Kontrol	7.215*	2.120	.001	3.04	11.39
Kelas Leaflet2	Kelas Leaflet1	.221	2.104	.917	-3.92	4.36
	Kelas Leaflet3	-2.868	2.137	.181	-7.08	1.34
	Kelas Kontrol	7.435*	2.120	.001	3.26	11.61
Kelas Leaflet3	Kelas Leaflet1	3.088	2.137	.150	-1.12	7.30
	Kelas Leaflet2	2.868	2.137	.181	-1.34	7.08
	Kelas Kontrol	10.303*	2.153	.000	6.06	14.54
Kelas Kontrol	Kelas Leaflet1	-7.215*	2.120	.001	-11.39	-3.04
	Kelas Leaflet2	-7.435*	2.120	.001	-11.61	-3.26
	Kelas Leaflet3	-10.303*	2.153	.000	-14.54	-6.06

*. The mean difference is significant at the 0.05 level.

Table 7 shows that the significance probability value is $(0.917) > (0.050)$, therefore (H_0) is accepted. So the conclusion is that there is no effect of treatment on the learning outcomes of the experimental class and the implementation of PS assisted by leaflets containing indigenous knowledge has an effect on the learning outcomes of class x students of SMA N 1 Gondang in the 2023/2024 academic year on the material Solutions to overcome global warming.

3.2. Discussion

Based on the results of the anova test of cognitive assessment, it was found that giving leaflet treatment containing IK had an effect on student learning outcomes. For this reason, learning using leaflet media can affect student learning outcomes and as a teacher can be helped in delivering material to students so that it can be understood easily. In line with the opinion of (Basir & Rohmawati, 2023) Learning using leaflet media indirectly facilitates students to sort and improve mastery of the material that has been learned, so the function of the leaflet can help speed up the process of receiving messages to be conveyed and help students receive the material simply and encourage them to be active in learning. This is also in line with (Antika et al., 2023) that students feel that learning with the help of leaflet learning media is easy, interesting, fun, profitable, useful, and makes them more active in learning. And also in line with (Yusandika et al. 2018) that leaflets are able to visualize messages, information and concepts and present images that make it easier for students to explain the material.

Leaflet learning is also able to make students interested in the material in the leaflet because it is not only the content of the reading material in the leaflet but also presented with an attractive design in the form of pictures and the latest news about the material Solutions to overcome global warming. The content in the leaflet is also clear in the form of important points of material that students will learn such as understanding, cases of global warming, the impact of global warming solutions, and of course indigenous knowledge associated with the material Solutions to overcome global warming which is a new learning or still rarely applied to leaflets. This is in line with the opinion of (Wahyuni, 2022) that leaflets are in the form of sheet-shaped information sources,

equipped with pictures so that readers are more interested in seeing them and the use of leaflets can make learning more interesting, innovative, and most importantly, the learning outcomes of students. This is also in line with (Winarso & Yuliyanti, 2017) Leaflet learning media are usually simpler and portable. This shows that leaflet media is more effective than other printing products because of its attractive and simple design. The presence of leaflet learning media is believed to make students easier and faster to understand the messages conveyed by the teacher.

Problem solving learning aided by leaflets also affects student learning outcomes because the material for solutions to overcome global warming is teaching material that relates problems that require solutions, therefore the PS learning model is suitable. This is in line with (Wiria & Alberida, 2023) In the problem solving learning model, it is necessary to understand how to see the solution to the problems it faces, for this reason, during the cognitive process, it is important to understand the problem, collect reliable facts to solve the problem, look for the right answers and identify problems, and this is described as an action that teachers must take in class because it can help students solve problems that arise during learning. This is also in line with (Lestari, 2023) The use of problem solving learning models in the classroom helps students become more focused and creative, and also makes it easier for teachers to explain the material. Utilizing this model as one of the main strategies to answer students' needs for new material so that learning is not boring. And also in line with (Diva and Purwaningrum 2023) that learning with Problem solving fosters students' ability to use the widest possible thinking with the maximum of their capacity to capture.

Learners in this study are not only required to understand the material but also in the material studied there is indigenous knowledge or local wisdom that students must understand and relate to learning. According to (Muchsin et al. 2023) opinions Indigenous Knowledge is a form of knowledge based on beliefs, understanding and perceptions of the community related to habits that serve as guidelines for behavior in relation to the ecological and systemic environment. For this reason, indigenous knowledge can be related to the material on solutions to global warming, pretest, posttest, and LKPD questions that must be understood and done by students. In the answers to the pretest questions, the average student's answers were wrong and some were missed. Then after the leaflet was distributed and learning was carried out, students began to understand the indigenous knowledge associated with the material, students worked on the LKPD and also the posttest results were good, while in the control class there were still students who were confused about indigenous knowledge associated with the material and had to be given understanding and examples repeatedly until students understood.

The application of leaflet learning media whose material contains indigenous knowledge this time is a new thing for students by looking for examples of solutions to overcome global warming in LKPD and for the overall LKPD results make students active to think critically in answering all activities in LKPD. Indigenous knowledge is associated with the material so that students know about local wisdom that can be taken as learning that can be applied and preserved. In line with (Dewi, 2021) opinion Indigenous knowledge-based learning media can be used to increase children's creativity (content), because the more advanced the times, the higher the level of global competition that will be faced in the future. The purpose of this success is to increase educators' awareness and attention to research and development of local cultural education (indigenous knowledge) based on local potential. This is also in line with (Hadi & Dazrullisa, 2018) Integration of local wisdom values in teaching materials can be done by adjusting the local wisdom values analyzed with the learning materials presented in the teaching materials.

In the affective or attitudinal assessment itself, the results vary greatly for each student, for the attitude assessment, 3 indicators are taken from the profile of Pancasila students, namely faith, fear of God and noble character, mutual cooperation, and critical reasoning. In the results of the highest average value of attitude assessment obtained in the control class and for the lowest attitude assessment obtained in the low-criteria class. This shows that the use of leaflet media has nothing to do with attitude assessment because attitude assessment is taken based on the innate attitude that each student has from the beginning of learning to the end of learning. This is in line with

(Nurholis et al., 2022) the teacher's attitude/affective assessment uses the observation method by direct observation of the teacher himself, observing students in everyday life in the school environment. In line also with (Novitasari & Wardani, 2020) Attitude assessment is an assessment that focuses on student attitudes, so it requires a rubric that is made based on observations and during learning activities. And in line with (Erni 2022) An important form of attitude assessment carried out by teachers to determine the character or behavior of students both inside and outside the classroom, socially and emotionally.

In the psychomotor assessment, 3 assessment indicators are also taken, namely mastery of material, cooperation, and delivery/performance, the results of which are the average value of each class are different in experimental and control classes. For this reason, in this psychomotor assessment, the highest average value is obtained in the high ability class and the lowest average value is obtained in the low ability class. This shows that the use of leaflets has something to do with psychomotor assessment because psychomotor assessment is taken when students form groups to discuss working on LKPD with the help of leaflets containing teaching material and then the results of the discussion are presented. This is in line with (Veronika Sitepu et al., 2022) Psychomotor assessment refers to the skills and abilities that students learn after learning, product and process oriented assessment, and the form of psychomotor assessment of students is a test that directly observes their behavior. In line with (Ulfah and Arifudin 2021) The psychomotor aspect is related to physical activity and also from skills that are directly related to the learning experienced by students. And in line with (Rizqiani and Wijayanti 2022) Skills assessment in the form of an assessment rubric that contains a number of assessment techniques such as practice, projects, products, portfolios and other techniques.

Based on the results of the research that has been conducted, it can be concluded that the implementation of leaflet media containing indigenous knowledge makes students' learning outcomes better in doing assignments and discussing in groups. Students are also more active in class learning activities, the material associated with indigenous knowledge can be understood, and are able to develop their critical thinking skills on the material of solutions to overcome global warming. But based on the LSD further test of cognitive assessment, it was shown that there was no effect of the treatment of using leaflets containing IK on the learning outcomes of the experimental class for high, medium, and low classes, which means that it could not show differences in learning outcomes in high, medium, and low classes.

4. CONCLUSIONS

Based on the research and discussion, it can be concluded that: the implementation of Problem solving assisted by leaflets containing indigenous knowledge has an effect on the learning outcomes of class X students of SMA N 1 Gondang in the 2023/2024 academic year on the material of solutions to overcome global warming, but does not make a difference in high, medium, and low classes.

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