



The Implementation of a Generative Learning Model With Contextual Approach Toward Physics Learning Outcomes

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ABSTRACT

Learning is an interactive process among students to accomplish the educational outcome. The problem occurring is that the students give few participations in during the learning process, since they only listen to the teachers, as a result, they are not able to develop their own knowledge so the learning outcome is low. The solution offered to improve the learning outcome is implement generative learning model which is based on contextual approach. The goal of the study is to discover the impact of generative learning model based on contextual approach toward senior high school physics learning outcomes. This is a quasi-experiment research with Post-test Only Control Design. The population of this research is XI science students in the year of 2022/2023. The technique used to achieve data is Purposive Sampling. The sample is XI Science 1 students as experiment class used generatif learning model based on contextual approach and XI Science 3 as control class used Problem Based Learning Model based on contextual approach. Instrument applied is written test in form of multiple questions. Data analysis was done by two averages similarity test. The results showed that the average score in experimental class 73.14 was higher than control class was 69.83. Based on the two averages similarity test, it is obtained t_{count} 9.70 and $t_{table}=1.995$ in significant level $\alpha = 0,05$. The condition for H_0 being rejected is if $t_{table} < t_{count}$. The t_{count} value is in the rejection of H_0 so that H_1 received. It proves that generative learning model based on contextual approach affected students learning outcome.

Keywords: Generative Learning Model, Contextual Approach, Learning Outcomes.



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I. INTRODUCTION

Education is a process of respectful communication between teachers and students in order to accomplish educational objectives [1]. Education serves to support students in realizing all of their potential and positively developing the talents that are based on their personalities. Education is conducted formally in schools. To accomplish the purposes and goals of education, educational institutions must be structured in a methodical and directed way. Teachers, students, and resources or materials are only a few of the many aspects that go into the educational process in schools. The learning process is a more accurate name for how education is implemented in classrooms [2].

The learning process is an activity that has educational value that shapes interaction among teachers and students [3]. Learning process consists of a series of events that are planned and structured in a way that will affect and support the student's learning process [4]. One of the branches of natural science, physics is one of the subjects taught in the learning process. Physics is basically a collection of knowledge (products), ways of thinking (attitudes), and investigations (processes). Facts, concepts, principles, laws, theories, models, and theories can fall within the domain of physics knowledge. Physics as an attitude, the way people think, act, and do scientific things, and physics as a process, the understanding of how scientific data is obtained, tested, and validated [5]. Therefore, learning physics that occurs must be able to change the paradigm from teacher center become student center so that active learning will be created in line with the demands of 2013 curriculum [6].

In 2013 curriculum, learning process is student-centered so that the teacher is no longer dominant in class but acts as a facilitator and students are required to active in learning activities. In addition, the interaction between teachers and students in the classroom occurs in two directions [7]. The 2013 curriculum requires students to have 4C abilities, namely Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation [8].

The reality found in the field, student learning outcomes are still relatively low. This is because students are less active in learning both in asking questions and giving suggestions on the implementation of learning. Student activities are just listening to the teacher's explanation, so it is difficult to stimulate memory to remember previously acquired knowledge, because the material and concepts students have learned are not firmly embedded in their brains, because they are not often repeated. As well as the low knowledge of students to connect Physics material with everyday life. This problem occurs because students can not to develop their own knowledge. Students tend to rely on educators as a source of knowledge. Knowledge is built in the child's mind through assimilation and accommodation. Assimilation is the process of perfecting the schema that has been formed. Accommodation is the process of schema change. Therefore, when a child gets assimilation, accommodation, and balance, the child creates a new stage of cognitive development [9].

To solve this problem, a proper learning model is needed. The learning model describes the student environment, their learning conditions, and the teacher's actions to create their learning environment [10]. In line with this opinion, [11] stated that the learning model is a conceptual framework used by teachers to help them carry out learning activities. The learning model is considered as a systematic framework and a complete teaching guide that can be used by teachers during the learning process [11]. In order for student learning outcomes to increase, the learning model can be applied is the Generative learning model.

Generative learning consists of two words, namely generative and learning. Generative is being able to produce, while learning is defined as knowledge. Therefore, generative learning is a learning process that can produce knowledge. It means that knowledge is not obtained by itself but through one's efforts by using its potential and cognitive efforts since knowledge is not a fact that remains to be found [12]. The Generative Learning Model is a model that emphasizes integrating new knowledge with previously learned knowledge [13]. The generative learning model is a learning model that helps students elaborate thinking skills to gain a detailed understanding of certain topics [14]. The generative learning model helps students improve conceptual understanding, development through the assimilation of information and ideas, and capabilities in solving problems.

Generative learning is a model that learning that emphasizes active integration among material or new knowledge acquired with schemata. Learning patterns in models generative learning is that students use principles explanatory education rules that are actively studied by students [15]. The generative learning model is expected by students become more adaptive when face a new stimulus. In addition, as a model learning based on constructivism, Generative learning also focuses on involvement and active student participation in the process learning as the main goal in the learning process. Generative learning will encourage students create as owned in the 2013 curriculum through a generative thinking process (to generative thinking ability) [16].

The generative learning model developed by [14] is a Creative Thinking Oriented Cognitive Conflict-Based Generative Learning Model (PGOC3ARE). The syntax of the generative learning model is orientation, cognitive conflict, disclosure, construct, application, and reflection evaluation. The orientation serves as prior knowledge activation in an endeavor to produce meaningful learning through cognitive processes in associative memory by drawing students' attention to and motivating them toward the topics that will be covered directly. The purpose of the cognitive conflict is to pique pupils' curiosity so they will start to ask questions. Teachers' questions aid students in understanding concepts [17]. Students are encouraged to consider problem-solving strategies in the form of cognitive conflicts and plan ahead through cognitive process control during the disclosure stage. The construct stage aims, students are expected to develop conceptual knowledge during the construct stage. The purpose of the application stage is to push students to put what they have learned into practice so they better understand the topics they have acquired and broaden their knowledge and skills. The purpose reflection' goal to provide feedback on the construction process and outcomes achieved. Responses to activity events, newly acquired knowledge, process evaluations, and strengthening of the knowledge development process are all examples of reflection. This stage is used to fix mistakes, reinforce results, and ensure that the student has mastered the topic [14].

The Generative Learning Model is a learning model which guides pupils explore their knowledge to form new knowledge [18]. This shows that students do not only receive information passively, but are actively involved in constructing their own knowledge so that it influences learning outcomes [19]. This is evidenced research conducted by [20] which states that generative learning models can increase student learning outcomes.

A concept is easily understood and remembered by students if it is related to daily life. One of them is by combining generative learning models with contextual approaches. Students study at school not only focused on theoretical knowledge, but the material students learn can also be related to real life. One way to connect the material being studied with the real life of students is with a contextual approach. The word contextual is from the word context, meaning relationship, context, atmosphere or situation. So, contextual is related to the atmosphere (context). The contextual learning approach is defined as a learning related to a certain atmosphere [21]. The Contextual Approach was chosen because this approach is more relevant to use for help students understand physics, with contextual approach to the teacher's role is facilitator Which will connect knowledge of students with their lives [22].

The contextual approach is a learning concept helping educators connect the material taught with real life situations of students and encourages them to create connections between their knowledge and its application in

everyday life [23]. By using a contextual approach, the teaching and learning process will be more meaningful, educators become facilitators who can help students find the meaning of learning [24]. The contextual approach is a learning strategy that emphasizes the full involvement of students in finding the material they are studying and relating it to situations in real life, so students are encouraged to be able to apply it in everyday life. The contextual approach is the most effective way for students to see the relationship between what is learned in group and the real world [23].

This generative learning model based on a contextual approach can help students understand every aspect of learning required in 2013 curriculum where students can not only be in theory but can apply related material in everyday life. The application of a generative learning model based on a contextual approach is expected that students will better understand the Physics concepts given in learning and know their use in everyday life so as to improve student learning outcomes. It is in the same with the results of research by [25] stating that the application of generative learning models can improve student learning outcomes. The research results of [26] stated that through a contextual approach can improve student learning outcomes. However, there has been no previous research that discusses the influence of generative learning models based on contextual approaches to student learning outcomes study. The purpose of this research to determine the effect of applying generative learning model based on a contextual approach toward senior high school physics learning outcomes.

II. METHOD

This research employed Quasi Experiment. Design of the research employed is Post-test Only Control Design. It research design consists of two groups which were randomly selected. First group was given treatment named experimental group and the other group which was not given any treatment is called control group [27]. The treatment given to experiment class is generative learning model based on contextual approach, and control class used the learning model from 2013 curriculum which is PBL learning model on a contextual approach. At the end of the study, both groups were given a final test to see the learning outcomes. The research design can be seen in Table 1.

Tabel 1. Research Design

Class	Treatment	Post-test
Experiment	X	O
Control	-	O

(Source: [27])

Keterangan:

X : Treatment given to the experimental group

O : Post-test of Experimental and Control Classes

Population of this research is XI Science students in the year of 2022/2023. Sample of the research is from two classes, the process of taking the sample was done by employing Purposive Sampling. Purposive sampling is sampling based on certain criteria and objectives. Sampling in this research, based on classes taught by the same teacher, and has a class average that is close. Based on sampling technique XI Science I was experimental class and XI Science 3 as control class. The independent variable of this research is generative model learning based on contextual approach and dependent variable is the students' learning outcomes of dynamic fluid material.

Instrument used to collect the data of students' learning outcomes was written test of multiple choices accounted for 25 questions which had been validated by the experts in physics. The data analysis technique used is two averages similarity test. Two averages similarity test used first is the normality test and homogeneity test. Test normality using the Lilliefors test. Homogeneity test aims to see if both groups of data have homogeneous variance or not. After the homogeneity test was carried out, the two average similarity tests were carried out using the t test with the data obtained is normal and homogeneous.

III. RESULTS AND DISCUSSION

A. Results

The result done XI science that the average score of students' learning outcome in experimental group is 73.14 and control group which is 69.83. the details of learning outcomes both in experimental and control classes can be shown in Table 2.

Tabel 2. Data Description of Learning Outcomes from Both Samples

Class	Highest Score	Lowest Score	\bar{X}	S	S^2
Experiment	92.00	52.00	73.14	11.944	142.66
Control	88.00	48.00	69.83	11.615	134.91

Table 2 shows students learning outcomes from experimental class and control class, where average (\bar{X}), deviation standard (S), dan variants (S^2). According Table 2, it is noticeable that the students' knowledge average score in experimental class is higher than control class. It can be described a comparison of student learning outcomes after learning process is carried out by applying a generative learning model based on a contextual approach and a PBL learning model with a contextual approach. The measurement of student learning outcomes in experimental class 73.14 and in control class 69.83. To see whether or not the application of a generative learning model based on a contextual approach can be shown by testing the hypothesis. However, before doing it, normality and homogeneity tests were conducted.

After the post-test data were obtained, data analysis was carried out to see whether there was a compelling difference in the mean between the two classes for the sample or not. Before drawing conclusions from research results, data analysis be carried out by hypothesis testing. Hypothesis is tested to see whether it is accepted or rejected. The hypothesis test in question is the similarity test of the two averages. The condition is that the normality test and homogeneity test must be done to the two sample classes first, then the two average similarity tests are carried out.

Normality test used Liliefors test to ensure samples are from population which is normally distributed. The result of it based on students learning outcomes can be seen in Table 3.

Table 3. Calculation Results of Normality Test of learning Outcome Data.

Class	N	α	Lo	Lt	Information
Experiment	35	0.05	0.137	0.149	Normal
Control	35	0.05	0.117	0.149	Normal

From Table 3, it is clear that the score of $Lo < Lt$, means score of knowledge aspect from both classes are normally distributed. Continued with homogeneity test which is showed in Table 14.

Table 4. Calculation Results of the Normality Test of Learning Outcome Data

Class	N	S^2	α	F_h	F_t	Information
Experiment	35	142.66	0.05	1.057	1.757	Homogeneous
Control	35	134.91	0.05			

According to Table 4, it is gotten that $F_h < F_t$ which shows that both classes variants homogeneous .

From normality test and homogeneity test of knowledge aspect, it is clear that both classes are normally distributed and have homogeneous variants. Furthermore, hypothetical test which is similarity test of two means was done to prove both samples have significant difference after generative model learning is implemented based on contextual approach, seen in Table 5.

Table 5. Calculation of Similarity Test of Two Means of Learning Outcome Data

Class	N	α	\bar{X}	S^2	t_h	t_t
Experiment	35	0.05	73.14	142.66	9.70	1.995
Control	35	0.05	69.83	134.91		

Additionally, Table 5 explains that, at a real level of .05 gets mark $t_h = 9.70$ and $t_t = 1.995$ $t_{count} > t_{table}$. From the calculation, it is gotten that t_h is in denial level H_0 . it means H_1 is accepted at a real level of 0.05 stating that there is a important diversity in both classes so it can be concluded that there is an effect of the implementation of generative learning model, based on contextual approach toward students learning outcomes in the lesson of Dynamic Fluida.

B. Discussion

Research that has been conducted in class XI Science, in this research there were two sample classes. In experimental class, namely class XI Science 1, using a generative learning model based on a contextual approach, while in control class, class XI Science 3, using a learning model Problem Based Learning (PBL) based on contextual approach. According data analysis of learning outcomes of knowledge competency students, it shows that used a generative learning model based on a contextual approach can show a significant influence on the learning outcomes of students in class XI Science 1. It seen from the results of the value post-test in both sample classes. In experiment class with an average of 73.14 while in the control class with an average of 69.83.

From the results of data analysis in the homogeneity normality test with a meaningful level of 0.05 in both sample classes with the results of the two samples being normally distributed and having a homogeneous variance then a hypothesis test was carried out, the hypothesis test carried out was the test obtained the value $t_{count}=9.70 > t_{table}= 1,995$. The calculation results get that the value of t_h is in the H_0 rejection region. H_i means accepted at a significant level of 0.05 which states that there are significant differences in the two sample classes so there is an influence of used a generative learning model based on a contextual approach to the learning outcomes of students in Dynamic Fluids material for class XI Science.

The generative learning model has 6 syntax consisting of orientation, conflict delivery, disclosure, construct, application, and evaluation reflection [14]. The generative learning model begins with the orientation syntax. The orientation syntax contains how educators prepare students and provide motivation [14]. Students are prepared by checking attendance. Educators also provide motivation to students in the form of facts related to learning material. This orientation stage requires students to be able to think more specifically and varied. This research was conducted on dynamic fluid material. Furthermore, the teacher conveys the conflict to students according to the material.

The problems given to students are carried out in the syntax of conveying conflicts. The syntax for conveying conflict contains how educators convey a problem to students. Submission of conflict contains important information that is conveyed to students through images related to the material being studied [14]. Furthermore, a stimulus is given, a stimulus is given in the form of problems that exist in everyday life. Based on the material, educators provide images related to ideal fluid and the principle of continuity. For example an ideal fluid, observing 2 pictures of river water flow. The principle of continuity, observing a picture of someone watering plants using a water hose. Then the educator gives the problem, "Why when watering plants that are far from the end of the hose, what you do is press the end of the hose?". Based on the problem, educators guide students to find answers so they don't have different concepts.

Different student concepts will be guided by educators on the disclosure syntax. The disclosure syntax contains educators who help students find solutions to problems [14]. Educators do not explain all learning material. Educators make students able to think directed so as to produce the same concept. The concepts possessed by students will then be constructed.

Knowledge construction is carried out on the construct syntax. The construct syntax contains educators who construct students' knowledge. Educators act as facilitators who direct students to construct knowledge quickly and efficiently. Knowledge construction helps students to understand concepts [14]. Educators direct students to find concepts with a contextual approach so that students can relate the material being taught to everyday life. Knowledge of students who have been constructed will then be used in solving problems in the form of giving questions.

Troubleshooting is done on application syntax. Application syntax requires students to be able to apply what they have learned to build knowledge [14]. The application syntax is done by giving problems. The problems given are in the form of questions about fluid dynamics. Students are required to be able to answer questions using their own abilities, provide many alternative answers, and provide original answers from these students. Problems that have been solved by students are then given feedback.

Educators provide feedback on syntax reflection and evaluation. The syntax of reflection and evaluation contains how educators provide feedback to students [14]. Educators respond to answers to problem solving from students then educators provide reinforcement or understanding of the material that has been studied. Educators direct students to analyze the advantages and disadvantages of learning. Educators also direct students to conclude learning.

From the research results obtained, the generative learning model based on a contextual approach can have a positive impact on students. This learning model is able to provide opportunities for students to express their thoughts, opinions, and understanding of a concept. The generative learning model based on a contextual approach requires students to be active and dare to explore and express their ideas. Students are required to issue what they understand for a symptom. The symptoms given are symptoms or events that exist in everyday life that make students understand them better.

Regarding the description above, it is stated that learning using a generative learning model based on a contextual approach has an effect on student learning outcomes. This learning model if applied properly will certainly increase the enthusiasm of students to know more about Physics. Thus, a meaningful learning process will be created which in turn will obtain optimal learning results.

IV. CONCLUSION

The results present the significant diversity between classes that applied a generative learning model based on a contextual approach and classes that applied a PBL model based on a contextual approach. The effect of the generative learning model based on the contextual approach can be seen through the learning outcomes of students obtained based on the analysis of research data conducted and testing of hypotheses, so it can be concluded in this study that the generative learning model based on the contextual approach has a positive influence on student learning outcomes in the material dynamic fluid class XI Science.

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