The Effect of Case-Based Learning in Improving Student Creativity and Thinking Skills in the Vector and Rodent Control Course

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Abstract. One learning model that can actively involve students and increase student creativity is Case Based Learning (CBL). The purpose of this study was to identify differences in students' creativity and thinking skills between the application of case-based learning and conventional learning in vector and rodent control courses. This research was conducted at the Department of Public Health, Jambi University on fifth semester students interested in environmental health with a total of 37 students. The research design is in the form of a pseudo-experimental class involving an experimental class and a control class. The instruments used are test sheets with indicators to measure thinking skills and creativity, communication skills test sheets and assessment report sheets. Data was collected twice through pre-test and post-test. Data processing and analysis using Paired Sample T-Test. The results showed that most students were still less active during lectures using conventional methods / lectures, which was as many as 15 people (40.5%). Students only pay attention, are silent and there are no questions or comments related to the lecture material submitted. The results of statistical tests show that the p value is 0.000, the p value is $< \alpha$ (0.05), which means there are differences in student learning outcomes using conventional methods / lectures with the CBL method. This means that there is an influence of providing CBL learning methods on the thinking skills (learning outcomes) of students in semester V interested in environmental health majoring in public health sciences FKIK Jambi University in vector and rodent control courses. The conclusion of this study is that the application of case-based learning models is expected to increase students' creativity and thinking skills and hone communication skills by being actively involved in complex case-study-based learning processes.

Keywords: Case-based learning · creativity · thinking skills · vectors and rodents

1 Precedence

Education is a learning process that includes teaching and learning activities, where there is interaction between students and lecturers. In the field of education, lecturers act as educators who guide students to be able to develop knowledge and can change

the condition of students from not knowing to knowing. Education is also one of the main factors determining economic growth, namely through increasing the productivity of the educated workforce, and education also has an important role in ensuring the development and survival of the nation [1].

The delivery of learning material or teaching and learning process is a communication process, namely the process of conveying messages or thoughts from one person to another, the use of appropriate methods will make students effectively able to receive the message conveyed [2]. Based on Law No. 20 of 2003, it is clear that the task of teachers and lecturers is to educate students to become whole people, so it can be said that the duties of lecturers are heavier. A lecturer is required to master various abilities as a professional lecturer in his field. [3] The abilities in question start from how to teach, mastery of the material, selection of various teaching methods, the ability to make teaching tools/media, attitudes, examples and so on [4].

To develop student creativity, a good and innovative learning process is needed. The learning process is an activity to provide knowledge, attitudes and skills that are planned so that students are able to achieve the expected competencies. Therefore, the right learning model is needed in an effort to increase student creativity. One learning model that can actively involve students and increase student creativity is Case Based Learning (CBL). The CBL learning model is a constructivist-oriented learning approach with active student participation so that students can form their own knowledge. In CBL, students are given a realistic problem scenario, a case, which can be studied retrospectively by testing how the case was solved or interactively trying to solve the case. With the cases presented in the CBL, the student is given the opportunity to practice his mathematical abilities. Cases are closely related to problems, so students can improve problem-solving skills. In addition, a case certainly contains many things, can connect several concepts at once, so that students can practice their abilities related to connections [5].

Control of vectors and disease-carrying animals (intruders) aims to break the chain of transmission between the source of disease and humans or prevent transmission of infectious diseases to humans through the role of disease vectors. Vector control efforts are more focused on integrated vector control policies through vector control approaches using one or a combination of several vector control methods; Integrated Vector Control (PVP) is an approach that uses a combination of several vector control methods based on the principles of safety, rationality and effectiveness of its implementation and pays attention to the sustainability of its success [6].

Seeing this phenomenon, the creativity of students of the Vector Control course, Public Health Science Study Program, FKIK Jambi University needs to be developed as an effort to overcome problems in learning achievement. This CBL method is one method that can be used in learning vector and pest control. So far, the learning process in the Vector Control and Roden courses only relies on face-to-face methods (teacher centered learning) and audiovisual systems, thus making students less active and creative and independent in understanding the problems and phenomena that occur. In addition, students' understanding of learning content is still very lacking, because students are passive in receiving knowledge and lack creative thinking so they often ignore the learning process itself [7].

Therefore, the research that has been carried out is in line with previous research where this study discusses the character of self-efficacy with the title Self-efficacy of teachers in inclusion classrooms. The novelty of this study is that there is still a lack of identification of self-efficacy characters so it needs to be reviewed. To overcome these problems, researchers want to try to apply the case-based learning or CBL method as one of active learning. learning methods in the Vector Control and Roden courses at the Public Health Study Program FKIK Jambi University. By using a case-based learning model, it is expected to increase student creativity so that literacy and character competencies can be achieved.

2 Method

This research was conducted at the Department of Public Health, Jambi University on fifth semester students interested in environmental health with a total of 37 students. The research design was in the form of a pseudo-experimental class involving an experimental class and a control class [8]. The instruments used are test sheets with indicators to measure thinking skills and creativity, communication skills test sheets and assessment report sheets. Data was collected twice through pre-test and post-test. Data processing and analysis using the Paired Sample T-Test, so that information is obtained about the difference in results between the control group and the experimental group [9].

3 Results and Discussion

At the planning stage, researchers compile designs that will be implemented, namely: compiling semester learning plans (RPS) for Vector Control and Roden which will be studied by the lecture method, compiling and preparing teaching materials to be taught, preparing observation sheets for the implementation of the learning process, compiling questionnaires to see the mastery of student understanding.

3.1 Overview of Student Activities When Learning with Conventional Methods

The initial condition of learning activities for fifth-semester students interested in environmental health of the Department of Public Health. FKIK Jambi University is still relatively low (less active), this can be seen from the results of initial observations of research (Table 1).

Based on the results of the analysis, it is known that student activity during Vector and rodent control lectures uses conventional methods / lectures, namely most students are still less active during lectures, namely 15 people (40.5%). Students only pay attention, are silent and there are no questions or comments related to the lecture material submitted. Meanwhile, there are 6 active students (16.2) and only 3 students who are very active during lectures (8.1%). This result is because during the learning process still using lecturer-centered learning methods and models, which use more lecture methods during the learning process, and lecturers are also less creative in using media and The right learning strategy as a means. from the student's understanding. So that the learning process takes place monotonously and there is no feedback.

Table 1. Description of Student Activities in Learning Vector Control with Conventional Methods / Lecture Methods

Active Criteria	Frequency (f)	Percentage (%)
Very less active	6	16,2
Less active	15	40,5
Quite active	7	19
Avtive	6	16,2
Very avtif	3	8,1
Total	37	100

3.2 Pre-test and Post-test Results Data on Conventional Method Learning

Before being given treatment (Case Based Learning learning method), students are given learning using conventional methods, namely by lectures or explanation of lecture material by lecturers. Before the lecture method is implemented, students are given an initial test (Pre-test) first, then after learning with the conventional method / lecture students are given the same test (Post-test). Data on pretest and posttest results can be seen in Table 2.

Based on the results in Table 2, before learning using conventional methods / lectures students are given a test first. Of the 37 students, the average score on the test was 38.38 and the standard deviation was 10.67. The data shows that students' understanding of the concept Mosquito vectors and ecology still tend to be low, with the lowest score being 20 points out of 100 points and the highest score being 60 points out of 100 points. Low student learning outcomes are considered reasonable because learning activities have not been carried out.

Furthermore, the final test is given after learning with the lecture method. This is done to see the learning outcomes of students after being treated in the form of learning activities with the lecture method. Based on the post test results in Table 2, student learning outcomes obtained an average score of 50.27 and a standard deviation of 7.98.

Table 2. Pretest and Posttest Values of Learning Vector Control and Roden with Conventional Methods / Lectures

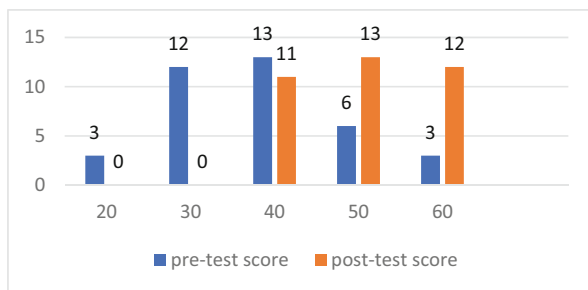| Data	Pre-test	Post-test
N	37	37
Minimal score	20	40
Maximum score	60	60
Mean	38,38	50,27
Standard Deviation	10,67	7,98

Fig. 1. Pretest and Posttest Value Graph Learning with Conventional Methods

The data shows that students' understanding of the concept of vectors and mosquito ecology has increased when compared to before the learning activities were carried out. However, students' scores are still relatively low because students' maximum scores are still at 60 points out of 100 points.

Based on Fig. 1, it is known that 3 people scored 20 people during the pre-test, 12 people got 30, 13 people got 40, 6 people got 50 and 3 people got 60. While the students' scores at the time of the post test, as many as 11 people scored 40, 13 people got 50 and 12 people got 60. This shows that the understanding of fifth-semester students who are interested in environmental health is still low in learning with the lecture method.

3.3 Overview of Student Activities When Learning with the CBL Method

The initial condition of learning activities for fifth-semester students interested in environmental health of the Department of Public Health. FKIK Jambi University at the time of learning with the CBL method can be seen from the results of research observations (Table 3).

Based on the results of the analysis, it is known that student activities during lectures. Control of vectors and rodents with the CBL method went well from the 4th meeting to the 6th meeting, this can be seen from the percentage of activity. There was an increase in activity at each meeting, where the less active child at the fourth meeting increased to

Table 3. Overview of Student Activities in Learning Vector Control with CBL Method

Active Criteria	Frequency (f)	Percentage (%)
Very less active	0	0
Less active	0	0
Quite active	3	8,1
Avtive	24	64,9
Very avtif	10	27
Total	37	100

be quite active and the child who was active enough to be active and very active at the 6th meeting. This means that there are still students who are still less active at the 4th meeting, namely 1 person (2.7%), but at the next meeting students increase to be active enough to be active at the 6th meeting.

One of the stages in CBL is the provision of evaluation. This aims to determine the level of understanding of each group member towards the case learning is solved and also to provide information to other groups. In this case, not only group representatives master the case material, but all group members must master the case material that has been solved/solved. Thus, students will be more active and their understanding and thinking skills will increase.

3.4 Pretest and Posttest Results Data for CBL Method Learning

After learning with conventional methods / lectures, students are given learning using the CBL method, namely by solving cases that have been agreed between lecturers and each student group. Before the CBL method is implemented, students are given an initial test (Pre-test) first, then after learning with the CBL method are given the same test (Post-test). Data on pretest and posttest results can be seen in Table 4.

Based on the results in Table 4, before learning using the CBL method students are given a test first. Of the 37 students, the average score of the test results was 46.76 and the standard deviation was 11.56. The data showed that students' understanding of the concept of mosquito ecology and its relationship to malaria was still low, with the lowest score being 20 points out of 100 points and the highest score being 70 points out of 100 points. Low student learning outcomes are considered reasonable because learning activities have not been carried out.

Furthermore, a final test is given after learning using the CBL method. This is done to see the learning outcomes of students after being treated in the form of learning activities with the CBL method. Based on the post test results in Table 5, student learning outcomes obtained an average score of 82.16 and a standard deviation of 11.58. The data shows that students' understanding of the concept of mosquito ecology and its relationship with malaria has increased when compared to before the learning activities were carried out. This is evidenced by the lowest student grade, which is 60 points out of 100 points, and some students even get 100 points.

Table 4. Pretest and Posttest Values of Vector and Roden Control Learning with CBL Method

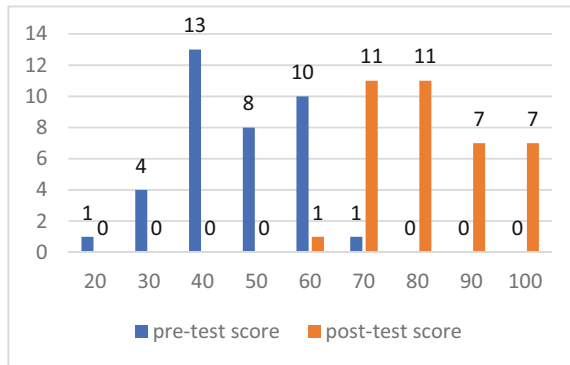| Data	Pre-test	Post-test
N	37	37
Minimal score	20	60
Maximum score	70	100
Mean	46,76	82,16
Standard Deviation	11,56	11,58

Fig. 2. Pretest and Posttest Value Graph of Learning with CBL Method

Based on Fig. 2, it is known that the students' scores at the time of the pre-test, as many as 1 person scored 20, 4 people scored 30, 13 people scored 40, 8 people scored 50, 10 people scored 60 and 1 person scored 70. Students at the time of the post test no one scored 20 to 50, as many as 1 person scored 60, 11 people got a score of 70, 11 people got a score of 80, 7 people got a score of 90 and 7 people got a score of 10. This shows that the understanding of semester V students' interest in environmental health increased after being given CBL learning treatment.

3.5 The Effect of Learning Using the CBL Method on Thinking Skills (Learning Outcomes)

Furthermore, statistical analysis (independent sample t-test) was carried out to determine the difference in thinking skills (learning outcomes) using conventional methods with the CBL method. The difference test and the effect of CBL method administration were analyzed using IBM SPSS.20 Application, obtained data in Table 5.

Based on Table 5, it is known that the average score of students in learning with conventional methods / lectures is 50.27 and the standard deviation is 7.988. While the average score of students in learning with the CBL method is 82.16 and the standard deviation is 11.579. The difference in the results of the two methods is 31.89. The results of the statistical test show a p.value of 0.000 p value $< (0.05)$ which means that there are differences in student learning outcomes using conventional methods / lectures with the CBL method.

Table 5. The effect of learning using the CBL method on thinking skills (learning outcomes)

Study Methods	n	*Mean*	Sd	*Meaningful Differences*	*thing. value*
Conventional	37	50,27	7.988	31,89	0,000
Case-Based Learning (CBL)	37	82,16	11.579		

Research conducted so far has not discussed more deeply related to differences in learning outcomes of knowledge dimensions, both factual and metacognitive between Case Based Learning (CBL) models and other learning methods. However, some of the studies below discuss CBL on student learning outcomes.

A researcher who developed CBL into Biology lessons with his research entitled "Case Study Teaching Method Improves Student Performance and Perceptions of Learning Gains" showed that case studies, regardless of the source, are significantly more effective than other methods for improving performance on assessment questions. related to some biological material. These findings correlate positively with improved learning outcomes related to oral and written communication skills as well as the ability to recognize relationships between biological concepts and other aspects of life. [10]. This is because the cases given are cases in the form of problems that are well structured in the story and are still related to their lives. Then the research entitled "Application of Problem-Based Learning to Improve Biology Learning Outcomes of Inshafuddin High School Students in Banda Aceh" stated that by being given problem-based learning (in this case), the ability of student biology learning outcomes on fungal material was better than students who were given conventional learning. [11].

The results obtained can be concluded that there is an influence of CBL learning method on the thinking skills (learning outcomes) of semester V students interested in environmental health majoring in public health FKIK Jambi University in vector and rodent control courses.

4 Conclusion

The conclusion of this study is that the application of a case-based learning model is expected to increase students' creativity and thinking skills and hone communication skills by being actively involved in complex learning processes based on case studies.

Author's Contributions
Title "The Influence of Case-Based Work in Improving Student Creativity and Thinking Skills in Vector Control and Rodent Courses".

Research Concepts & Questions	:	Fajrina Hidayati
Conducting Research	:	Fajrina Hidayati, Evy Wisudariani
Statistical analysis	:	Fajrina Hidayati
Report Writing	:	Fajrina Hidayati, Evy Wisudariani

References

1. RT Sari, "Analisis Proses Pembelajaran IPA Dengan Menggunakan Modul Pembelajaran Pendidikan Karakter Berorientasi Melalui Pendekatan Quantum Learning," *Jurnal Penelitian dan Pembelajaran IPA* , vol. 4, tidak. 1, hlm. 14–24, 2018.
2. IR Jusar, "Analisis Kebutuhan Modul Pembelajaran IPA Berorientasi Pendidikan Karakter Melalui Pendekatan Quantum Learning di Sekolah Dasar," *Bioedukasi (Jurnal Pendidikan Biologi)* , vol. 8, tidak. 1, hlm. 26–32, 2017.
3. UU RI No.20, *Sistem Pendidikan Nasional* . 2003.
4. S. Masholekhatin, "Pengaruh Model Project Based Learning (PBL) terhadap Hasil Belajar Geografi," *Jurnal Online Muhammadiyah* , 2015.
5. M. Afcariono, "Penerapan Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Siswa pada Mata Pelajaran Biologi," *Jurnal Pendidikan Inovatif* , vol. 3, tidak. 2, 2008.
6. PP RI, *Peraturan Pemerintah Republik Indonesia Nomor 66 Tahun 2014 tentang Kesehatan Lingkungan* . 2014.
7. RT Sari, "Penerapan Model Pembelajaran Project Based Learning (PjBL) Upaya Peningkatan Kreativitas Mahasiswa," *Varia Pendidikan* , vol. 30, tidak. 1, hlm. 79–83, 2018.
8. Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif dan R&D* . Bandung: Alfabet, 2014.
9. AM Yusuf, *Metode Penelitian: Kuantitatif, Kualitatif dan Penelitian Gabungan* . Jakarta: Kencana, 2017.
10. JTT dan Rybarczyk, Brian J, Antonio T. Baines, Mitch McVey dan H. Wilkins, "Pendekatan Berbasis Kasus Meningkatkan Hasil Belajar Siswa dan Pemahaman Konsep Respirasi Seluler., " *Biokimia dan Pendidikan Biologi Molekuler* , vol. 35, tidak. 3, 2017.
11. M. Afcariono, "Penerapan Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Siswa pada Mata Pelajaran Biologi," *Jurnal Pendidikan Inovatif* , vol. 3, tidak. 2, 20