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Improving Students' Independent Learning Outcomes and Science Through Discovery Learning

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Abstract

This study aims to improve student learning outcomes and independence through discovery learning in science subjects. Class action research methods. In the pre-action, there were 5 students (26.3%) who had fulfilled the KKM and there were 14 students (73.7%) who had not. In cycle I there were 10 students (52.7%) who fulfilled the KKM and 9 students (47.3%) who did not. Student independence was obtained by 12 students (63.16%) with sufficient criteria. and 7 students (36.84%) in less criteria. In cycle II there were 15 students (78.9%) who fulfilled the KKM and 4 students (21.1%) who had not, obtained student independence, namely there were 7 students (36.84%) with good criteria, there were 10 students (52.63 %) was sufficient, and there were 2 students (10.53%) lacking. The percentage of students who scored above the KKM in cycle I was 52.6% and cycle II was 78.9%, this shows that the discovery learning method was able to improve students' science learning outcomes.

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Introduction

Natural science (IPA) subjects in Elementary Schools in the era of competency-based curricula expect an emphasis on mutual learning (science, environment, technology, and society). Interlocking learning is directed at learning experiences to design and make work through the application of science concepts and competence to work scientifically wisely (Sundari, 2018).

Science as a subject in school can provide roles and experiences for students. Science learning outcomes can also be greatly influenced by student motivation. Whether it's internal motivation or external motivation. Natural science (IPA) is one of the subjects related to knowing nature systematically. Science is not only a collection of knowledge in the form of facts, concepts, or principles, but also a process of discovery. Concluding that the application of the guided discovery learning model can improve students' creative thinking skills (Khabibah et al., 2017; Simamora & Saragih, 2019). Science education in elementary schools is expected to be a vehicle for students to learn about themselves and their surroundings (Bonus & Mares, 2018; Nurdyansyah, 2018)

Standard Competence and Basic Competencies for Natural Science in Elementary School level as outlined in Content Standards are the minimum standards that students must achieve nationally and become a reference in curriculum development in each educational unit. The achievement of standard competence and basic competence in primary schools is based on empowering students to build their abilities, work scientifically, and their own knowledge which is facilitated by the teacher. In science learning problems, alternative solutions are given by increasing life Standard Competence. Whereas from the approach, method, media, and means, alternative solutions are given using the process standard competence approach or contextual approach (contextual teaching and learning), with methods that give students activeness (experiment, inquiry, discussion, assignment, problem-solving) (Abadi, 2017; Retnawati et al., 2018; Wiwik & Rambitan, 2018).

Science learning research can be done with classroom action research (CAR) is practical research in the form of various activities carried out to improve or enhance the quality of learning in the classroom. One form of classroom action research is collaborative action research, which involves teachers, school principals, and education instruction lecturers. Classroom action research starts with actual problems during the learning process in class. The teacher as the class manager tries to find solutions to these problems so that learning innovation occurs in the classroom(Saregar, 2016; Setiawan et al., 2019).

In a preliminary study conducted by researchers with science teachers at SDN 17 Palu, especially grade V teachers related to improving the quality of the learning process in class, the teacher submitted several complaints: (1) how to

implement science learning; (2) methods and approaches to support classroom learning to suit the essence of science; (3) integrating scientific and mutual cooperation activities; (4) worksheets that can train students to be trained in using scientific methods so that they can be trained to work independently; (5) how to carry out science learning; (6) how to conduct assessments in the cognitive, affective, and psychomotor domains; (7) how to overcome the limitations of the school's teaching aids (Adnyani et al., 2016; Matamay, 2019).

The teacher observes that during learning activities students rarely rise a question and often imitate the work of friends or are less independent and know something to the extent of what is explained, tried, assigned by the teacher in the class. The scores in science lessons in class V SDN 17 Palu in the 2018/2019 academic year are average in the cognitive realm it only reached 68.02 and had not yet reached the minimum completeness criteria which was 75.00.

The problems of learning natural science in class V SDN 17 Palu include: (1) how to carry out science learning so that students are involved in many activities to find or explain natural events that occur around the house or environment.

Materials and Method

This research is a Classroom Action Research (CAR), which is a research activity carried out in class. Classroom action research has three main characteristics, namely: (1) Reflective Inquiry, (2) Collaborative, and (3) Reflective

The research subjects were 19 students of SDN 17 Palu grade V, even semester of the 2019/2020 academic year.

After completing cycle I learning process, the researcher gave questions and corrected the results of the students' work. At the end of the cycle II meeting an individual evaluation was conducted. Each student works on evaluation questions about changes in the nature of objects, then the results of student work are collected for assessment. The researcher then corrects the results of the students' work. From the test results obtained data in the form of numbers regarding the total score obtained by each student

The indicator of the success of the action taken to state the end of the research cycle in the application of the discovery learning model is if the maximum completeness criteria reaches more than or equal to 80, this indicates that learning by applying the discovery learning learning model in action has been achieved, if not then continued in the next cycle.

Results and Discussion

The results of the pre-action quantitative descriptive analysis showed that the class average learning outcomes score was 68.95 with the highest score 80 and the lowest 60. Students who have met the minimum completeness criteria, there were ≥ 75, 5 students (26.3%). This can be seen from the number of frequencies of students who get grades ranging from 80 and above. Meanwhile, those who have not reached the minimum completeness, there were <75, 14 students (73.7%). It can be seen from the number of frequencies of students who get a score of 75 and below.

The results of quantitative descriptive analysis showed that the class average score obtained by all students in the evaluation cycle I reached 74.21 with the highest score of 100 and the lowest score. Students who have met the minimum completeness criteria, there are ≥ 80, there were 10 students (52.7%). This can be seen from the number of frequencies of students who get grades ranging from 80 and above. Meanwhile, those who had not reached the minimum completeness criteria, there were <80, 9 students (47.3%). It can be seen from the number of frequencies of students who scored 80 and below (Table 1). The results of the quantitative descriptive analysis showed that the class average score obtained by all students in the evaluation cycle II reached 80.3 (Table 1).

Table 1. Analysis of student learning outcomes test data in Cycle I and Cycle II

Observed aspects	Pre action	Cycle I	Cycle II
The highest score	80	100	100
Lowest score	60	50	60
Average value	68.95	74.74	80.30
Number of students who have not reached the Minimum Completeness Criteria	14	9	3
Number of students who has reached the Minimum Completeness Criteria	5	10	16
Percentage of students who has reached the Minimum Completeness Criteria	26.3%	52.7%	84.2%

In order to increase students' interest and enthusiasm in participating in science learning, it is necessary to design learning methods that are in accordance with the characteristics of science. The science content standard at Elementary level relates to how to find out about nature systematically, so that science learning should be taught by the discovery method (Asnawati, 2019; Ibáñez & Delgado-Kloos, 2018). Discovery method is defined as a teaching procedure that emphasizes individual teaching, manipulating objects before arriving at generalizations. Meanwhile, Bruner stated that children must play an active role in learning (Melnyk, 2020). Further stated, that activity needs to be carried out in a way called discovery. Discovery which is carried out by

students in their learning process is directed to find a concept or principle (Hariyati, 2020; Saputri, 2019).

In Cycle I learning, the themes discussed were daily life events with sub-themes the nature of light. The learning method used to explain the material is the Discovery learning method (Rahman, 2017). Through the Discovery Learning Model, learning can help students better master the learning theme, the teacher provides a glimpse of what, how, why, and the benefits of learning oriented to higher order thinking Skills (HOTS). Understanding and awareness of the importance of HOTS makes students motivated to take part in learning, Learning is not just memorizing theories and concepts will make students want to learn with HOTS (Hariyati, 2020; Ichsan et al., 2018; Ichsan et al., 2019).

The average value of the first cycle learning class showed an increase when compared to the pre-action, namely from 68.95 to 74.74. The maximum value is 100 and the minimum score is 60. While the percentage of students who have reached the minimum completeness criteria in the first cycle increased by 26.4%, from 26.3% in the pre-action to 52.7% in the first cycle. In the pre-action there were 14 students who entered the category failed because the value was carried by the specified minimum completeness criteria. In the pre-action, out of 19 students in one class, there were 14 students who had not reached the minimum completeness criteria, after getting the Discovery learning method, in cycle I there were only 9 (nine) students who had not met the minimum completeness criteria, or it could be said that in cycle I there was an increase of 5 (five) students who have reached the minimum completeness criteria.

The increase in students' science learning outcomes in the first cycle was due to the discovery learning method used by researchers to facilitate and guide students in finding the concept of the theme of events in everyday life, so that students were able to find their own concepts. This is in line with Hariyati's (2020) opinion, that the application of the discovery learning method has advantages including students who are finding concepts. This opinion is also in line with Saputri (2019) that with the discovery learning method students are encouraged to do experimental activities, so that in the end students can find something that is expected.

The level of student independence is also low, this is proven by the low percentage of the results of the student independence questionnaire. In cycle I, the number of students who are in sufficient qualification is 12 students (63.16%) and 7 students in the deficient category (36.84). This is because in cycle I students are still busy in learning activities, time is less efficient, the learning model does not make students enthusiastic in participating in learning, and there are some children who are still not confident when they come to the front of the class to deliver the results of the discussion.

In addition to learning outcomes, the data collection technique in this study was a questionnaire to measure students' learning independence. The results of the questionnaire in Cycle I showed that students had independent learning in the good category of 63.16. Cycle II shows 7 students who get good criteria with a percentage of 36.84%, there were 10 students who get sufficient grades with a percentage of 52.63%, and there were 2 students who get poor criteria with a percentage of 10.53% (Table 2).

In cycle II, the same daily life event theme with the sub-themes discussed, is a continuation of the previous sub-themes, namely light reflection and decomposition. The learning process is the same as the discovery learning method by making improvements according to the results of reflection on the implementation of cycle I. Students sit in groups (Ambarwati, 2016; Hadija et al., 2014). Then students carry out learning activities by doing practicum, according to the material explained, guided by researchers to make conclusions.

Table 2. The student learning independence questionnaire in Cycle I and II

No.	Interval	Cycle I		Cycle II		Criteria
		ΣStudents	%	ΣStudents	%	
1	76% - 100%	0	0	7	36.84	Good
2	56% - 75%	12	63.16	10	52.63	Enough
3	40% - 55%	7	36.84	2	10.53	Poor
4	Below 40%	0	0	0	0	Failed
	Total	19	100	19	100	

Giving the opportunity to the selected group to come forward to present the results of their practicum, the learning atmosphere becomes more lively, students seem more eager to express their opinions, so that in cycle II students who have reached minimum completeness criteria reached 78.9% or there are 15 students out of 19 students that reaches the minimum completeness criteria. Still left 4 (four) students who failed to reach the minimum completeness criteria.

In the discovery learning process, students are formed in small groups. Each group consists of four people consisting of men and women. It turns out that learning in groups can attract students' attention and enthusiasm in participating in learning. This is in line with Ambarwati's (2016) opinion regarding the principles of discovery

learning, which is to suggest that learning outcomes be obtained through collaboration with others.

In cycle II learning outcomes increased when compared to cycle I. This was indicated by an increase in the class average score from 74.74 to 80.53. The percentage of students who have reached the minimum completeness criteria in cycle II also increased by 26.2%, from 52.7% in cycle I to 78.9% in cycle II Actions taken in cycle II still used the discovery learning approach, but researchers divided the students into several small heterogeneous groups based on achievement, gender, and social habits. This is in line with the research of Hadija et al. (2014), which shows a heterogeneous group division, students can work together and pass on their knowledge to one another.

The science material taught to students is a real example in daily life, so that in the learning process and practicum activities, all material is related to daily life and is often experienced by students. The discovery learning approach used in cycle II is more effective than in cycle I because the researcher provides more intensive guidance to study groups in drawing conclusions and motivates students to make a percentage so that student activity tends to increase compared to cycle I. This learning can be carried out by teachers effectively and improve better. This research is in line with what (Sumiati 2020) has done (Sumiati, 2020).

Conclusions

The percentage of students who scored above the minimum completeness criteria in the first cycle only reached 52.6% and, the percentage of students who scored above the minimum completeness criteria in the second cycle increased to 84.2%, indicating that the discovery learning method was able to improve students' science learning outcomes. The level of independence of students in cycle I, the number of students who are in sufficient qualification are 12 students (63.16%) and in the less category 7 students (36.84), there is an increase in cycle II to 7 students who get good criteria with a percentage of 36 84% and there were 10 students who got sufficient grades with a percentage of 52.63%.

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