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THE EFFECT OF INTEGRATION OF PROBLEM BASED LEARNING (PBL) LEARNING MODELS AND ORIENTATION, IDENTIFY, DISCUSSION, DECISSION AND ENGAGE IN BEHAVIOR (OIDDE) TO SOCIO-SCIENTIFIC DECISION MAKING SKILLS STUDENTS AT SMP NEGERI 2 BITUNG

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Abstract: This research uses a hypothesis test of one-way analysis of covariance or one-way ANCOVA to measure the respective effects of using the integration of the PBL model with OIDDE on socioscientific decision making skills. Before testing the hypothesis, prerequisite tests must be carried out, namely the normality test and homogeneity test. The use of this test is assisted by SPSS 23 for Windows software. The conclusion of this research is that the integration of the Problem Based Learning (PBL) learning model with the OIDDE (Orientation, Identify, Discussion, Decision, and Engage In Behavior) learning model has a real influence on improving students' Socioscientific Decision Making skills with a sig. 0.001 > 0.005 and the highest corrected mean value was 86.21.

Keywords:

Introduction

A. Background

The development of the 21st century is marked by the use of information and communication technology which is used in almost all aspects of life (Daryanto, 2022). This large number of uses is supported by access to technology and various information which is very easy, and the process is very fast.(Redhana, 2019). The impact of this has resulted in changes in life in routine conditions in the 21st century which are increasingly automated, and clear changes in aspects of life order (Agustin, et al, 2021). The changes of this century have made human survival full of uncertainty and given rise to complex social problems(Zubaidah, 2018). The social problems that arise mostly involve concepts, procedures or technology in science(Nurtamara et al., 2020). As a result, challenges will continue to emerge, especially in the field of education, to prepare students as the nation's next generation who are competent and professional(Ismail, 2018). Therefore, students are required to have the ability to solve various problems and make decisions based on scientific evidence that does not harm any party, one of which is mastering socioscientific decision making skills.(Chang et al., 2016).

Socioscientific decision making skills emphasize making decisions or solutions in solving socio-scientific problems that are supported by scientific arguments or opinions(Sadler, 2004). According toGarrecht et al., (2020)Socioscientific decision making is also emphasized on a more social perspective in decision making and is also considered as empowering decision making that

comes from one's own thoughts or opinions. The existence of these skills can also be used as a basis for the informal reasoning process for students(Sadler & Zeidler, 2005). This reasoning involves contemplating cause and effect, advantages and disadvantages, pros and cons of alternative decisions in addressing socio-scientific issues.(Nurtamara et al., 2020). Thus, socioscientific decision making skills can guide students in the process of searching and evaluating information, argumentation, reasoning, problem solving, taking perspectives and also integrating perspectives into solution strategies.(Eggert et al., 2013).

Several previous studies byGarrecht et al., (2020)Students who took part in science competitions in Germany showed that socioscientific decision making did not increase significantly with a p-value of 0.989. The results of socio-scientific decisions can be seen from the number of students writing arguments regarding socio-scientific problems which are described, proposed and supported by evidence. According toAcar et al., (2010)stated that the decisions taken from presenting arguments in the context of socio-scientific issues to students were still relatively low. This has also become a concern in the field of science education with the identification of several problems such as errors in evaluation of the evidence obtained, the subjective nature of scientific conceptualization, and the use of value-based reasoning that is still not appropriate.(Acar et al., 2010).

The results of initial observations on class VII students at SMP Negeri 2 Bitung showed that the results of socioscientific decision making skills were still relatively low with an average of 26.7 in two classes, each with approximately 30 students. These results indicate that there were students' errors in describing, developing and evaluating solutions to the given socio-scientific problems.

Based on the results of interviews by the science teacher at SMP Negeri 2 Bitung, it was stated that the difficulties experienced by the students were supported by the empowerment of socioscientific decision making skills which had never previously been taught in class. The existence of this factor makes students unfamiliar with socioscientific decision making skills and students lack cognitive experience to solve existing problems. Apart from that, the use of the surrounding environment as a learning resource to discover socio-scientific problems is still not optimal and the learning process still tends to memorize concepts or theories and does not make connections with surrounding life. According toRahmadianti (2020), a learning process that is only oriented in one direction can result in students' level of understanding regarding the material being taught being lacking and their mastery of skills that should be mastered being inadequate, especially socioscientific decision making, thus having an impact on student learning outcomes that do not reach the minimum completeness score. This indicates that the students' existing understanding is still not fully studied well. Moreover, most of the learning methods are still dominated by teachers, so that students tend to be passive and their socioscientific decision making skills in learning are less well empowered. The result of this has an influence on the development of students' cognitive learning outcomes and shows the low level of student learning outcomes obtained.

Methods

This type of research is experimental research, which is categorized as quasi-experimental. The research design for this research is The Non-Equivalent Group Design as follows:

Class	Initial Test	Treatment	Final Test
Experiment	O1	X	O2
Control	O3		O4

Information :
O1 : Initial test or test before treatment (Pre-test) in the experimental class
O2 : Final test (Post-test) in the experimental class
O3 : Initial test or test before treatment (Pre-test) in the control class
O4 : Final test (Post-test) in the experimental class
X :Treatment with integrated learning models

This research was carried out twice, namely before and after treatment. O1 and O3 is an assessment carried out before (pre-test) giving treatment, while O2 and O4 are assessments carried out after or after (post-test) giving treatment.

A. Population and sample

1. Population

The population in the study were all students in class VII of SMP Negeri 2 Bitung, consisting of 13 classes.

2. Sample

Sampling for this research used a random sampling technique (Random Sampling). This technique is carried out by placing all the class names of 13 class VII SMP N 2 BITUNG into one jar container and then taking them randomly as research class samples, namely class VII-5 and class VII-9

B. Data collection instruments and techniques

In this research, the use of instruments to measure socioscientific decision making skills and cognitive learning outcomes of each student uses a written test instrument in the form of a 10-item essay question arranged based on the indicators. These two instruments will be given to students during pretest activities, namely before treatment and posttest activities, namely after treatment. Before being given to students, the two instruments must be tested through validity and reliability tests. Instruments that have been said to be valid and reliable can then be used to collect research data. The data collection techniques in this research are as follows:

a. Pre Experiment

Observation and Permits

Conduct direct observations at the research location by consulting directly with the school principal regarding the research survey and subject teachers.

b. Implementation of experiments

- **The first stage**

The experimental class and control class were first given a pretest before starting the treatment or entering the learning material. This activity aims to see an overview of students' mastery of the material that will be given.

- **Second stage**

Carrying out treatment by applying the PBL integration model with OIDDE in the experimental class and teaching with the conventional model (without model integration) in the control class.

- **Final Stage**

After the learning activities ended, the experimental class and control class were given a post-test.

C. Data analysis technique

This research uses a hypothesis test of one-way analysis of covariance or one-way ANCOVA to measure the respective effects of using the integration of the PBL model with OIDDE on socioscientific decision making skills. Before testing the hypothesis, prerequisite tests must be carried out, namely the normality test and homogeneity test. The use of this test is assisted by SPSS 23 for Windows software

Result and Disscusion

A. Research result

1. Data on Learning Syntax Implementation Results

Data on the results of the implementation of learning syntax in this research were obtained from filling in the observation sheet by the science subject teacher regarding the process of learning activities in the experimental class on February 2 2024. The results obtained were 73% in syntax achievement, which shows that a series of syntaxes that were carried out were carried out well. . These results can be seen in detail in Appendix 3. Meanwhile, in the control class, the teacher used a conventional

model, namely the lecture method and assigning worksheets to students.

2. Data on the Results of Socioscientific Decision Making Skills

Data on Socioscientific Decision Making skills were obtained from pre-test and post-test scores in the experimental class and control class which can be seen in Table 4.3

Table 4.3 Mean Pretest and Posttest Socioscientific Decision Making Scores

Class	*Pretest*		*Posttest*		Difference	Enhancement
	Mean	Std. Dev	*Mean*	Std. Dev		
Experiment	46.16	9.36	86.16	5.08	40.00	86.66%
Control	47.44	9.40	75.66	6.94	28.22	59.49%

Source: Data processed by researchers, 2024

Based on Table 4.3, the results of the average pre-test and post-test scores in the experimental class and control class show an increase in each class. The highest improvement results occurred in the experimental class, namely 86.66% with a difference of 59.49.

3. Prerequisite Test Results

a. Normality test

The results of the normality test on the pre-test and post-test score data for students' Socioscientific Decision Making skills can be seen in detail in Appendix 7. Decision making in this normality test is based on the sig value. > 0.05 which states that the data is normally distributed and the summary results can be seen in Table 4.4

Table 4.4 Summary of Normality Test Results

Class	Sig value. (2-tailed)			
	Pretest	Ket.	*Posttest*	Conclusion
Experiment	0.095	Normal	0.195	Normal
Control	0.097	Normal	0.173	Normal

Source: Appendix 7

b. Homogeneity Test

The results of the homogeneity test on the pre-test and post-test score data for students' Socioscientific Decision Making skills can be seen in detail in Appendix 7. Decision making in this homogeneity test is based on the sig value. > 0.05 which states that the data is normally distributed and the summary results can be seen in Table 4.5

Table 4.5 Summary of Homogeneity Test Results

Variable	F	df1	df2	Sig.	Information
*Pretest*SSDM	3,334	1	62	0.073	Homogeneous
*Posttest*SSDM	0.059	1	62	0.809	Homogeneous

Source: Appendix 7

4. Hypothesis testing

Hypothesis testing for Socioscientific Decision Making skills was carried out using ANCOVA test analysis which can be seen in detail in Appendix 8. Meanwhile, the summary results of the test can be seen in Table 4.6

Table 4.6 Summary of One-way ANCOVA Test Analysis Results for Socioscientific Decision Making Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1802.619a	2	901.310	24,362	,000
Intercept	14206.783	1	14206.783	383,998	,000
X_SSDM	38,619	1	38,619	1,044	.311
Class	1791,779	1	1791,779	48,430	**,000**
Error	2256.818	61	36,997		
Total	422992,000	64			
Corrected Total	4059.437	63			

Source:Appendix 8

Source:Appendix 8

Based on Table 4.6, it shows that there are significant differences in Socioscientific Decision Making in classes taught by the Problem Based Learning (PBL) learning model with the OIDDE (Orientation, Identify, Discussion, Decision, and Engage In Behavior) learning model and conventional learning with a value of sig. equal to 0.000 < 0.05. These results provide information that the use of learning models in the classroom has a real influence on improving students' Socioscientific Decision Making. Then, to find out the use of learning models that have the greatest influence on students' Socioscientific Decision Making, further tests were carried out, the results of which can be seen in Table 4.7

Table 4.7 Summary of One-way ANCOVA Test Analysis Results of the Effect of Learning Models on Socioscientific Decision Making

Model	*Mean*		Difference	Enhancement	Corrected Mean	LSD notation
	Pretest	***Posttest***				
Conventional	47.44	75.66	28.22	59.49%	75.60	a
PBL-OIDDE	46.16	86.16	40.00	86.66%	86.21	b

Source:Appendix 8

Table 4.7 shows that the use of the Problem Based Learning (PBL) learning model with the OIDDE (Orientation, Identify, Discussion, Decision and Engage In Behavior) learning model is significantly different from the conventional model for students' Socioscientific Decision Making which is seen based on the LSD notation value. Apart from that, the experimental class that uses the integration of the Problem Based Learning (PBL) learning model with the OIDDE learning model (Orientation, Identify, Discussion, Decision, and Engage In Behavior) has the highest corrected mean value of 86.21 with an increase of 86 .66%. These results provide information that the integration of the Problem Based Learning (PBL) learning model with the OIDDE (Orientation, Identify, Discussion, Decision and Engage In Behavior) learning model is effective in improving students' Socioscientific Decision Making compared to conventional models.

B. Discussion

Based on the analysis of hypothesis testing, it shows that the experimental class applied using the integration of the Problem Based Learning (PBL) learning model with the OIDDE learning model

(Orientation, Identify, Discussion, Decision, and Engage In Behavior) has a significant difference in Socioscientific Decision Making skills with the control class applied using conventional learning models. This significant difference states that the integration of the Problem Based Learning (PBL) learning model with the OIDDE (Orientation, Identify, Discussion, Decision and Engage In Behavior) learning model can have a real influence on improving students' Socioscientific Decision Making skills. The results of previous research agree that the application of the PBL learning model has proven effective in improving Socioscientific Decision Making through the help of creative teaching materials.(Nurtamara et al., 2020). As with the application of the OIDDE learning model, it is also able to improve students' Socioscientific Decision Making skills in the ethical aspect(Hudha & Husamah, 2019; Putri et al., 2021).

The successful use of the integration of the Problem Based Learning (PBL) learning model with the OIDDE (Orientation, Identify, Discussion, Decision and Engage In Behavior) learning model in improving students' Socioscientific Decision Making skills cannot be separated from a series of syntaxes which are able to provide good thinking stimulation in the learning process in class. This can be seen in the first syntax, namely orientation, where in this syntax students are directed to listen, observe, take notes and choose topics individually regarding several dilemmatic issues that have been presented by the teacher. Next, students are directed to search for literature on the dilemmatic topic of their choice. Socioscientific Decision Making skills will play a role in searching for information to make it easier to analyze information and unique facts from dilemmatic problems as a general overview and basis for consideration later before carrying out more in-depth identification activities with the group.

In the second syntax, namely organizing and identifying, where students are divided into small groups consisting of 5-6 people to carry out activities to identify dilemmatic problems that they have noted. Together with small groups, students will collect and choose a topic or dilemmatic problem to focus on in problem identification activities. This syntax encourages collaboration between students and their group members to jointly investigate problems(Rizkita et al., 2016). Socioscientific Decision Making stimulation plays a role in identification activities to describe, relate and consider socio-scientific problems through various aspects such as social, economic and ecological aspects.(Nurtamara et al., 2020). Apart from that, students are able to solve dilemmatic problems that occur by developing effective solutions for overcoming and preventing them. Students take responsibility independently for this learning by providing some of the information they need to solve problems(Rizkita et al., 2016).

The third syntax is guidance and discussion, where students are guided by the teacher to discuss between groups to communicate their findings to each other regarding their dilemmas. In this syntax, Socioscientific Decision Making will be empowered through gathering information about the problem and discussion in groups to use information relevant to the problem as evidence that supports the solution(Utomo et al., 2020). Through group discussions, students are able to formulate solutions and develop more than one solution based on complex dilemmatic problems(Eggert et al., 2013). The involvement of students in discussions is able to provide an overview of improving ethical aspects which are supported by moral reasoning, searching for deeper answers to dilemmatic problems in real life.(Hudha & Husamah, 2019).

Next, the fourth syntax is presentation of results and decision making, where students organize the results of discussions between small groups systematically and determine decisions that are considered most appropriate as alternative solutions to the dilemmatic problem being studied based on the position (role) determined (chosen) in the small group. they. This activity involves a collaborative process of negotiation and evaluation of understanding to construct knowledge in more depth(Nurtamara et al., 2020). Thus, the resulting decision-making process is truly appropriate and effective for application in real life.

The fifth syntax is evaluating and showing attitudes/behavior, where students evaluate the process and results of the investigations they have carried out and write down actions as a description of the behavior resulting from the decisions made. Then students are directed to draw learning conclusions

together. Socioscientific Decision Making plays a role in comparing and evaluating several possible solutions to problems and being able to reflect on the decision making process(Eggert et al., 2013). In this syntax, students can also formulate suggestions to support the implementation of the most effective solution as an evaluation of problem solving

Conclusion

The conclusion of this research is that the integration of the Problem Based Learning (PBL) learning model with the OIDDE (Orientation, Identify, Discussion, Decision, and Engage In Behavior) learning model has a real influence on improving students' Socioscientific Decision Making skills with a sig. 0.001 > 0.005 and the highest corrected mean value was 86.21.

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