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(RESEARCH ARTICLE)

Augmenting sixth graders' science process skills and learning outcomes on plant breeding materials using the outdoor learning method at SDN 23 Pulubala Gorontalo district

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Abstract

This class action research explores how to augment sixth graders' science process skills and learning outcomes on plant breeding materials using the outdoor learning method at SDN 23 Pulubala Gorontalo District. It was class action research. 15 students, eight males and seven females, acted as subjects. Data analysis results and discussion led us to conclusions that (1) students who demonstrated science process skills with a Good category after using the outdoor learning method in Cycle I increased by number in Cycle II, from eight (48%) to 14 (93%). In other words, the increase involved six students (40%), (2) students who achieved learning outcomes with a completeness category after using the outdoor learning method in Cycle I also increased by number in Cycle II, from seven (48%) to 13 (88%). The increase hence involved six students (40%), and (3) the number of students attained a good category after using the outdoor learning method in Cycle I increased by number in Cycle II, from 7 (47%) to 13 (88%). The increase thus involved six students (72%).

Keywords: Science Process Skill; Student Learning Outcome; Outdoor Learning Method

1. Introduction

A teaching-learning activity exhibits an interaction process or a mutual relationship between teachers and students in a learning unit. Schools, which are formal education institutions, introduce the expectation of decent education to the community. They are liable for creating quality human beings, especially preparing students to be individuals who can give more contributions and show preeminent, formidable, creative, independent, and professional characteristics.

In Indonesia, education, notably at an elementary school/Islamic elementary school level, treats students as objects. Accordingly, teachers, who have two highest scientific authorities in a learning process, play more active roles compared to students, who only receive knowledge from their teachers. Students show passiveness and only sit, focus on the board, listen, and pay attention to teachers, who are delivering learning materials, making the teachers the only learning sources. It poses a compelled learning process.

An absolute component of an educational process is the teacher. Successful delivery of materials in the class anchors on how teachers design the activity. Teachers hence have to be creative and innovative in planning the learning process to carry out. And yet, it is inevitable for teachers when teaching at class to face several challenges albeit having designed lessons as optimally as possible to attract students to be more active in learning. There will be always students who are bored, tired, lazy, drowsy, and do not concentrate on learning. Poor learning activities of students are the corollary of such a poor learning process. Teachers must induce students to think or act in a teaching-learning process. Lesson delivery through student activities will leave an impression to the students, who will think about and process the lesson

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into a different outcome. Active participation of students will result in good knowledge they can have. It is thus mandatory for teachers to figure out more creative and innovative methods which can motivate students to partake in a learning process actively.

We conducted a brief interview with a teacher at SDN 23 Pulubala Gorontalo District. Some challenges we found were that sixth graders at the school, specifically when solving science problems, lacked science process skills and learning media. Additionally, students were absent frequently as they had to assist their parents to work in plantation, which dominated the district area. We found that each week, there were always students who had to be picked up and persuaded to go to the school because they should help their parents to work at plantation. Because of this phenomenon, we desire to introduce a method which can provide and associate materials with student experiences.

Science education aims to allow students to understand the definition of science as a product and process, develop scientific attitudes, and be aware of character values existing in the community to develop positive attitudes and actions. Poor science learning outcomes can be results of several factors, e.g., monotonous learning strategies and internal factors from students themselves, such as a lack of understanding, poor learning material mastery, conceptual errors related to some discussion topics, and teachers' lack of understanding of student learning styles. Learning barriers may come from students who are inclined to participate passively or teachers who lack innovativeness. It yields a monotonous learning activity, growing boredom in students when learning science.

Itching to resolve the issues, we improve the learning using the outdoor learning method, enabling students to self-construct knowledge by thinking critically, and real-life experiences, creating more meaningful learning. The outdoor learning method helps students to cultivate their interest and activeness in participating in learning and independence in catching onto information through observation activities in the surrounding community and group discussion. It makes students able to attribute science materials (concepts) to their environment (the real-life situation) around. Students will also be more creative and positive toward science and realize that science is paramount for daily life. The outdoor science learning steps cover pre-activities, introduction, development, implementation, and closing.

This research aims to elevate process skills and learning outcomes of sixth graders at SDN 23 Pulubala using the outdoor learning method.

2. Methods

This action class research was composed of four action stages, i.e., planning, implementation, observation/evaluation, and reflection. The subjects were 15 sixth graders (eight males and seven females) from SDN 23 Pulubala. Data were collected using observation, tests, and questionnaires as instruments. The practicum activity was assessed using the observation instrument and scored from 0 to 3, in which a score of 0 indicated that no expected character in the experiment was noticeable, while a score of 3 pointed out that all expected characters in the experiment were noticeable in student activities. Research data were then analyzed using a descriptive technique. The analysis was performed by determining the percentage (%), which was then converted into a qualitative form by the range of scales as indicated in Table 1.

Table 1 Converted Observation and Questionnaire Analysis Results

No.	Range of Percentage	Interpretation
1	80%-100%	Good
2	60%-79%	Acceptable
3	≤ 59%	Poor

3. Results

3.1. Cycle I

3.1.1. Observation and Analysis Results

Observation Results of the Use of the Outdoor Learning Method

We present the observation results of teacher skills in using the outdoor learning method in Cycle I comprising four meetings.

Table 2 Summary of the Observation Results of Teacher Activities in Cycle I

No.	Syntaxes of the Outdoor Learning Method	Teacher Activities	Meeting Observation Results				Total
			1	2	3	4	
1	Introductory activity	Preliminary activity	2	2	3	3	10
		Apperception	2	2	2	2	8
		Sub-total	4	4	5	5	18
		Percentage (%)	67	67	83	83	75
		Category	C	C	B	B	B
2	Core activity	Observing stage	2	2	3	3	10
		Categorizing stage	2	2	3	3	10
		Interpreting stage	1	2	3	3	9
		Implementing stage	2	2	2	3	9
		Drawing/communicating conclusions	2	2	2	2	8
		Sub-total	9	10	13	14	46
		Percentage (%)	60	67	87	93	76
		Category	C	C	B	B	B
3	Closing	Reflecting the learning material	2	2	2	2	8
		Evaluating	1	2	2	2	7
		Giving follows-up	1	1	1	2	5
		Sub-total	4	5	5	6	20
		Percentage (%)	67	83	83	100	87
		Category	C	B	B	B	B
Total			17	19	23	25	84
Percentage (%)			60	63	77	85	71
Category			C	C	C	B	C

Description:

(-) = Unimplemented
(√) = Implemented
B = Good
C = Acceptable
K = Poor

An achievement score of 4 or 67% with an Acceptable category was acquired from the introductory activity in Meeting 1. An achievement score of 9 or 60% with an Acceptable category was acquired from the core activity. An achievement score of 4 or 67% with an Acceptable category was acquired from the closing activity. A total score of 17 or 60% with an Acceptable category was hence acquired as the observation result from Meeting 1 in Cycle I.

An achievement score of 4 or 67% with an Acceptable category was acquired from the introductory activity in Meeting 2. An achievement score of 10 or 67% with an Acceptable category was acquired from the core activity. An achievement score of 5 or 83% with a Good category was acquired from the closing activity. A total score of 19 or 63% with an Acceptable category was hence acquired as the observation result from Meeting 2 in Cycle I.

An achievement score of 5 or 83% with a Good category was acquired from the introductory activity in Meeting 3. An achievement score of 13 or 87% with a Good category was acquired from the core activity. An achievement score of 5 or 83% with a Good category was acquired from the closing activity. A total score of 23 or 77% with an Acceptable category was hence acquired as the observation result from Meeting 3 in Cycle I.

An achievement score of 5 or 83% with a Good category was acquired from the introductory activity in Meeting 4. An achievement score of 14 or 90% with a Good category was acquired from the core activity. An achievement score of 6 or 100% with a Good category was acquired from the closing activity. A total score of 25 or 85% with a Good category was hence acquired as the observation result from Meeting 4 in Cycle I.

3.1.2. Evaluation Results

Observation Evaluation Results of Student Process Skills

We show our processing results of data on student process skills during the practicum activity in Table 3.

Table 3 Processing Results of Data on Student Process Skills from Cycle 1

No.	Category	Sub-Total	Percentage (%)
1	Good	8	48
2	Acceptable	2	20
3	Poor	5	32
Total		15	100

Table 3 states that eight students (48%) achieved a Good category, two (20%) achieved an Acceptable category, and five (32%) showed Poor process skills. The noticeable trend of student process skills in Cycle 1 thus demonstrated that only 12 students (18%) were good in quality.

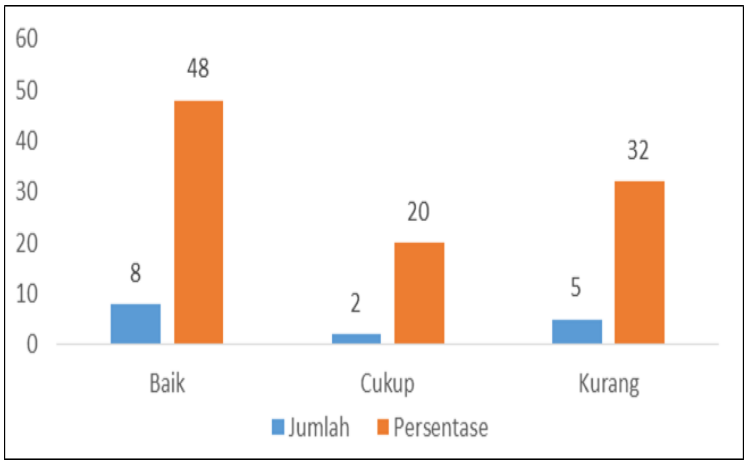

Figure 1 Processing Results of Data on Science Process Skills of Students Undertaking Outdoor Activities in Cycle 1

Student Learning Outcome

We evaluated student learning outcomes using the instrument of a learning outcome test of daily test consisting of multiple-choice and essay questions. The results are suggested in Table 4. 7 out of 15 students (48%) acquired learning outcomes aligned with KKM or ≥ 75, while eight (52%) acquired scores < KKM or < 75.

Table 4 Processing Results of Data on Student Learning Outcome Evaluation in Cycle I

No.	Completeness	Sub-Total	Percentage (%)
1	Completed	7	48
2	Uncompleted	8	52
Total		15	100

Student learning outcomes from Cycle I scored 65% on average with an Uncompleted category. Student learning outcomes from Cycle I hence unfulfilled the criteria for success indicators as required in this research, emphasizing the necessity of carrying out Cycle II.

3.1.3. Reflection

Teacher Skills of Using the Outdoor Learning Method

Teacher skills as examined in Cycle I were categorized as B (Good) but still needed improvements, specifically in the following aspects.

- The teacher did not review the previous lesson during apperception.
- The teacher did not pay attention to class conduciveness related to lesson receptance when delivering learning objectives.
- The teacher provided no thinking opportunity for students related to questions concerning pictures which were given to deliver the problem to students.
- The teacher provided no instructions during the question-answer session for students to raise their hands before answering questions.
- The teacher did not divide students heterogeneously when grouping them. Instead, the grouping was left to students.
- The teacher merely focused on two groups during group assistance.
- The teacher gave no instruction to students to focus on work presentations conducted by their friends.
- Bearing on time management, the teacher delivered the lesson without being concerned about time allocation, closed learning activities unpunctually, and provided no follow-up after the lesson ended.

Student Learning Outcome

A student mean score of 64 was engendered from the daily test in Cycle I, and only five students met KKM. The lowest student score was ten, while the highest was 84. Our reflection results indicated that student learning completeness did not attain the determined criteria. The variable of learning outcomes, according to the success indicator in this research, was arguably unachieved in the Cycle I learning process. The determined success indicator required 80% of students meeting learning outcome completeness. Improvements in Cycle II were thus of crucial importance.

Student Process Skill

Our observation of seven indicators in Meeting 1 in Cycle 1 gave rise to the results that student activities belonged to Category C (Acceptable). None of the determined eight indicators achieved a maximum score. Many weaknesses hence required improvements. The weaknesses were as follows.

- Students focused on teacher explanations poorly. The majority of them paid no attention to teacher explanations and did not record pivotal materials delivered by the teacher.
- Grouping was not conducive. Students were noisy during grouping, unwilling to mingle with their group mates, and showed discomfiture as socializing with their group mates.
- Students were confused when exploring, observing, working, and evaluating the learning process.

- Students were unconfident about expressing arguments and presenting discussion results.
- Students lacked participation and activeness when observing, working, presenting, and evaluating.
- Students lacked the determination and intention to propose questions. Most students were unwilling to propose questions.
- Students lacked participation in reflection and drawing conclusions from learning. Several students did not partake in reflecting or drawing conclusions from learning.
- Students preferred playing when learning, chatting with, and even annoying their friends.
- Students lacked discipline. They were still eating, running outside, or playing in the garden when the class started.

3.2. Cycle II

3.2.1. Observation Results

Observation Results of the Use of the Outdoor Learning Method

Our observation results of teacher skills in using the learning outdoor method in Cycle II which consisted of four meetings are demonstrated in Table 5.

An achievement score of 5 or 83% with a Good category was acquired from the introductory activity in Meeting 5. An achievement score of 16 or 81% with a Good category was acquired from the core activity. An achievement score of 8 or 87% with a Good category was acquired from the closing activity. A total score of 29 or 88% with a good category was hence acquired as the observation result from Meeting 5 in Cycle II.

An achievement score of 6 or 100% with a Good category was acquired from the introductory activity in Meeting 6. An achievement score of 17 or 94% with a Good category was acquired from the core activity. An achievement score of 9 or 100% with a Good category was acquired from the closing activity. A total score 32 or 96% with a Good category was hence acquired as the observation result from Meeting 6 in Cycle II.

Table 5 Summary of the Observation Results of the Use of the Outdoor Learning Method in Cycle II

No.	Syntaxes of the Outdoor Learning Method	Teacher Activities	Meeting Observation Results		Total
			5	6	
1	Introductory activity	Preliminary activity	3	3	6
		Apperception	2	3	5
		Sub-total	5	6	11
		Percentage (%)	83	100	92
		Category	B	B	B
2	Core activity	Observing stage	3	3	6
		Categorizing stage	3	3	6
		Interpreting stage	2	3	5
		Predicting stage	3	2	5
		Implementing stage	2	3	5
		Drawing/communicating conclusions	3	3	6
		Sub-total	16	17	33
		Percentage (%)	81	94	92
		Category	B	B	B
3	Closing	Reflecting the learning material	3	3	6
		Evaluating	3	3	6

		Giving follows-up	2	3	5
		Sub-total	8	9	17
		Percentage (%)	87	100	94
		Category	B	B	B
Total			29	32	61
Percentage (%)			88	96	97
Category			B	B	B

Description:

(-) = Unimplemented
(√) = Implemented
B = Good
C = Acceptable
K = Poor

3.2.2. Evaluation Results

Evaluation Results of Science Process Skill Observation

We exhibit the processing results of data on student science process skills during the practicum activity in Table 6.

Table 6 Processing Results of Data on Student Science Process Skills in Cycle II

No.	Category	Sub-Total	Percentage (%)
1	Good	14	93
2	Acceptable	1	7
Total		15	100

Table 6 indicates the finding that 14 students (93%) belonged to a Good category, and one (7%) belonged to an Acceptable one. The notable trend of process skill completeness in Cycle II, therefore, pointed out that 14 students (93%) had good quality in carrying out the practicum activity.

Student Learning Outcome

We evaluated student learning outcomes after Meeting 2. The instrument of the learning outcome test of a daily test made up of multiple-choice and essay questions was used. The evaluation results are encapsulated in Table 7. 13 out of 15 students (88%) came with scores as learning outcomes which met KKM or ≥ 75, while two (12%) scored less than KKM.

Table 7 Processing Results of Data on the Evaluation of Student Learning Outcomes from Cycle II

No.	Completeness	Sub-Total	Percentage (%)
1	Completed	13	88
2	Uncompleted	2	12
Total		15	100

Students achieved an average learning outcome of 78% with a completed category in Cycle II. We could hence infer that, by studying these data, students had attained cognitive learning outcomes which could meet the criteria for the successful research indicator, requiring no Cycle III.

3.2.3. Reflection

Teacher Skills in Using the Outdoor Learning Method

Teacher skills related to learning was categorized as B (Good) overall. This result brought interpretations as follows:

- The teacher checked the availability of requirements needed, motivated students, delivered learning objectives, delivered material coverage, explained the activities by the syllabus, divided students into several groups, and instructed students to sit by group the teacher had decided as introductory activities. However, in terms of checking student attendance, the teacher did it poorly.
- The teacher formulated the problem, proposed hypotheses, collected data, tested the hypotheses, and drew conclusions as core activities. The activities allowed students to present their works in front of the class.
- The teacher instructed students to understand the core and discussion of the learning materials in a logical sequence and gave follows-up related to the learning activities. We found that test giving during the learning process still needed improvements.

Student Process Skill

Our observation results demonstrated that 14 students (93%) had good scores, and each indicator also resulted in a good category, yet a student (7%) came with an acceptable score. The mean score was thus 442 or 84% with a good category. Our observation also brought to light that seven indicators of process skills had a good category.

Student Learning Outcome

The daily test in Cycle II demonstrated 13 students (88%) scored aligned with the minimum completeness criteria, while two others (12%) did not. The mean score acquired was 487 (78%) with a Completed category. The variable of learning outcomes, based on the success indicators in this research, fulfilled learning outcome completeness. Cycle III was hence not a requirement.

4. Discussion

4.1. Augmenting Science Process Skills Using the Outdoor Learning at SDN 23 Pulubala

Teacher skills in using the outdoor learning method in the introductory activity in Cycle I scored 18 (75%) with an Acceptable category. The teacher checked the availability of requirements needed, divided students into several groups, instructed students to sit by group, and delivered learning objectives well, but in terms of checking student attendance, motivating students, delivering material coverage, and explaining syllabus-based activities, some improvements were required. Teacher skills in the core activity scored 46 (75%) with an Acceptable category and scored 20 (55%) in the closing activity with a Good category. The teacher gave a test in the learning process yet did not instruct students to understand the core and discussion of the learning material in a logical sequence. The teacher gave some learning activity follows-up.

The use of the outdoor learning in Cycle I was proven effective to escalate science process skill activities of students. Eight students (53%) had good scores, and the mean score was 371 (71%) with an Acceptable category. The aspect of predicting experiment results scored 34 (45%), which was considered the lowest in terms of score accomplishment by each skill indicator and therefore categorized as Poor, while the aspect of observing the practicum activity scored the highest at 63 (84%), categorized as Good. The mean accomplishment score of process skill indicators was 53 (71%) with an Acceptable category.

Teacher skills in using the outdoor learning method in the introductory activity in Cycle II scored 11 (92%) with a Good category. The teacher checked the availability of requirements needed, divided students into several groups, instructed students to sit by group, delivered learning objectives, motivated students, delivered material coverage, and explaining syllabus-based activities well, yet in terms of checking student attendance, the category was Acceptable. Teacher skills in the core activity scored 33 (92%) with a Good category and scored 17 (94%) in the closing activity with the same category. The teacher provided learning activity follows-up, instructed students to understand the core and discussion of learning materials in a logical sequence, and gave a test after the learning process.

The use of the outdoor learning method in Cycle II could heighten the science process skill activities of students, as indicated by the results that 14 students (93%) scored with a Good category and that the mean score acquired was 442 (84%) with a Good category. The mean accomplishment score achieved by each indicator of science process skills was 63 (84%) with a Good category. The teacher was identified as having assisting students in planning and preparing required works as the task implementation products, i.e., reports, and in sharing works with friends. Each group presented or delivered group findings in front of the class orally, and the teacher and other groups gave comments on them.

The teacher grouped students in Cycle II evenly, assisted all groups, gave instructions concerning observatory phases to students clearly, and controlled observatory activities of students continuously, enabling them to stay in the school environment. The use of the outdoor learning method helped the teacher apply a range of classroom teaching methods. It made the teacher able to deliver abstract materials in a more concrete and real way through direct observatory activities. Additionally, it allowed the teacher to carry out the roles as a mediator, facilitator, and motivator optimally and help students in the activities of observing, preparing works, presenting, and discussing. The teacher gave motivation during the learning.

Science learning through the outdoor learning method was also of great benefit to students. The method enabled students to be involved actively in learning and gave them more opportunities to make scientific works rather than only listening to the teacher and understand materials by engaging with direct learning, e.g., exploration, group discussion, group presentation, and others. As a result, students acquired knowledge through their inquiry process instead of acquiring it merely through memorization merely. The knowledge students earned would be thus more meaningful, improving their science learning outcomes.

4.2. Augmenting Sixth Graders' Learning Outcomes at SDN 23 Pulubala Using the Outdoor Learning Method

Teacher skills in using the outdoor learning method in all activities Cycle I needed improvements. The introductory activity, based on our observation, scored 18 (75%) with an Acceptable category. The score implied that the teacher checked the availability of requirements needed, divided students into several groups, instructed students to sit by group, and delivered learning objectives well, but in terms of checking student attendance, motivating students, delivering material coverage, and explaining syllabus-based activities, some improvements were required. Teacher skills in the core activity scored 46 (75%) with an Acceptable category and scored 20 (55%) in the closing activity with a Good category. The score pointed out findings that the teacher gave a test in the learning process and some learning activity follow-up but did not instruct students to understand the core and discussion of the learning material in a logical sequence. Seven students (47%) scored conforming to KKM of 75, and the mean cognitive learning score of students in Cycle I was 12% with an Uncompleted category.

Teacher skills in using the outdoor learning method in the introductory activity in Cycle II scored 11 (92%) with a Good category. The data pointed out that the teacher checked the availability of requirements needed, divided students into several groups, instructed students to sit by group, delivered learning objectives, motivated students, delivered material coverage, and explaining syllabus-based activities well. Teacher skills in the core activity scored 33 (92%) with a Good category. The score implied that the teacher formulated problems, proposed hypotheses, collected data, tested hypotheses, and drew the conclusions of learning activities well. Teacher skills in the closing activity scored 17 (94%) with a Good category, describing the facts that teacher had provided learning activity follows-up and instructed students to understand the core and discussion of learning materials in a logical sequence. Using the outdoor learning was proven effective to increase learning outcomes of 13 students (87%), and the mean cognitive learning outcome of students was promoted to 78% with a Completed category. The mean learning outcome completeness score of students, based on each process skill indicator, was 63 (93%) with a Good category. The action of using the outdoor learning method, grounded on the data given, was effective to scale up student learning outcomes, leading us to a decision of the non-necessity of performing Cycle II as success indicators in this research was met.

5. Conclusion

We drew the following conclusions by considering data analysis results and discussion.

- Using the outdoor learning method was effective in augmenting the science process skills of sixth graders at SDN 23 Pulubala Gorontalo District on plant breeding materials in the science learning subject. The effectiveness was stated by the finding that eight students (53%) showed process skills with a Good category in Cycle I and that 14 students (93%) performed similarly in Cycle II. There was an increase in number by six students (40%).

- Using the outdoor learning method could elevate learning outcomes of sixth graders at SDN 23 Pulubala Gorontalo District on plant breeding materials in the science learning subject. The ability was suggested by the finding that seven students (48%) attained good cognitive learning outcomes in Cycle I and 13 (88%) performed similarly in Cycle II, implying an increase in number by ten students (40%).

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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