International Journal of Research and Review
[Indexed, Peer-Reviewed Journal]
Volume 12; Issue: 4; April 2025
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

The Implementation of Project-Based Learning (PjBL) Model on Students' Creative Thinking Skills in Science Subject: Human Excretory System Material for Eighth Grade at SMP State 1 Bulawa Junior High School

Sugiyanti Slamet[1], Elya Nusantari[2], Djuna Lamondo[3], Margaretha Solang[4], Frida Maryati Yusuf[5], Muh Nur Akbar[6]

[1,2,3,4,5,6]Biology Education Study Program, Department of Biology,
Faculty of Mathematics and Natural Sciences, Universitas Negeri Gorontalo, Indonesia

Corresponding Author: Elya Nusantari

DOI: https://doi.org/10.52403/ijrr.20250446

ABSTRACT

Creative thinking ability is a cognitive activity or thought process that enables individuals to generate new and beneficial ideas. One instructional model that can be implemented to develop students' creative thinking skills is the Project-Based Learning (PjBL) model. This study aims to apply the Project-Based Learning (PjBL) model to enhance the creative thinking skills of eighth-grade students on the topic of the human excretory system. The research method used a Pre-Experimental design with a One-Group Pretest-Posttest approach. The subjects of the study consisted of 24 eighth-grade students from SMP State 1 Bulawa Junior High School. Data collection techniques included written tests, observations, and student response questionnaires, analyzed using a quantitative descriptive approach. The results indicate that the implementation of the learning model achieved an average percentage of 92%, categorized as very good. Student activity obtained an average percentage of 65%, categorized as fairly good. Student responses reached an average percentage of 88%, categorized as very good. The overall pretest results showed an average percentage of 50%, categorized as less creative, while the posttest results demonstrated an average percentage of 88%, categorized as creative. Additionally, the average percentage of product scores from each group was 77%, categorized as creative. Therefore, it can be concluded that the implementation of the Project-Based Learning model in the human excretory system topic was successfully conducted and had a positive impact on students' creative thinking skills in the eighth grade of SMP State 1 Bulawa Junior High School.

Keywords: Project-Based Learning, Creative Thinking Ability, Human Excretory System

INTRODUCTION

Education plays a crucial role in the advancement of a nation and contributes to improving the quality of human resources. In the 21st century, also known as the Knowledge Age, there is a growing demand for highly skilled human resources who possess the ability to collaborate, think critically and creatively, communicate effectively, and be involved in lifelong learning (Riastuti & Febrianti, 2021). In the field of education, skill development is

essential for enhancing the quality of education. Students may struggle to realize their ideas and produce creative works without adequate skills. Furthermore, for their work to be recognized and appreciated, students must also cultivate attitudes and behaviors that are socially acceptable (Nahdiah & Handayani, 2021).

The ability to think creatively is essential for individuals, as it enhances their existing skills. Creative thinking is one of the cognitive characteristics of creativity. It refers to the ability to plan and solve problems, make improvements and modifications, and generate new ideas. As stated by Putra et al. (2016), "Creative thinking is part of the thought process that aims to reveal new relationships, view things from a new perspective, and build combinations of previously mastered concepts." This ability enables students to develop innovative ideas by utilizing their prior knowledge to solve problems from different perspectives.

After conducting observations and analyzing the results of interviews with science subject teachers at SMP State 1 Bulawa Ju7nior High School, particularly in eighth-grade classes, several issues were identified. Students were found to be less active during the learning process, with some hesitant to ask questions or express their opinions. The teaching and learning process, which should be student-centred, was instead dominated by teachers leading the learning instead of supporting it. Additionally, there was no implementation of project-based assignments that emphasize research activities based on predetermined themes or topics. As a result, many students showed a lack of enthusiasm for learning, as teachers had not sufficiently applied instructional models that encourage student engagement. This lack of active participation hindered students' creativity in processing and understanding the material, leading to minimal active responses from learners during lessons.

An instructional model that can be implemented to develop students' creative thinking skills is the Project-Based Learning (PjBL) model. This approach engages students with real-world problems and places them in positions of responsibility. Throughout the process of completing a project, students are required to work collaboratively in teams or groups, which indirectly encourages them to express creative ideas actively and fosters the development of creative actions and thinking (Suranti et al., 2017).

The human excretory system topic, when taught using the PjBL model, allows students to work independently within groups, thereby facilitating deeper understanding. This subject matter is directly related to the students themselves. Thus, when they discover information from various sources on their own, they are more likely to understand how to apply knowledge of the excretory system in everyday life. Furthermore, it enables them to implement this knowledge in maintaining personal health (Siti et al., 2016).

MATERIALS & METHODS

This research was conducted at SMP State 1 Bulawa Junior High School, located on Jl. Simpang Tiga Kaidundu, Kaidundu Subdistrict, Bulawa District, Bone Bolango Regency, Gorontalo Province. The research employed a Pre-Experimental design with a One-Group Pretest-Posttest approach. The subjects of the study were 24 eighth-grade students from SMP State 1 Bulawa Junior High School. Data collection techniques included observation using learning implementation sheets, student activity sheets, student response questionnaires, and tests of creative thinking skills. Data analysis was carried out using quantitative descriptive analysis, with specific formulas and interpretation tables applied accordingly.

Analysis of Learning Implementation

The analysis of learning implementation was conducted by assigning scores to each indicator using observation sheets based on a Likert scale.

$$\text{Learning Implementation} = \frac{\sum \text{Score of each aspect}}{\sum \text{Maximum score}} \text{ x } 100\%$$

The resulting percentage of learning implementation was then interpreted in accordance with the criteria presented in Table 1 (Husain et al., 2019).

Table 1. Learning Implementation Criteria

Implementation	Criteria
0-20	Very poor
21-40	Poor
41-60	Fair
61-80	Good
81-100	Very Good

Student Activity

Data obtained from student activity observation sheets were analyzed using a percentage formula (Marlina & Tamrin, 2015):

P = Number of indicators performed by students X 100% Total number of students

The resulting percentage of student activity was then interpreted according to the criteria presented in Table 2 (Sugiyono, 2017).

Table 2. Student Activity Criteria

Student Activity (%)	Criteria
0-20	Very poor
21-40	Poor
41-60	Fair
61-80	Good
81-100	Very Good

Student Response

Data obtained from the student response questionnaire were analyzed using a percentage formula (Agustina as cited in Efendi, 2021):

P = Total number of student responses X 100% Total ideal score

The resulting percentage of student responses was then interpreted based on the criteria outlined in Table 3 (Riduwan, 2015).

Table 3. Student Response Criteria

Student Response (%)	Criteria
81-100	Very Good
61-80	Good
41-60	Fair
21-40	Poor
0-20	Very Poor

Students' Creative Thinking Skills

The analysis of students' creative thinking skills was conducted through several stages. The initial stage involved calculating the total scores of the pre-test and post-test. Following this, students' creative thinking abilities were analyzed using the percentage formula (Novantoro, 2019):

$$P_i = \frac{nx_t}{nx_i} \times 100\%$$

Description:

Pi : Percentage of creative thinking ability

nxt : Total student score per indicator

nxi : Total ideal score per indicator

In the final stage, the percentage of creative thinking ability was interpreted according to the criteria outlined in Table 4 (Effendi & Farlina, 2017).

Table 4. Creative Thinking Skills Criteria

Creative Thinking Ability (%)	Criteria
81-100	Very Creative
61-80	Creative
41-60	Fairly Creative
21-40	Less Creative
0-20	Not Creative

RESULTS

Learning Implementation

The results of learning implementation using the Project-Based Learning model in the first meeting reached a percentage of 90.77% the

second meeting 92.31%, and the third meeting was 93.85%. These results are included in the "Very Good" category and are illustrated in Figure 1.

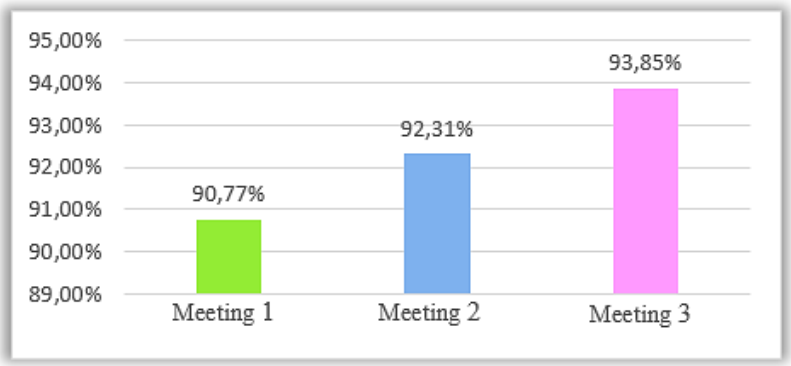

Figure 1. Graph of Learning Implementation Percentage Results

Based on the learning implementation results over three meetings, which followed the syntax of the Project-Based Learning model on the topic of the human excretory system, the implementation can be categorized as very good, with an average percentage score of 92.31%. The criteria used to determine the level of learning implementation were adopted from Rahmawati (Husain et al., 2019).

Student Activity

The results of student activity during the implementation of the Project-Based Learning model on the topic of the human excretory system are shown in Figure 2.

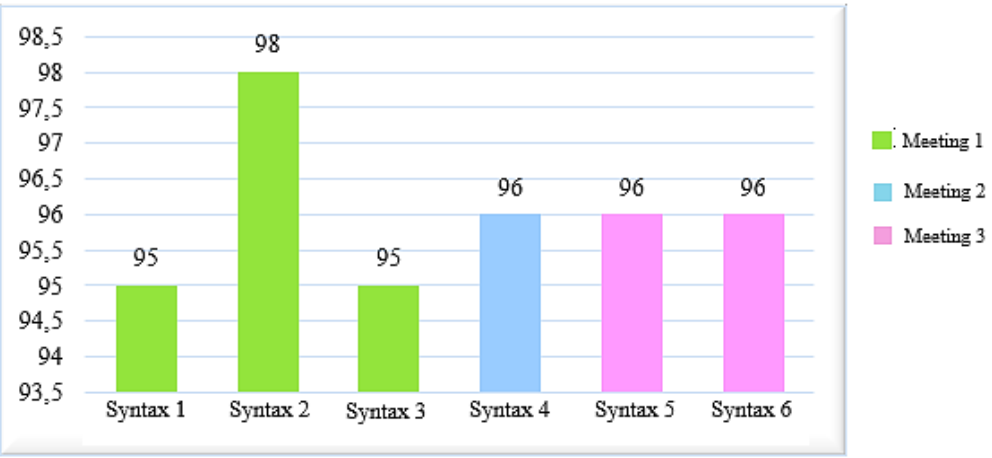

Figure 2. Graph of Student Activity Percentage Results

Description:

Syntax 1: Posing essential questions
Syntax 2: Planning steps
Syntax 3: Creating a schedule
Syntax 4: Monitoring students and project progress
Syntax 5: Presenting/testing results
Syntax 6: Evaluating experiences and project outcomes

The results of student activity analysis revealed that in the first meeting, Syntax 1 scored 95%, Syntax 2 scored 98%, and Syntax 3 scored 95%, all of which are categorized as Very Good. In the second meeting, Syntax 4 achieved a score of 96%, while in the third meeting, both Syntax 5 and

Syntax 6 each obtained a score of 96%, also including the Very Good category.

The students' activities during the three meetings using the syntax of the Project-Based Learning model on the topic of the human excretory system obtained an average percentage score of 65%, which is categorized as Good. The category used to determine the criteria for student activity was adopted from Sugiyono (2017), in which a percentage range of 61%–80% is included in the good category.

Student Responses

The results of students' responses after the implementation of the Project-Based Learning (PjBL) model on the topic of the human excretory system can be seen in Figure 3.

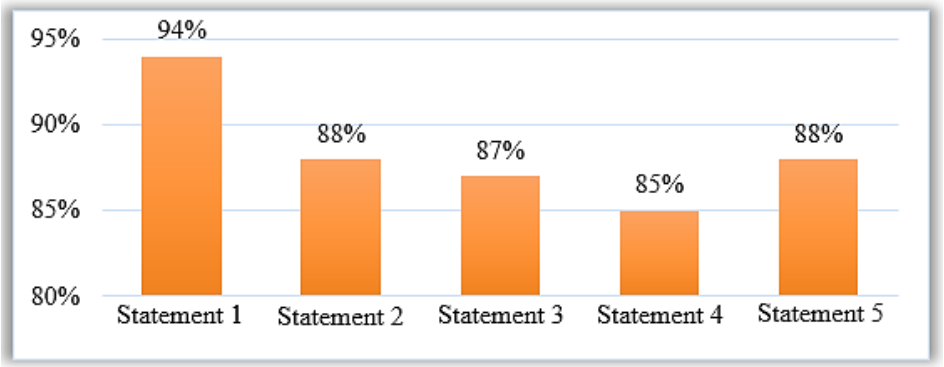

Figure 3. Percentage Graph of Students' Response Results

Description:

1. Statement 1: With the implementation of the recently learned Project-Based Learning model, I feel more enthusiastic about participating in the learning process on the topic of the human excretory system.
2. Statement 2: With the implementation of the recently learned Project-Based Learning model, I am more active during the learning process on the topic of the human excretory system.
3. Statement 3: With the implementation of the recently learned Project-Based Learning model, I find it easier to understand the human excretory system material.
4. Statement 4: With the implementation of the recently learned Project-Based Learning model, I am more confident in asking questions to both the teacher and my classmates.
5. Statement 5: I enjoy learning in groups with the application of the recently learned Project-Based Learning model on the human excretory system topic.

The results of students' responses showed that statement 1 received a percentage of 94% with a "very good" category, statement 2 received 88% with a "very good" category, statement 3 received 87% with a "very good" category, statement 4 received 85% with a "very good" category, and statement 5 received 88% with a "very good" category. The students' responses can be categorized as very good, with an average percentage of 88%. The criteria used to determine the students' responses category was adopted from Ridwan (2015), in which a percentage range of 81%–100% is classified in the very good category.

Creative Thinking Skills

Pre-test and Post-test of Creative Thinking Skills

The results of the implementation of learning using the Project-Based Learning model on the topic of the human excretory system can be seen in Figure 4.

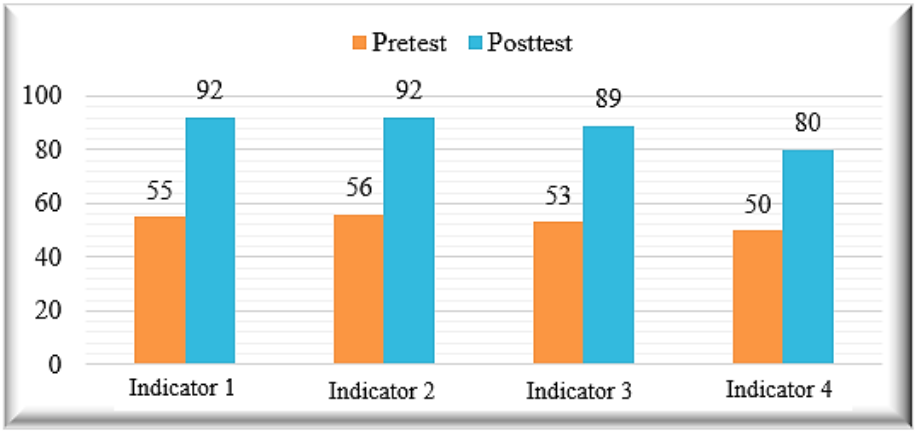

Figure 4. Graph of Students' Creative Thinking Skills

Description:

Indicator 1: Fluency - the ability to produce multiple ideas smoothly

Indicator 2: Flexibility - the ability to approach problems from different perspectives

Indicator 3: Originality - the ability to generate unique or novel ideas

Indicator 4: Elaboration - the ability to develop and refine ideas in detail

The results of students' creative thinking skills before the implementation of the Project-Based Learning model (Pre-test) showed an overall average percentage of 54%, which is included in the less creative category within the 41%–55% range. Meanwhile, after the implementation of the Project-Based Learning model (Post-test) on the topic of the human excretory system, students' creative thinking skills showed an improvement with an overall average percentage of 88%, categorized as very creative, within the 80%–100% range. The criteria used to determine the level of students' creative thinking ability were adopted from Arikunto (2010).

Product Assessment on the Excretory System

The analysis results of creative thinking skills, consisting of indicators such as fluency, flexibility, originality, and elaboration, were obtained through the assessment of products created in the Project-Based Learning (PjBL) activity. These products were in the form of learning media on the human excretory system, developed by four student groups. The product assessment served as supporting data to measure the creative thinking skills of each group. The detailed results are presented in Figure 5.

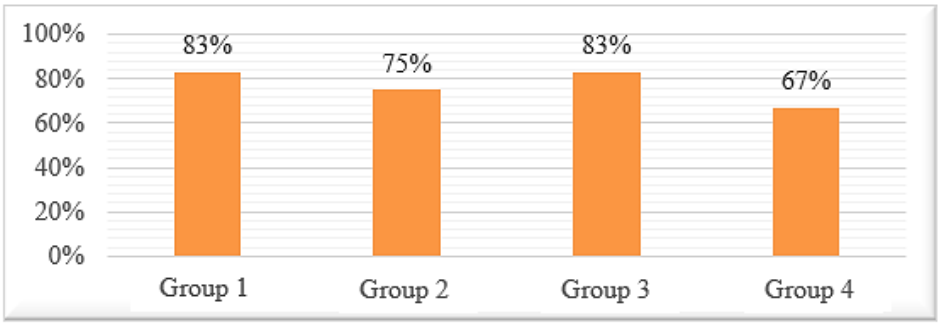

Figure 5. Average Percentage of Product Development by Each Group

The scores obtained from the product assessment showed that Group 1 achieved a percentage of 83%, categorized as very creative; Group 2 achieved 75%, categorized

as creative; Group 3 achieved 83%, categorized as very creative; and Group 4 achieved 67%, categorized as creative. Thus, the overall average percentage of product-based creative thinking skills across all groups was 77%. The average scores for each indicator of creative thinking skills are further illustrated in Figure 6.

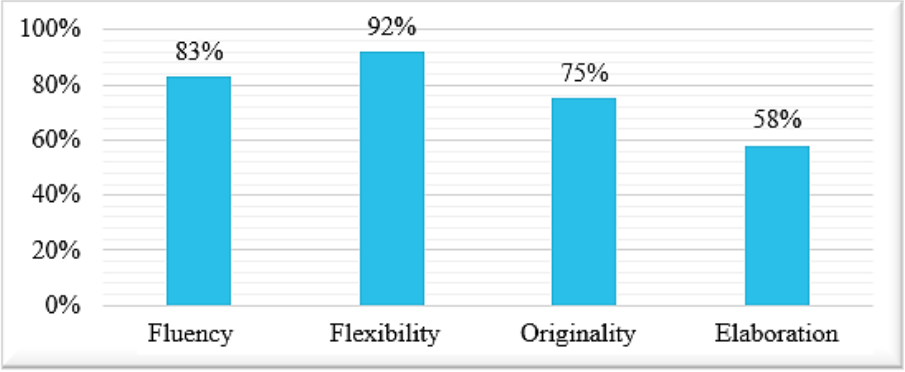

Figure 6. Average Score Percentage for Each Indicator

The results showed that the fluency indicator obtained a percentage of 83%, categorized as very creative; the flexibility indicator achieved 92%, also categorized as very creative; the originality indicator scored 75%, falling under the creative category; and the elaboration indicator scored 58%, which is categorized as moderately creative.

DISCUSSION

Based on the learning implementation data over three meetings, the results showed percentages of 90.77%, 92.31%, and 93.85%, with an average percentage of 92.31%, categorized as very good. This indicates that the implementation of the Project-Based Learning model was carried out effectively and successfully.

Student activities were aimed at observing learners during the learning process using observation sheets conducted by an observer. According to Putri et al. (2017), students' learning activities contribute to the development of knowledge and skills, which in turn enhance learning outcomes and help create a positive learning environment. Based on the research results over three meetings, the average percentage of student activity reached 65%, which falls under the good category within the range of 61%–80%, as classified by Sugiyono (2017). This indicates that students were actively engaged during the learning process, expressed their opinions to one another, and demonstrated key ideas related to the learning materials through the implementation of the Project-Based Learning model on the topic of the human excretory system.

Students demonstrated a positive response throughout the learning process using the Project-Based Learning model. This was reflected in the results of student response questionnaires, which indicated active participation during the lessons. The average percentage of student responses obtained after the implementation of the Project-Based Learning model on the topic of the human excretory system was 88%, falling into the very good category within the range of 81%–100%, as adopted from Riduwan (2015). This positive response illustrates the effectiveness of the Project-Based Learning model in stimulating student engagement and enhancing students' creative thinking skills. These findings are supported by research conducted by Rahmazatullaili et al. (2017), which also indicated that students' creative thinking skills showed a positive impact following the implementation of the Project-Based Learning model.

Based on the creative thinking skills measured through the implementation of the Project-Based Learning model on the topic of the human excretory system, the overall

average score obtained was 54% on the pre-test and 88% on the post-test. These scores were then averaged and presented according to each indicator of creative thinking skills based on the assessment criteria proposed by Effendi & Farlina (2017). The first indicator, Fluency (the ability to think fluently), showed an average percentage of 55% on the pre-test, which falls into the moderately creative category. In comparison, the post-test showed an average of 92%, categorized as very creative. This indicates an improvement of 37% in students' fluency thinking ability. As stated by Firdaus et al. (2018), the number of solutions generated for a problem is directly proportional to the level of fluency thinking skills possessed by students. This finding is also consistent with research by Noor (2024), which showed that students categorized as "Very Creative" were able to generate numerous ideas, provide answers to problem-solving questions, suggest multiple solutions and demonstrate their ability to think beyond a single answer.

The second indicator, Flexibility (the ability to think flexibly), showed an average pre-test percentage of 56%, categorized as moderately creative. In comparison, the post-test result reached an average of 92%, categorized as very creative. This indicates an improvement of 36% in students' flexibility in thinking. Open-ended questions provide students with the opportunity to think more flexibly (Ayu & Tri, 2019). According to Shively (2011), exploratory activities that encourage flexibility help students discover new insights based on differing interpretations of their findings. This is consistent with the study conducted by Noor (2024), which showed that students reached an average percentage of 86.2% in the Very Creative category, particularly in generating various ideas, answers, and questions.

The third indicator, Originality (the ability to think originally), showed an average pre-test percentage of 53%, categorized as moderately creative, while the post-test reached an average of 89%, categorized as very creative. This suggests that students were able to generate new ideas to solve problems, consider various alternative solutions, and express them effectively. This finding aligns with the research conducted by Mursidik et al. (2015), which stated that students with good originality skills categorized as high and moderate were capable of providing appropriate solutions and responses that addressed the given problems. Similarly, research by Febrianti et al. (2016) indicated that students' originality ability fell into the good category, with an average score of 79.9%, suggesting that students at this level demonstrated distinctive thinking and were able to apply new approaches after being exposed to various ideas through reading and listening.

The fourth indicator, Elaboration (the ability to elaborate ideas), showed an average pre-test percentage of 50%, categorized as moderately creative, while the post-test reached an average of 80%, categorized as creative. This indicates a relative lack of ability among students to provide detailed and elaborative responses or to add depth to their ideas or objects, which prevented them from reaching the very creative category for the elaboration indicator. This finding is in line with Firdaus et al. (2018), who stated that students' elaborative abilities generally fall into the moderately good category. Supporting findings are also reported by Haerunisa et al. (2021), who found that students' elaboration skills were categorized as moderately good, as some students were able to explain their answers. However, many were still unable to provide complete and detailed elaborations in their responses.

The test results for the elaboration indicator showed an average percentage score of 80%, placing it in the creative category. Students are expected to possess strong abilities to provide detailed and well-explained descriptions of the ideas they generate. Several factors influence students' creative thinking skills in this regard. One key factor is that students are generally not accustomed to open-ended or divergent questions that

have multiple possible solutions, making such tasks more challenging for them. Additionally, students tend to rely on pre-existing solutions by memorizing problem-solving methods found in textbooks or online resources. This finding is in accordance with the statement of Firdaus (2018), who noted that such tendencies limit students' elaboration abilities in creative thinking tasks.

This is in line with the study conducted by Nita and Irwandi (2021), which stated that the Project-Based Learning model has a significant impact on students' creative thinking skills. Accordingly, the high post-test scores achieved in the indicators of Fluency (fluency in thinking), Flexibility (flexible thinking), and Originality (original thinking) reflect the effectiveness of both the learning content and the instructional model in enhancing students' understanding and creative thinking abilities.

As supporting data to measure students' creative thinking skills, a product assessment was carried out based on the results of the Project-Based Learning model in the form of learning media on the human excretory system created by each group. The learning media were constructed using various materials such as plasticine, mineral water bottles, cardboard, straws, and boxes. Based on the analysis, the highest creative thinking scores in the creation of the excretory system learning media were achieved by Groups 1 and 3, each obtaining a score of 83, while Group 2 obtained a score of 75. The lowest score was recorded by Group 4, with a score of 67. After averaging the scores of all groups, the overall percentage obtained was 77%, which falls under the "creative" category. The detailed percentage scores for each indicator were as follows: fluency (83%), flexibility (92%), originality (75%), and elaboration (58%).

The scores for creative thinking skills in the development of excretory system learning media products for each indicator were assessed based on the criteria established by Effendi & Farlina (2017). The percentage score for the fluency indicator was 83%, which falls within the 81%–100% range and is categorized as "very creative." This indicates students' ability to generate ideas during product development, propose multiple methods or suggestions to improve the product, and offer constructive input and ideas collaboratively within their groups. These findings are in line with the research conducted by Wiwin Wulandari et al. (2011), which reported a 96.5% achievement in the fluency aspect, indicating that nearly all students in the class had mastered creative thinking skills related to fluency.

The percentage score for the flexibility indicator was 92%, which falls within the 81%–100% range and is categorized as "very creative." This reflects the students' ability to utilize a variety of appropriate materials for their products and to consider alternative approaches in designing and developing the product. These results are consistent with the findings of Noor (2024), which reported a score of 86.2% in the "very creative" category. The study highlighted students' ability to create diverse ideas, view situations from different perspectives, present varied suggestions, and offer alternative solutions distinct from those of other groups.

The percentage score for the originality indicator was 75%, which falls within the 61%–80% range and is categorized as "creative." This indicates students' ability to create innovative products, question conventional methods, and develop new approaches that result in distinctive and engaging outcomes when modifying existing products. However, the originality indicator did not reach the "very creative" category. This is primarily because only a portion of students were able to develop products beyond those previously created by others. Many of the student-produced items resembled existing models. This finding aligns with the study conducted by Navies Luthvitasari et al. (2012), which reported that most students still struggle with the originality aspect. This may be due to

students' limited ability to innovate or imagine new and original creations.

The percentage score for the elaboration indicator was 58%, which falls within the 41%–60% range and is categorized as "moderately creative." This result is attributed to students' limited ability to develop or enhance products previously created by others, particularly in terms of adding detailed elements. For example, students struggled with color coordination and shaping specific parts of the product. This limitation was evident as the available modeling clay was limited, preventing students from freely combining colors and thus restricting their creative imagination during the product design process. This finding is consistent with the study conducted by Safrina (2019), which reported a score of 62.5% in the elaboration aspect and also categorized as moderately creative due to students' lack of ability to take full responsibility for the products they had created.

One of the factors contributing to students' creative thinking skills not reaching the "Highly Creative" category is the limited availability of time. This aligns with the findings of Huang et al. (2020), who stated that an individual's belief in their ability (Creative Self-Efficacy) significantly influences creative thinking skills. Furthermore, research by Chasanah et al. (2017) also highlights several factors encountered during the learning process, such as time constraints, lack of teaching materials, and challenges in assessment as key issues that hinder teachers from identifying effective strategies to enhance students' creative thinking skills.

CONCLUSION

The results of the research on the implementation of the Project-Based Learning (PjBL) model in enhancing students' creative thinking skills indicate that the learning implementation achieved an average percentage of 92%, categorized as very good. Students' learning activities reached an average percentage of 65%, categorized as fairly good, and student responses averaged 88%, categorized as very good. The overall average score for the pretest was 50%, categorized as less creative, whereas the post-test average was 88%, categorized as very creative. However, one indicator, elaboration, did not reach the very creative category, achieving an average percentage of 80%, which falls into the creative category. Supporting data in this study included product assessments from each group and each indicator, which showed an average percentage of 77%, categorized as creative. Therefore, it can be concluded that the implementation of the Project-Based Learning model on the human excretory system topic was well implemented and had a positive impact on the creative thinking skills of Grade VIII students at SMP State 1 Bulawa Junior High School.

Based on the conclusions, the following suggestions are proposed: Science teachers are encouraged to consider implementing the Project-Based Learning (PjBL) model as one of the instructional strategies in future lessons to enhance students' ability to elaborate on facts in problem-solving. Furthermore, future researchers are advised to conduct further studies by applying the Project-Based Learning model to other subject materials as a basis for comparison with the results of this study.

Declaration by Authors

Acknowledgement: None
Source of Funding: None
Conflict of Interest: No conflicts of interest declared.

REFERENCES

1. Arikunto S. Prosedur Penelitian Suatu Pendekatan Praktik [Research Procedures: A Practical Approach]. Rineka Cipta; 2010.
2. Ayu R, Tri A. Analisis Kemampuan Berpikir Kreatif Peserta Didik Melalui Penerapan Blended Project-Based Learning. Analisis Kemampuan Berpikir Kreatif Peserta Didik Melalui Penerapan Blended Project-Based Learning. 2019; 13(2):2437–2446.

3. Chasanah L, Kaniawati I, Hernani H. How to Assess Creative Thinking Skill in Making Products of Liquid Pressure? Journal of Physics: Conference Series. 2017; 895(1).
4. Effendi KN, Farlina E. Kemampuan Berpikir Kreatif Siswa SMP Kelas VII Dalam Penyelesaian Masalah Statistika. Jurnal Analisa. 2017; 3(2):130–137. https://doi.org/10.15575/ja.v3i2.2013
5. Febrianti Y et al. Analisis Kemampuan Berpikir Kreatif Peserta Didik dengan Memanfaatkan Lingkungan pada Mata Pelajaran Ekonomi di SMA Negeri 6 Palembang. Jurnal Profit. 2016; 3(1):121–127. http://ejournal.unsri.ac.id/index.php/jp/issue/view/591
6. Firdaus HM, Widodo A, Rochintaniawati D. Analisis Kemampuan Berpikir Kreatif dan Proses Pengembangan Kemampuan Berpikir Kreatif Siswa SMP pada Pembelajaran Biologi. Assimilation: Indonesian Journal of Biology Education. 2018; 1(1):21–28.
7. Haerunisa H, Prasetyaningsih P. Analisis Kemampuan Berfikir Kreatif Siswa dalam Menyelesaikan Soal HOTS Tema Air dan Pelestarian Lingkungan. Edumaspul: Jurnal. 2021; 5(1):299–308.
8. Huang N et al. Effects of creative thinking, psychomotor skills, and creative self-efficacy on engineering design creativity. Thinking Skills and Creativity. 2020; 37(April):1–10.
9. Luthvitasari N et al. Implementasi Pembelajaran Fisika Berbasis Proyek Terhadap Keterampilan Berpikir Kritis, Berpikir Kreatif, dan Kemahiran Generik Sains. Jurnal of Innovative Science Education. 2012; 1(2).
10. Marlina L, Tamrin M. Peningkatan Aktivitas Belajar Belajar Siswa Kelas IV dalam Pembelajaran IPS melalui Metode Inkuiri di SD Negeri 29 Ulak Karang Utara Padang. Jurnal Fakultas Keguruan dan Ilmu Pendidikan. 2015; 1(5).
11. Mursidik EM, Samsiyah N, Rudyanto HE. Creative Thinking Ability in Solving Open-Ended Mathematical Problems Viewed from the Level of Mathematics Ability of Elementary School Students. PEDAGOGIA: Journal of Education. 2015; 4(1):23–33.
12. Nahdiah A, Handayani SL. Pengaruh Model PjBL Berbantuan Google Meet Terhadap Kemampuan Berfikir Kreatif Siswa. Jurnal Basicedu. 2021; 5(4):2377–2385.
13. Nita RS, Irwandi. Peningkatan Keterampilan Berpikir Kreatif Siswa Melalui Model Project-Based Learning (PjBL). BIOEDUSAINS: Jurnal Pendidikan Biologi dan Sains. 2021; 4(2):231–238.
14. Noor SNFM. Analisis Keterampilan Berpikir Kreatif Peserta Didik Melalui Penerapan Model PjBL Berbasis Video Pembelajaran. Gorontalo: Universitas Negeri Gorontalo; 2024.
15. Novantoro A. Analisis Kemampuan Berfikir Kritis Dalam Menyelesaikan Masalah Matematika Siswa Kelas VIII C SMP Negeri 1 Kalibawang. Delta: Jurnal Ilmiah Pendidikan Matematika. 2019; 6(2):1–10.
16. Putra RD et al. Peningkatan Kemampuan Berpikir Kreatif Siswa melalui Model Pembelajaran Inkuiri Terbimbing pada Siswa Kelas XI MIA 1 SMA Negeri Colomadu Karanganyar Tahun Pelajaran 2015 / 2016. Proceeding Biology Education Conference. 2016; 13(1):330–334.
17. Putri IS, Juliani R, Lestari IN. Pengaruh Model Pembelajaran Discovery Learning Terhadap Hasil Belajar Siswa dan Aktivitas Siswa. Jurnal Pendidikan Fisika. 2017; 6(2).
18. Rahmazatullaili Z et al. Kemampuan Berpikir Kreatif dan Pemecahan Masalah Siswa Melalui Penerapan Model Project-Based Learning. Beta: Jurnal Tadris Matematika. 2017; 10(2):166–183.
19. Riduwan. Skala Pengukuran Variabel-Variabel Penelitian [Scale of Measurement for Research Variables]. Bandung: Alfabeta; 2015.
20. Safrina D. Keterampilan dan Kemampuan Berfikir Kreatif Siswa dengan Menggunakan Model PjBL Pada Materi Sistem Eksresi di MTsN 3 Bireun. Banda Aceh: Universitas Islam Negeri Ar-Raniry Darusalam; 2020.
21. Shively CH. Grow Creativity! International Society for Technology in Education. 2011; 38(7):10–15.
22. Sugiyono. Metode Penelitian Kuantitatif, Kualitatif, dan R&D [Quantitative, Qualitative, and R&D Research Methods]. Bandung: Alfabeta; 2017.
23. Suranti NMY et al. Pengaruh Model Project-Based Learning Berbantuan Media Virtual Terhadap Penguasaan Konsep Peserta didik pada Materi Alat-alat Optik. Jurnal

Pendidikan Fisika dan Teknologi. 2017; 2(2):73.
24. Wiwin W et al. Problem Based Learning untuk Meningkatkan Keterampilan Berpikir Kreatif dan Penguasaan Konsep Siswa pada Materi Larutan Penyangga. Jurnal Pengajaran MIPA. 2011; 16(2).

How to cite this article: Sugiyanti Slamet, Elya Nusantari, Djuna Lamondo, Margaretha Solang, Frida Maryati Yusuf, Muh Nur Akbar. The implementation of project-based learning (PjBL) model on students' creative thinking skills in science subject: human excretory system material for eighth grade at SMP State 1 Bulawa Junior High School. *International Journal of Research and Review*. 2025; 12(4): 388-399. DOI: *https://doi.org/10.52403/ijrr.20250446*

******