***Empowering Communication and Collaboration Skills of Prospective Biology Teachers
With a Global Insight Through Think Pair Share Based Lesson Study***

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Abstract
A teacher's ability to teach Biology science concepts in English is a must. English language proficiency will make it easier for prospective biology teachers to access knowledge from various disciplines and countries. Unfortunately, several challenges in teaching Biology in English, such as student difficulties in understanding the material, inability to express oneself clearly, and lack of participation in class discussions make it difficult to achieve targets. This is relevant to the low level of communication and collaboration skills observed in classroom learning. Therefore, this action research study examined an approach that focuses on empowering prospective biology teachers' communication and collaboration skills through implementation of TPS (Think Pair Share) learning model into class. We worked with 9 prospective biology teachers in a teaching biology in English course at the biology department university in Indonesia. The method used in this research is the classroom action research method (CAR) based on lesson study activities, which consists of three cycles, namely planning, implementation, and reflection. Assessment is carried out using self-assessment and observation using Greenstein rubric. The data analysis technique used is descriptive analysis. The results suggested that the TPS (Think Pair Share) model helped prospective biology teachers to achieve better ways of communicating and collaborating during biology teaching. Communication skills in each cycle have increased, while collaboration skills still fluctuate in each cycle. We argued that grouping students should consider their previous abilities such as communication and collaboration, so that lecturers or teachers could make diagnostic tests before the TPS implementation in learning.

Keywords: Communication, Collaboration, Prospective Biology Teachers

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Introduction

The future landscape of education is evidently shifting towards the digitalization of learning and globalization (Astuti et al., 2019; Choudhary et al., 2021). It require students to master the English language as the international lingua franca (Islam, 2023). Moreover, English is frequently employed as the standard language in scientific journals and international conferences, thereby facilitating access to education across diverse disciplinary boundaries and national borders. Consequently, numerous higher education institutions have begun to incorporate English-medium instruction for Biology as part of their curricula (Nurhadi, 2015; Coelho et al., 2019).

However, several challenges arise in teaching Biology in English, particularly for students whose proficiency in the language is not yet fluent (Archila & Mejía, 2019). Students may encounter difficulties in comprehending the materials, expressing themselves clearly, and participating in class discussions. Furthermore, English-medium instruction necessitates curriculum adjustments and teaching methodologies to align with the intended learning outcomes (Holbah & Sharma, 2021). This is especially pertinent for teacher-training institutions, which inherently prepare educators for the current generation—a generation highly adept in technology and the rapidly evolving global landscape, including foreign languages. A teacher's ability to impart biological science concepts in English has become imperative (Astuti, R. A., 2019; Chen et al., 2022).

Some obstacles in English-medium Biology instruction also manifest among students of Biology Education at Universitas Negeri Malang who undertake the Teaching Biology in English course. Observations during the course reveal challenges in English communication and collaboration among students. For instance, when posed with questions in English, many students require prolonged time and exhibit hesitancy in responding. Moreover, they tend to adopt a passive stance in utilizing English during group discussions, preferring to individually comprehend and then work on assigned tasks before submitting their work to group members without prior discussion.

Special strategies and efforts are required to address these challenges. The utilization of cooperative learning models is believed to aid students in English-medium Biology instruction by enhancing communication and collaboration skills (Yaduvanshi & Singh, 2019). A study by Chen et al. (2020) reveals that cooperative learning models employing high-order thinking skills and English as the medium of instruction can enhance students' critical thinking, cooperation, and problem-solving skills. Parallel to the enhancement of English proficiency, communication and collaboration skills are pivotal for success in various occupational domains (Fu & Wang, 2021). In the digital era, such skills are increasingly vital as technological advancements facilitate cross-national and cross-cultural collaboration (Dogara et al., 2020). Students are urged to possess not only academic but also social skills, often encapsulated within the concept of 21st-century skills. Communication and collaboration skills are integral components of 21st-century skills and warrant emphasis in higher education (The Partnership, 2009; Ober et al., 2023).

Therefore, education needs to adapt to these exigencies, and the Think Pair Share (TPS) cooperative learning model could be one of the solutions. TPS is recognized as an effective pedagogical method in enhancing students' communication and collaboration skills, including proficiency in English (Nurulaeni & Ismaniati 2019; Bukit, 2021). Several previous studies have also demonstrated the effectiveness of the TPS cooperative learning model in enhancing

students' communication and collaboration skills. For example, research by Prasetya (2018) indicates that the implementation of TPS can enhance students' communication and collaboration abilities in biology learning. Additionally, a study by Sari and Hardiyanti (2019) suggests that the implementation of TPS can also enhance student participation in Indonesian language learning. Findings from research by Sholihah and Retnaningsih (2018) similarly indicate that the TPS model can improve students' social skills in social studies learning.

Based on the foregoing exposition, students' English language proficiency is influenced, among other factors, by the accuracy of teachers in implementing innovative and creative learning models, which subsequently impact students' efficacy, efficiency, and enjoyment in receiving lessons (Qin, 2022; Bernal & Mligalig, 2023; Zeng, 2023). Bilingual education needs to be holistically implemented throughout the learning process in every subject. Hence, this study aims to ascertain the influence of the implementation of the Think-Pair-Share (TPS) model on the enhancement of communication and collaboration skills among students enrolled in the Teaching Biology in English course at Universitas Negeri Malang.

Methods

The research method employed in this study is Classroom Action Research (CAR) consisting of three cycles, namely planning, implementation, and reflection. The implementation phase and observation are conducted simultaneously, meaning that observations take place during the teaching process. The subjects of this study are undergraduate students majoring in Biology Education at Universitas Negeri Malang who are taking the course Teaching Biology in English, totaling 9 students. The subjects exhibit heterogeneous abilities, with some students demonstrating high, moderate, and low proficiency levels. Communication and collaboration indicators utilized in this study are based on the indicators proposed by Greenstein (2012), which are then elaborated into descriptors. Assessment is conducted using observation during the learning activities.

Result and Discussion

Communication Skills Through the Application of TPS Model for Students Teaching Biology in English State University of Malang

The research was conducted over 3 cycles, with each cycle implemented in a single meeting. Data collected in this study pertained to students' communication and collaboration skills. The gathered data were analyzed according to the predetermined data analysis techniques.

1) Cycle I

In Cycle I: (1) the planning stage involved preparing lesson designs, lesson plans (RPP), chapter designs, and materials suitable for the Think-Pair-Share (TPS) learning model, while also adhering to the Achievement Standards of the Teaching Biology in English course. Additionally, instructional media, assessment instruments or tests, and communication and collaboration observation sheets were prepared at this stage; (2) the action stage involved implementing scenarios aligned with the prepared Think-Pair-Share (TPS) learning syntax, with approval from the course instructor, during the teaching and learning process. Cycle I was conducted in a single session according to the Learning Implementation Plan (RPP) for the Think-Pair-Share (TPS) learning model; (3) the observation stage involved collecting observational data to monitor student activities during the learning process; and (4) the

reflection stage entailed reflecting on shortcomings and strengths to be addressed in the subsequent cycle.
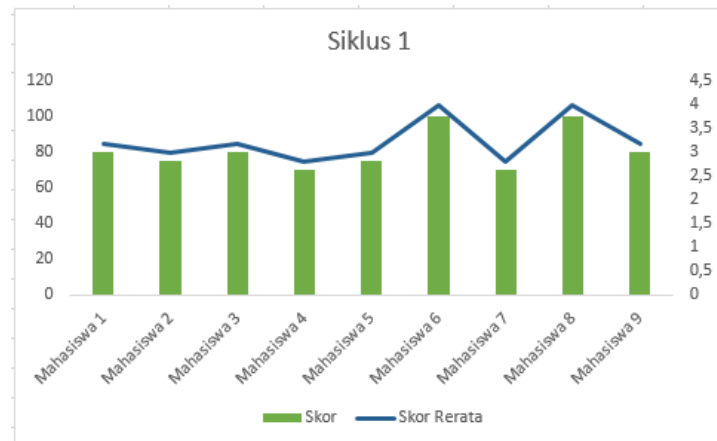

Figure 1. Communication Skills in Cycle 1

From the results of Cycle I (Figure 1), it is evident that the average communication skills of students were 81.11. The highest scores were achieved by Student 6 and Student 8, while the lowest scores were obtained by Student 4 and Student 7. Student 6 and Student 8 were notably more active during the learning process and exhibited above-average abilities compared to their peers. Conversely, Student 4 and Student 7 were less active and displayed less enthusiasm in learning.

Overall, student activity during Cycle I showed improvement compared to the initial observations before the implementation of CAR. Each pair of students began to bravely and actively pose questions regarding difficulties or materials they did not understand during the learning process. However, students were less active in discussing issues encountered during the learning process. Nevertheless, upon individual assessment, there were still several students who hesitated to express their opinions regarding the lesson material and lacked the willingness to effectively engage with the implemented Think-Pair-Share learning model.

Based on these findings, there are areas that require attention and improvement. Follow-up actions are necessary to address the aforementioned shortcomings. Therefore, the study proceeded to Cycle II by reapplying the same learning model, but with additional strategies to encourage greater student participation and enthusiasm. Additionally, special attention was given to students who were initially less active, with groupings pairing active students with less active ones in hopes of fostering better communication and collaboration.

2) Cycle II

In Cycle II: (1) the planning stage was conducted similarly to Cycle I. However, in this cycle, the materials and strategies employed were made more engaging and creative to enhance students' learning motivation; (3) the observation stage involved collecting observational data to monitor student activities during the learning process; (4) the reflection stage entailed reflecting on strengths and weaknesses for further action. The reflection on the implementation of Cycle II revealed that less active students began to confidently ask questions regarding their learning difficulties. Learning activities also improved in Cycle II as nearly all students were engaged in the learning process. However, there were still instances during group discussions where some students could not actively and efficiently

communicate with their group members. Observational analysis indicated that active group members often dominated the discussions, leaving less active students feeling marginalized and unable to actively participate in the discourse.
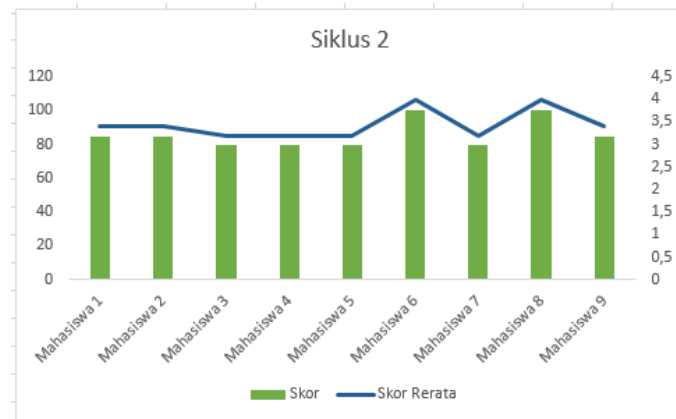

Figure 2. Communication Skills in Cycle 2

From the results of Cycle II (Figure 2), it is apparent that the average communication skills of students were 86.11. The improved grouping composition and teaching strategies have successfully enhanced the class's communication scores. The highest scores were achieved by Student 6 and Student 8, while the lowest scores were obtained by Student 3, 4, 5, and Student 7. Previously less active and enthusiastic students appeared more engaged during the implementation of Cycle II.

3) Cycle III

In Cycle III: (1) the planning stage was conducted similarly to Cycles I and II. In this cycle, the materials and teaching strategies continued to present engaging and creative content to boost student motivation, along with a new grouping composition; (3) the observation stage involved collecting observational data to monitor student activities during the learning process; (4) the reflection stage entailed reflecting on strengths and weaknesses for further action. The reflection on the implementation of Cycle III revealed that previously less active students seemed to enjoy discussions more during the learning process. Learning activities also improved in Cycle III as all students were actively engaged. A particular highlight was the success of the new group composition in ensuring each individual felt equally responsible without any one dominating the group dynamics.
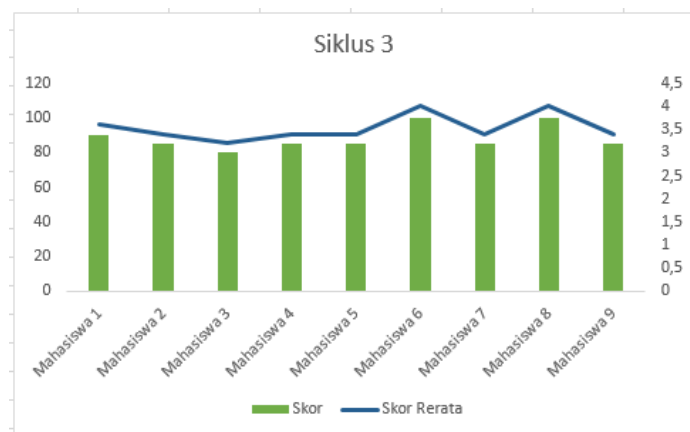

Figure 3. Communication Skills in Cycle 3

From the results of Cycle III (Figure 3), it is evident that the average communication skills of students were 88.33. The implementation of new grouping compositions and improved teaching strategies have successfully enhanced the class's communication scores. The highest scores were achieved by Student 6 and Student 8, while the lowest score was obtained by Student 3. Previously less active and enthusiastic students appeared more engaged during the implementation of Cycle III.

Collaboration Skill Through the Implementation of the TPS Model in Teaching Biology in English at Universitas Negeri Malang

Collaboration is defined as the ability to work effectively, responsibly, and empathetically among group members in collaborative work to achieve common goals, while also being able to value each group member's opinions (Xu et al., 2023). A collaborative attitude is crucially important to instill in students as it enhances their academic performance in problem-solving tasks within projects (Chu et al., 2012). Several studies have shown that collaborative learning can improve academic and social educational outcomes (Lin, 2020). In fact, teachers often assign individual tasks and rarely facilitate discussions or group work. Teachers tend to assign individual tasks from student textbooks. Furthermore, the lack of teacher competence in implementing collaborative learning affects the limited social interaction of students in groups because they tend to solely focus on academic achievement (Cubero et al., 2018; Tampubolon, 2018; Scager et al., 2016).

In the Teaching Biology in English course, learning is conducted over 3 cycles using the Think-Pair-Share (TPS) model in each cycle. Initial observations were conducted over two weeks and revealed that the collaboration skills of the 9 students enrolled in the Teaching Biology in English course were lacking. This is due to the fact that the language of instruction in this class is English, leading to difficulties for some students. Collaboration skills encompass both interpersonal and intrapersonal skill domains. Interpersonal skills are fundamental skills, especially needed for collaborating with peers and family in social relationships. Collaborative behaviors include getting to know others, actively listening, providing feedback, responding to others' ideas, and avoiding negative comments. Interpersonal skill aspects include contribution, group support, group dynamics, interaction among group members, and role flexibility (Ober et al., 2023). Meanwhile, the intrapersonal skill domain pertains to students' self-related abilities needed for collaboration. Intrapersonal skill aspects include motivation/engagement, work quality, time management, readiness, reflection, and team learning (Hodges, 2018).
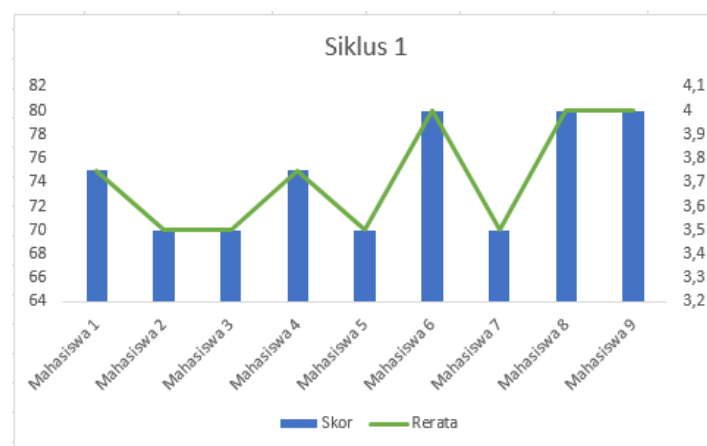

Figure 4. Collaboration Skills in Cycle 1

In Cycle 1 (Figure 4), the collaboration skills obtained show an average score of 70. Meanwhile, the scores of the other 5 students are above 70. Learning in the first cycle was conducted using the TPS method, with instructional materials provided before the lesson began, and students were randomly grouped to ensure the expected scores were distributed normally. The students who scored 70 are Student 2, Student 3, Student 5, and Student 7.
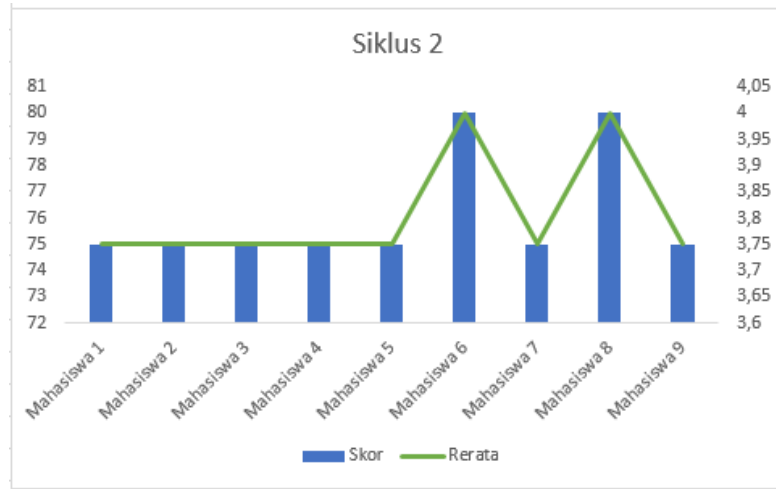

Figure 5. Collaboration Skills in Cycle 2

In Cycle 2 (Figure 5), collaboration skills generally experienced an increase in scores above 70. Learning in Cycle 2 was supplemented with active learning, where each student actively participated in presentations and discussions using English. This aligns with research conducted by Husain, Saenab, and Yunus (2019), where students' collaboration skills can be assessed by providing various tasks that incorporate elements such as goal setting, planning, generating and selecting strategies, and attempting solutions. Collaboration skills involve the social interaction process among students, where they exchange thoughts and feelings, cooperate, and interact to solve problems. However, the data obtained still show heterogeneity, with higher scores for Student 6 and Student 8 compared to the other 7 students.
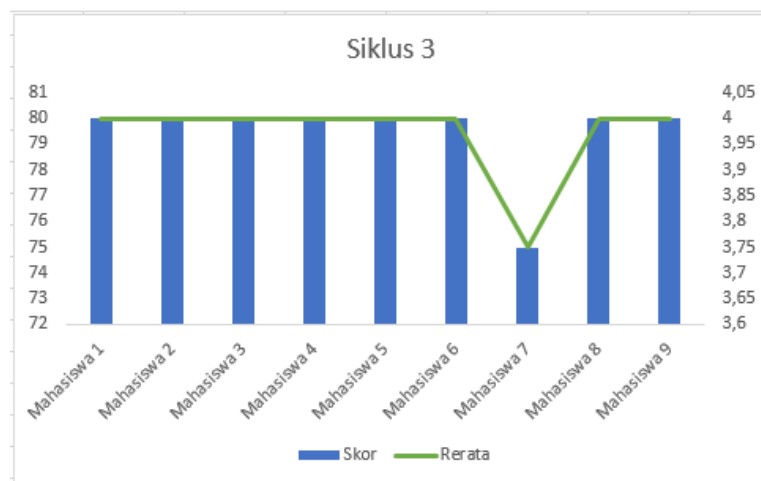

Figure 6. Collaboration Skills in Cycle 3

In Cycle 3 (Figure 6), it is observed that the average collaboration skills of each student have increased compared to the previous cycles. The average score for collaboration skills is 80. However, there is one student, Student 7, who still has a lower score compared to the others.

This is due to the student feeling less confident when speaking in public using English. Various studies conducted by researchers, such as, suggest that students should make the most of their time in completing tasks collaboratively, appreciate all members' opinions, engage in discussions within the group, share common goals, and take responsibility for completing assigned tasks (Luthfi et al., 2023).

Conclusion

Based on the data analysis and discussion, it can be concluded that communication skills experienced improvement in each cycle, while collaboration skills still fluctuated in each cycle. This indicates that the use of the Think-Pair-Share (TPS) learning model in the Teaching Biology in English course has positively impacted the enhancement of students' communication skills from cycle to cycle. However, there are fluctuations in collaboration skills, which may be influenced by factors such as comfort level in communicating in English, confidence level, and willingness to collaborate with groupmates. Therefore, there needs to be more focused and targeted efforts to enhance students' collaboration skills in the future, such as providing more opportunities for discussion and collaboration in English, as well as coaching to boost confidence and a sense of responsibility in working together in groups.

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