APPLICATION OF THE PBL MODEL WITH THE TaRL APPROACH TO IMPROVE COLLABORATION SKILLS IN THE HUMAN REPRODUCTIVE SYSTEM MATERIAL FOR GRADE VII

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Abstract

This study aims to find out the impact of applying the Problem-Based Learning (PBL) model with the Teaching at the Right Level (TaRL) approach to improve the collaboration skills and learning outcomes of grade VII-A students at Labschool Junior High School 2 of the State University of Surabaya on the topic of human reproductive systems. The method used is qualitative descriptive, where the researcher describes the students' collaboration skills and learning outcomes. Students' collaboration skills increased by 4%, from an average of 83% in cycle I to 87% in cycle II. Peer assessment of collaboration increased by 10%, from 73% in cycle I to 83% in cycle II. Student learning outcomes showed an increase, with the completion criteria rising from 58% in cycle I to 77% in cycle II. These findings demonstrate that the PBL learning model and the TaRL approach are effective in enhancing collaboration skills and student learning outcomes.

Keywords: Collaboration Skills, PBL, TaRL

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INTRODUCTION

The development of education in the 21st century aims to produce students who are both high-achieving and possess strong character. Along with this, there has been a shift in the curriculum from teacher-centered learning to student-centered learning, in which students are now required to develop skills in communication and collaboration. This aligns with the Independent Curriculum, which encourages students to learn independently and master the four essential 21st-century skills, known as the 4Cs: critical thinking, creativity, collaboration, and communication (Arifah et al., 2024).

Natural Sciences is one of the subjects introduced at the elementary level. Its purpose is to provide students with organized knowledge, ideas, and concepts about the surrounding environment. This enables them to better understand and develop concepts of investigation, organization, and presentation of ideas (Sakila et al., 2023). The learning process not only emphasizes mastery of concepts but also fosters collaboration skills through practical activities, group discussions, and joint scientific projects. Through collaboration, students learn to respect others' opinions, share responsibilities, and solve problems together. This ability to work together has been proven to have a positive impact on students' learning outcomes, as they become more active, responsible, and emotionally engaged in the learning process.

Science learning encompasses three main assessment components: attitude, knowledge, and skills. In the aspect of attitude, teachers may determine at least two relevant attitudes based on the learning needs, aligned with the values of the *Pancasila Student Profile*. Meanwhile, knowledge assessment is designed to support the achievement of learning objectives while taking into account the diverse abilities of students. For the skills component, assessment focuses on students' ability to apply their knowledge through practical activities, experiments, or contextual problem-solving.

The results of interviews with science teachers indicate that group work activities are frequently implemented in the learning process, with heterogeneous group members. However, based on observations during group or discussion activities, several challenges were identified in practice. Some students showed a lack of enthusiasm when working in diverse groups; many tended to be passive during lessons, failed to complete group assignments on time, and preferred working individually. This was mainly due to the limited participation of certain group members, often only one student completed the task while others were occupied with unrelated activities. This

situation is inconsistent with the development of collaboration skills, which ideally involve active discussion among group members to solve problems together. Every member should have the opportunity to express their opinions, listen without interrupting, and respect differing viewpoints during the discussion process (Octaviana et al., 2022).

A learning model that can encourage student collaboration is the Problem Based Learning (PBL) model. This model utilizes critical thinking and analytical skills to solve real-world problems. In classroom learning, the PBL model not only increases student engagement but also strengthens their collaborative abilities. PBL focuses on presenting contextual problems, providing teachers with the opportunity to observe the students' process of finding solutions (Rahmayanti et al., 2023).

In addition to the PBL model, the researcher also applied the Teaching at the Right Level (TaRL) approach as an effort to train and enhance collaboration skills in science learning. The TaRL approach focuses on students' initial understanding, which can be assessed through diagnostic assessments conducted at the beginning of the lesson or when introducing new material. By identifying the varying levels of understanding among students, it is expected that they can collaborate more effectively, sharing tasks with group members who have similar levels of comprehension (Arifah et al., 2024).

The PBL model combined with the TaRL approach is highly relevant for implementation in science learning, particularly in the topic of the Human Reproductive System. This topic involves complex concepts that require deep understanding, including knowledge of the structure and function of reproductive organs, the process of puberty, and the importance of reproductive health. Through this approach, students are encouraged to collaboratively solve problems related to real-life issues surrounding the reproductive system. For example, students may be given a case study on adolescent reproductive health problems and asked to discuss and find solutions together in their groups. Learning becomes more meaningful as students not only understand the concepts theoretically but also develop collaboration skills that are essential in everyday life (Nisa et al., 2023).

Based on the problems identified by the researcher in Class VII A of Labschool Junior High School 2 of the State University of Surabaya during learning activities, there is a need to improve students' collaboration skills and learning outcomes. According to the data collected, the Minimum Mastery Criteria (MMC) for the science subject at Labschool Junior High School 2

Surabaya is ≥80. However, 57.69% of students scored below the MMC in the sub-topic of the human reproductive system. This indicates low learning outcomes. This underachievement is suspected to be closely related to the suboptimal student involvement in collaborative activities, as reflected in the limited participation during group work and the dominance of one or two members in completing tasks. Therefore, the researcher implemented the PBL learning model combined with the TaRL approach as a solution to improve collaboration skills while also promoting a deeper understanding of the human reproductive system topic.

METHOD
Research Design

This study uses a Collaborative Classroom Action Research (CCAR) design, involving six students as researchers, in collaboration with the supervising teacher and the Field Supervisor. The research was conducted in two cycles, with each cycle consisting of one learning session.

Each cycle of the CCAR consists of four stages. This follows the cycle model developed by Stephen Kemmis and Robyn McTaggart, which begins with planning, followed by action implementation, then observation to collect data, and concludes with reflection for evaluation. (Muthmainnah et al., 2023). Here is the flow of the CCAR cycle:
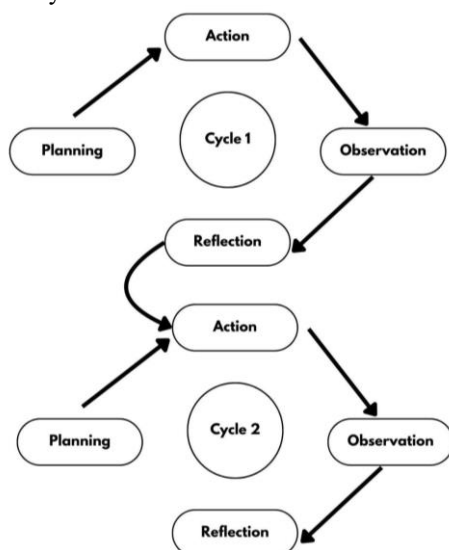

Figure 1. CCAR cycle flow
Source: Personal Doc.

In the first cycle, the material covered includes the menstrual cycle, fertilization process, and pregnancy. Meanwhile, in the second cycle, the topics discussed in this study include disorders of the human reproductive system and various preventive measures. Both cycles were implemented using the PBL learning model combined with the TaRL approach.

Research Participants

This study involved 29 students from class VII A as the research subjects. However, only 26 students participated, as 3 students were absent during both cycles of the research. Data related to collaboration skills and learning outcomes were collected during the second semester in February 2025, coinciding with the implementation of learning activities in each cycle. Therefore, this study produced two types of data: collaboration skills and learning outcomes.

Cycle I was conducted on Friday, February 21, 2025, and cycle II on Friday, March 7, 2025, with each cycle allocated 2 hours of lessons. This study took place at Labschool Junior High School 2 of the State University of Surabaya, located at Jl. Raya Kampus Unesa, Ketintang, Gayungan District, Surabaya, East Java.

Data Collection Techniques

In this study, data collection techniques include both test and non-test methods. The test technique was carried out through cognitive diagnostic assessment and post-test. The cognitive diagnostic assessment consists of 5 multiple-choice questions developed to measure the students' initial understanding before the learning process begins. Meanwhile, the post-test, which contains 10 multiple-choice questions, is administered at the end of each cycle as an evaluation of the students' understanding after participating in the learning process.

The data obtained from the cognitive diagnostic assessment aims to determine the students' initial understanding of the material. The results of this assessment are used to group students into several categories based on their level of knowledge, which are: needs guidance, proficient, and very proficient.

The students' learning outcomes are obtained from the test scores by administering a post-test at the end of each cycle. If a student's scores > 80, their learning outcomes are considered complete, and if the score is < 80, their learning outcomes are considered incomplete. To calculate the percentage of students who score > 80, the following formula is used:

$$SN\% = \frac{SB}{S} \times 100\%$$

Explanation:
SN% = Percentage of students' learning outcomes > 80
SB = Number of students who scored > 80
S = Total number of students

Referring to the learning outcome data measured through the post-test of cycle I and cycle II, the researcher conducted an in-depth analysis. The analysis was performed to assess the improvement in students' ability to understand and master the concepts of the material provided during the learning activities using the PBL model and the TaRL approach.

Data collection regarding collaboration skills was carried out through observation techniques conducted during the learning process. The data for this study were collected using two main instruments: the collaboration skills observation sheet for students, which helps the observer assess the students' collaboration skills during the learning process, and the peer observation sheet, which is used by students to provide evaluations or assessments of their group mates' collaboration skills. Collaboration skills refer to 5 aspects adapted from Greenstein, namely active participation, responsibility, productive work, flexibility and compromise, and mutual respect among group members. (Al Aziizah et al., 2024).

The data obtained were analyzed using a qualitative research method with a descriptive approach to provide an in-depth description of the findings. The description of students' collaboration skills was derived from observations during the learning process in cycle I and cycle II. The collaboration skills data obtained from teacher observations and peer assessments were calculated using the following formula: (Amellia et al., 2024).

$$NP = \frac{S}{SM} \times 100\%$$

Explanation:
NP = Percentage of the score to be calculated
S = Total score obtained
SM = Maximum score

Based on the percentage score data for collaboration skills obtained, it is then converted into qualitative data with the criteria in the table as follows: (Widoyoko, 2009).

Table 1. Collaboration skills criteria

Value Range	Category
80%<x≤100%	Very Good
60%<x≤80%	Good
40%<x≤60%	Satisfactory
20%<x≤40%	Needs Improvement
0%<x≤20%	Poor

RESULTS AND DISCUSSION

The Collaborative Classroom Action Research (CCAR) was conducted to improve the collaboration skills and learning outcomes of seventh-grade students in class VII-A at Labschool Junior High School 2 of the State University of Surabaya through the implementation of the PBL model with the TaRL approach on the topic of the Human Reproductive System in cycle I and cycle II.

In the pre-cycle stage, the researcher observed students' collaboration skills through group discussion activities. The field observation revealed several challenges: some students were less enthusiastic when working in diverse groups, most tended to be passive during lessons, students struggled to complete group tasks on time, and many preferred working individually. The lack of participation from certain group members was a major issue, where only one or two members actively completed the tasks while the others were preoccupied with unrelated activities. These findings indicate that students' collaboration skills still need improvement. This is evident from their tendency to work individually, limited active participation in group discussions, and low receptiveness to feedback and suggestions. Additionally, some students showed a lack of responsibility for group tasks and tended to rely on the more active and diligent members.

Based on the identified problems, the researcher conducted learning activities in cycle I using the PBL model and the TaRL approach, through discussion and question and answer methods. The material covered in this learning cycle included subtopics such as fertilization, menstruation, and pregnancy, with a focus on issues related to pregnancy.

According to Arends, the PBL model is a method that engages students with real-world problems to encourage them to build understanding independently, develop higher-order thinking and inquiry skills, become more self-reliant, and enhance their self-confidence. In its implementation, the TaRL approach was applied by grouping students based on their cognitive abilities, determined through the results of an initial assessment using a quiz on the Quizizz platform. As explained by Rahmayanti et al. (2023), the TaRL approach is a learning strategy that aligns with each student's ability level categorized as low, medium, or high rather than based on grade level or age. In cycle I, the discussion and question-and-answer methods were used to support the development of students' collaboration skills. These methods enabled students within groups to exchange ideas and actively participate in the Q&A sessions, thus promoting collaborative learning.

The implementation of PBL involves several stages, beginning with the teacher presenting the learning objectives, guiding students in selecting topics to be discussed, encouraging them to gather ideas or information relevant to the problem,

assisting in the preparation of reports, and supporting the evaluation process. According to Manasikana et al. (2022), the PBL syntax in learning includes orienting students to the problem, organizing students for learning, guiding individual and group investigations, developing and presenting products, and analyzing and evaluating the problem-solving process. This learning emphasizes improving collaboration skills and learning outcomes; therefore, the TaRL approach needs to be applied to bridge the gap caused by a lack of collaboration, which may affect students' academic performance. As an initial step in implementing TaRL, the researcher administered a cognitive pre-assessment to the students (Table 2).

Table 2. Cognitive pre-assessment results

No	Group	Percentage	Score Range
1	Highly Proficient	15,38%	81-100
2	Proficient	26,92%	61-80
3	Needs Guidance	57,69%	0-60

Based on the data above, 4 students were categorized as highly proficient, 7 students as proficient, and 15 students as needing guidance. These groupings were then used to form 6 student groups. After the grouping process, students worked collaboratively in their respective groups to complete Student Worksheets containing problems related to the lesson material. The researcher then applied process differentiation using the TaRL approach by providing different treatments in the form of mentoring and monitoring, tailored to the needs of the highly proficient, proficient, and needs-guidance groups. Subsequently, the researcher observed student interactions within the groups. The results of the collaboration skills observation in cycle I are presented in Table 3.

Table 3. Percentage of collaboration skills observation – cycle I

No	Aspect	Percentage	Criteria
1	Active participation	83%	Very Good
2	Productive work	77%	Good
3	Responsibility	88%	Very Good
4	Flexibility and compromise	78%	Good
5	Mutual respect among group members	88%	Very Good
	Average Percentage	**83%**	**Very Good**

Based on Table 3, the aspects that reached the "Good" criteria were working productively and flexibility and compromise. Meanwhile, the aspects that achieved the "Very Good" criteria were active participation, responsibility, and mutual respect among group members. Overall, students' collaboration skills in cycle I, based on the researcher's observation, showed an average percentage of 83%, categorized as "Very Good". To support the observer's assessment, students' collaboration skills were also evaluated through peer assessment. The results of the peer assessment of collaboration skills in cycle I are presented in Table 4.

Table 4. Peer assessment of collaboration skills – cycle I

No	Aspect	Pecentage	Criteria
1	Active participation	72%	Good
2	Productive work	73%	Good
3	Responsibility	73%	Good
4	Flexibility and compromise	68%	Good
5	Mutual respect among group members	80%	Very Good
	Average Percentage	**73%**	**Good**

Based on Table 4, the aspect of collaboration skills that achieved the "Very Good" criteria was mutual respect among group members. Meanwhile, the aspects that met the "Good" criteria were active participation, productive work, responsibility, and flexibility and compromise. Overall, the peer assessment results indicated that in cycle I, students' collaboration skills were categorized as "Good", with an average percentage of 73%. These findings align with the research conducted by

Noorfarida et al. (2024), which stated that collaboration allows students to work together, discuss within groups, and balance learning achievements while reducing gaps among them. As a follow-up, the researcher conducted a reflection at the end of cycle I to evaluate the learning process, allowing for improvements and enhancements in the implementation of cycle II.

The research in cycle II was conducted using the same treatments as in cycle I, which included the PBL model, the TaRL approach, and the discussion and question-and-answer methods. This learning continued with the subtopic of disorders of the human reproductive system and various preventive measures. The objective of cycle II was to determine the improvement in collaboration skills and learning outcomes of the students, while reinforcing the actions taken in cycle I. In its implementation, the researcher continued to apply process differentiation, providing different treatments for the highly proficient, proficient, and needs-guidance groups, particularly during the mentoring and monitoring stages. During the learning process, the researcher observed the students' collaboration skills. The results of these observations are outlined in Table 5.

Table 5. Percentage of collaboration skills observation cycle II

No	Aspect	Percentage	Criteria
1	Active participation	88%	Very Good
2	Productive work	80%	Good
3	Responsibility	91%	Very Good
4	Flexibility and compromise	81%	Very Good
5	Mutual respect among group members	93%	Very Good
	Average Percentage	**87%**	Very Good

Based on Table 5, only one aspect of collaboration skills reached the "Good" criteria, which was productive work at 80%, making it the lowest percentage among the aspects observed. According to the researcher's observations, this was due to some students still struggling to complete the tasks assigned to them during the learning process. Meanwhile, the aspects of active participation, responsibility, flexibility and compromise, and mutual respect among group members all achieved the "Very Good" criteria. The data show that students' collaboration skills in cycle II reached an average percentage of 87%, categorized as "Very Good". This average percentage indicates a 4% improvement in collaboration skills compared to cycle I. While there were two aspects rated "Good" in cycle I, this number decreased to only one aspect in cycle II, showing progress. Moreover, every aspect experienced an increase in percentage.

To support the researcher's observational assessment, collaboration skills were also evaluated through peer assessment. The results of the peer assessment in cycle II are presented in Table 6 below:

Table 6. Percentage of peer assessment of collaboration skills cycle II

No	Aspect	Percentage	Criteria
1	Active participation	84%	Very Good
2	Productive work	86%	Very Good
3	Responsibility	82%	Very Good
4	Flexibility and compromise	78%	Good
5	Mutual respect among group members	83%	Very Good
	Average Percentage	**83%**	**Very Good**

Based on Table 6, the results of peer observation of collaboration skills show that only one aspect achieved the "Good" category, namely *flexibility and compromise*, with a percentage of 78%. This was due to some group members not contributing optimally during discussions. However, this aspect showed a 10% improvement compared to cycle I. Meanwhile, the other aspects reached the "Very Good" category and also showed an increase from cycle I.

Collaboration skills based on peer assessment in cycle II showed an average of 83%, categorized as "Very Good". This marks a 10% improvement compared to cycle I. In cycle I, only one aspect was rated in the "Very Good" category, while in cycle II, four aspects reached that level. Although one

aspect has not yet improved to the "Very Good" category, overall, a significant improvement was observed.

This improvement is in line with the students' condition in cycle II, where they were more familiar with the learning model and approach compared to cycle I, enabling them to participate more actively in group work. Then, during the learning process, the researcher consistently conducted mentoring and monitoring based on the needs of each TaRL group. Students were able to share ideas and collaborate based on their cognitive levels and differentiated processes from the teacher. This is in accordance with Puspitasari et al. (2024), which states that the implementation of TaRL produces a student-centered learning design, providing each individual with the opportunity to develop their potential according to their learning needs.

Improving students' collaboration skills will have an impact on increasing the mastery of learning outcomes. The improvement in learning mastery can be seen from the comparison between the post-test results of cycle I and cycle II. The mastery and percentage of learning outcomes are described in Table 7 below:

Table 7. Mastery and percentage of learning outcomes in cycle I and cycle II

Score Range	Category	*Post-test* Cycle I	(%)	*Post-test* Cycle II	(%)
80<x≤100	Mastered	15	58	20	77
0<x≤80	Not Mastered	11	42	6	23

Based on Table 7, the number of students who achieved mastery or did not achieve mastery in the tests conducted in cycle I and cycle II can be observed. Learning mastery is measured by the Minimum Completeness Criteria at Labschool Junior High School 2 of the State University of Surabaya for the Science subject, which is 80. The learning outcomes in cycle I showed that 15 out of 26 students achieved mastery, with a percentage of 58%. Then, in cycle II, there was an improvement with 20 out of 26 students achieving mastery, reaching a percentage of 77%. This indicates a 19% improvement in learning outcomes from cycle I to cycle II.

From the discussion above, collaboration skills support the achievement of learning outcomes by encouraging active student involvement, especially in problem-solving. During this process, students are responsible for completing tasks and sharing knowledge. This is supported by the knowledge and learning experiences gained from collaboration, which can enhance their understanding of the material and make it more relevant to daily life. This is in line with research on the implementation of the PBL model with the TaRL approach, which has a positive impact on student learning outcomes (Khofifah, et al., 2025).

The Collaborative Classroom Action Research (CCAR) conducted proves that the learning process using the PBL model with the TaRL approach can improve students' collaboration skills as well as their learning outcomes. This research is supported by Hartina et al. (2022), which states that the PBL learning model can help students acquire knowledge and basic concepts of previous material. This method makes students more active and boosts their confidence in learning. This is further reinforced by research from Puspitasaari et al. (2024), which states that effective teamwork improves learning outcomes, especially when learning innovations are applied through the TaRL approach.

Thus, learning that uses the PBL model with the TaRL approach is effective in enhancing students' collaboration skills and learning outcomes. The application of this model not only improves the achievement of conceptual knowledge but also equips students with collaboration skills that can be applied in life.

CONCLUSIONS AND SUGGESTIONS
Conclusions

Based on the results of the CAR conducted in Class VII-A at Labschool Junior High School 2 of the State University of Surabaya, it can be concluded that the implementation of the PBL learning model using the TaRL approach is effective in improving students' collaboration skills and learning outcomes on the topic of the Human Reproductive System. The improvement in collaboration skills is reflected in the data, with the average score rising from 83% in cycle I to 87% in cycle II, showing a 4% increase. Then the peer assessment of collaboration skills showed an increase, from 73% in cycle I to 83% in cycle II, indicating a 10% improvement. On the other hand, students' learning outcomes also saw significant improvement. The percentage of students meeting the learning mastery criteria increased from 58% in cycle I to 77% in cycle II, showing an overall improvement of 19%. This data indicates that learning using the PBL model and TaRL approach not only encourages the development of

collaboration skills but also contributes significantly to the achievement of students' learning outcomes. The PBL learning model with the TaRL approach can be recommended as an alternative effective teaching model and approach, particularly for enhancing 21st century skills like collaboration and improving learning outcomes in Science's subjects.

Suggestions

Based on the research conducted through cycle I and cycle II, it can be concluded that the implementation of the study proceeded smoothly and demonstrated a significant improvement in both students' collaboration skills and learning outcomes. This indicates that the applied learning model and approach had a positive impact on the learning process and achievements. Recommendations for future research are as follows: (1) It is recommended that post-tests be conducted using digital platforms such as Google Forms to enhance efficiency, practicality, and ease of access for students. (2) In the peer assessment of collaboration skills, it is advisable for researchers to provide clearer instructions to students, encouraging them to give objective evaluations and to disregard personal factors that could influence their assessments.

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