BIOEDUPAT:
Pattimura Journal of Biology and Learning
https://ojs3.unpatti.ac.id/index.php/bioedupat
e-ISSN 2775-4472

Research Article

Integrating Culturally Responsive Teaching and Role Playing to Enhance Biology Learning Motivation

Prelly M. J. Tuapattinaya[1,*], Sendy Putra Pradana[1]

Department of Biology Education, Pattimura University, Ir. M. Putuhena Street, Poka-Ambon 97232, Indonesia
** corresponding author: pmjtuapattinaya@gmail.com*

Received: March 26, 2025 Accepted: October 07, 2025 Published: October 31, 2025

ABSTRACT

This classroom action research was conducted in 2024 at State Senior High School 42 Central Maluku, specifically in grade X Biology, focusing on the Plantae topic. The study was motivated by the low student engagement and learning outcomes, which were evident from several factors, including lack of enthusiasm during lessons, minimal participation in learning activities, the perceived irrelevance of the material to daily life, and overall poor academic performance. To address these issues, a combination of the Culturally Responsive Teaching (CRT) approach and the Role Playing model was implemented. This strategy aimed to enhance students' comprehension by connecting the material to real-world experiences, thereby improving their academic performance. Conducted in two cycles, the study revealed a significant improvement, with student motivation reaching 98% and learning outcomes achieving 100%. Students with higher motivation demonstrated better academic results as they were actively engaged in the learning process and could relate the material to their everyday experiences. The findings suggest that integrating the Culturally Responsive Teaching (CRT) approach with the Role Playing model effectively enhances student motivation and learning outcomes in Biology, particularly in the Plantae topic.

Keywords: biology, culturally responsive teaching (CRT), plantae, role playing

To cite this article:
Tuapattinaya, P. M. J., & Pradana, S. P. (2025). Integrating Culturally Responsive Teaching and Role-Playing to Enhance Biology Learning Motivation. BIOEDUPAT: Pattimura Journal of Biology and Learning, 5(2), 304-309. https://doi.org/10.30598/bioedupat.v5.i2.pp304-309

INTRODUCTION

Education plays a crucial role in improving the quality of human resources, ultimately contributing to the advancement of a nation. Therefore, efforts to provide high-quality education have become a necessity. However, one of the greatest challenges in the educational field is designing a learning system that is both inclusive and relevant to students' real-life experiences, thereby increasing their interest and motivation to learn (Alhanachi et al. 2021). A high level of learning motivation is essential in determining an individual's academic success, as students with strong motivation tend to achieve better learning outcomes than those with lower motivation (Andriani & Rasto, 2019). Furthermore, motivation in the learning process serves as a driving force, whether intrinsic or extrinsic, encouraging students to continuously engage in learning and undergo positive transformations in their knowledge, skills, and attitudes (Putri Ningrat et al. 2018).

Based on this perspective, an appropriate learning approach is needed to ensure that the learning process is not only effective but also capable of enhancing student motivation. With a suitable approach, students are expected to become more actively engaged in learning, develop a strong curiosity, and gain a deeper understanding of the subject matter. One such approach is Culturally Responsive Teaching (CRT), which integrates learning concepts and activities with local culture, traditions, and regional customs (Taher, 2023). The implementation of CRT in education is essential for improving student engagement, motivation, and academic

performance. When instruction becomes more culturally responsive, students tend to participate more actively, ultimately enhancing classroom effectiveness (Chen & Yang, 2017).

One instructional model that can be integrated with CRT is role-playing. This approach allows students to understand learning concepts through role simulations that are closely related to their own cultural backgrounds and experiences. The integration of CRT with role-playing fosters a more contextual, interactive, and meaningful learning experience, as students do not merely acquire theoretical knowledge but also engage in experiential learning that aligns with their everyday lives. Role-playing is a pedagogical method designed to simulate historical events, current occurrences, and future scenarios (Oktivianto et al. 2018). This model has a significant impact on improving students' academic performance in Biology subjects, as it encourages active participation, leading to a better understanding of the material (Ndraha et al. 2024). Role-Playing also fosters a dynamic learning environment, making the learning process more enjoyable while enhancing students' motivation and enthusiasm (Rosifah et al. 2018).

By implementing the Role-Playing model in education, students become more engaged and enthusiastic, thereby achieving a deeper comprehension of the subject matter. Compared to conventional teaching methods, which often tend to be monotonous, this model creates a more interactive and enjoyable learning experience (Khadam et al. 2024). Additionally, Role-Playing excels in simulating real-world experiences and bridging the gap between theoretical knowledge and practical applications (Latif et al. 2018). This approach further simplifies abstract concepts by transforming them into direct experiences and social interactions (Takemura & Kurabayashi, 2014).

In the context of Biology education, particularly in teaching the topic of Plantae, students often struggle due to the complexity of distinguishing different plant species, while their familiarity with the studied plants remains limited. However, such understanding is a fundamental aspect of mastering this topic (Handika et al. 2022). This difficulty is further compounded when the learning process lacks contextual relevance and does not connect to students' everyday experiences. Therefore, integrating CRT and role-playing presents a potential solution by linking the study of Plantae to students' cultural backgrounds and local traditions.

In Biology lessons, a Role-Playing model based on CRT can be implemented by designing scenarios that illustrate plant diversity, its utilization in local cultures, and its role in ecosystems. Students may take on roles such as mosses, ferns, gymnosperms, or angiosperms to explore their distinct characteristics. Additionally, they can simulate pollination by insects, mutualistic relationships with fungi, or the role of plants as primary producers in the food chain. This approach encourages students to be more engaged, enthusiastic, and capable of understanding Plantae concepts more comprehensively.

Based on the discussion above, this study aims to apply a combination of CRT and the role-playing model in Biology instruction for Grade X students at State Senior High School 42 Central Maluku. This approach is expected to enhance students' motivation in the learning process. Furthermore, the selected methodology seeks to assist students in gaining a deeper understanding of Plantae concepts. Thus, the learning process becomes more meaningful and effective for students.

METHODS

This study employs a Classroom Action Research (CAR) approach based on the model developed by Kemmis & Taggart (1988). The research follows a cyclical process consisting of four key stages in each cycle: Planning, Acting, Observing, and Reflecting. The study is conducted in two cycles to examine the effectiveness of integrating the CRT approach with the role-playing learning model in enhancing students' motivation and learning outcomes in Biology for Grade 10 at State Senior High School 42 Central Maluku.

In the pre-cycle stage, Biology lessons are conducted using a conventional approach that tends to be monotonous. Additionally, a diagnostic assessment is carried out to identify challenges related to students' learning motivation and conceptual understanding of Biology. Based on the findings from this assessment, the researcher develops a lesson plan incorporating the collaboration between CRT and the role-playing model. Preparatory steps include designing a teaching module, developing assessment instruments, selecting culturally relevant learning media, and creating Role-Playing scenarios that align with Biology topics.

The first cycle consists of three main stages. In the Acting stage, the researcher implements the combination of CRT and the role-playing model in teaching Biology, focusing on the topic "Plant Diversity in the Surrounding Environment." The Role-Playing scenario involves simulating interactions among plants within an ecosystem and exploring their roles in the local community. In the Observing stage, the researcher closely monitors the learning process, student interactions, participation in role-playing activities, and the learning outcomes achieved following the lesson. The Reflecting stage involves evaluating the effectiveness of the learning process, identifying areas for improvement, and devising strategies to enhance the next cycle.

In the second cycle, improvements and refinements are made based on reflections from the first cycle, focusing on increasing student engagement through more contextualized roles and scenarios. Enrichment and remedial

lessons are implemented to ensure all students gain a deeper understanding of the concepts covered. The cycle concludes with a final reflection on the effectiveness of integrating CRT with the role-playing model to improve Grade 10 students' motivation and learning outcomes in Biology at State Senior High School 42 Central Maluku. By employing this approach, students are expected to become more engaged, enthusiastic, and develop a deeper understanding of Biology concepts through a culturally relevant and contextualized learning experience.

RESULTS AND DISCUSSION

This section presents the research findings based on the implementation of a collaborative approach combining CRT and the role playing learning model to enhance students' motivation and learning outcomes in Biology for 10th-grade students at State Senior High School 42 Central Maluku. The analysis was conducted by comparing the conditions in the pre-cycle, Cycle 1, and Cycle 2 to assess the effectiveness of the intervention. The research findings for each cycle are summarized in Table 1 and Table 2.

Table 1. Students' Learning Motivation

Cycle	Unmotivated Students	Motivated Students	Total
Pre Cycle	14	15	
Cycle 1	4	25	29
Cycle 2	1	28	

Table 1 illustrates the improvement in students' learning motivation from the pre-cycle to Cycle 2. In the pre-cycle, 14 students were unmotivated; however, this number decreased to 4 in Cycle 1 and further declined to just 1 student in Cycle 2. Conversely, the number of motivated students increased significantly, reaching 28 in Cycle 2. These results indicate that the implementation of Culturally Responsive Teaching (CRT) and Role Playing effectively enhances students' learning motivation. Subsequently, Table 2 presents the progression of students' learning outcomes as an impact of the increased motivation.

Table 2. Students' Learning Outcomes

Cycle	Students who did not pass.	Students who passed.	Passed and received additional	Total
Pre Cycle	3	26	0	
Cycle 1	0	9	20	29
Cycle 2	0	0	29	

Table 2 illustrates the improvement in students' learning outcomes from the pre-cycle to Cycle 2. In the pre-cycle, 3 students had not yet achieved mastery, but by Cycle 1, all students had met the required competency level, with 20 requiring enrichment. In Cycle 2, all students were classified as achieving mastery with enrichment, demonstrating a deeper understanding of the material. These findings indicate that the implementation of CRT and role playing not only enhances motivation but also significantly improves students' learning outcomes. Furthermore, these results highlight the effectiveness of combining culturally relevant teaching strategies with interactive learning models in fostering both engagement and academic achievement.

After examining the data presented in the previous table, the following graph (figure 1, figure 2) offers a clearer representation of the improvement in students' motivation and learning outcomes from the pre-cycle to the second cycle. This visualization aims to depict the changes at each stage of the learning process, facilitating a more comprehensive analysis of the effectiveness of the applied methodology.

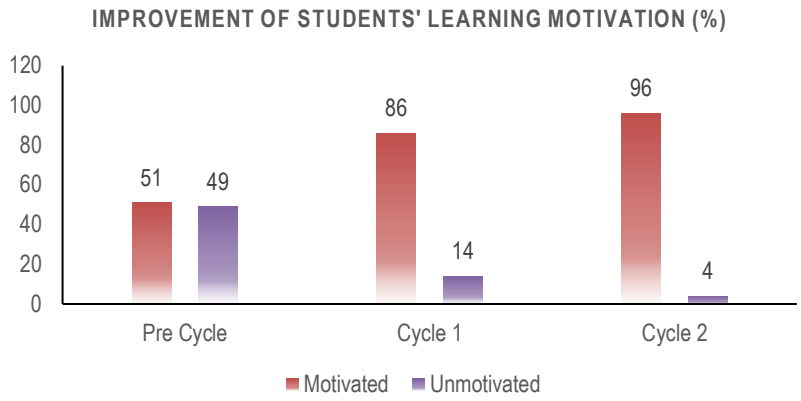

Figure 1. Improvement of Students' Learning Motivation

In the pre-cycle stage, the learning process remained conventional and monotonous, resulting in 49% of students lacking motivation. After the first cycle was implemented, the percentage of unmotivated students significantly decreased to 14%, indicating an 86% increase in motivation. Furthermore, following the implementation of the second cycle with improved strategies, learning motivation increased to 96%, with only 4% of students still experiencing low motivation. These findings suggest that the CRT and Role-Playing methods effectively create a more engaging and meaningful learning environment for students.

To gain a deeper understanding of the relationship between increased motivation and students' learning outcomes, the following graph (Figure 2) provides a clearer depiction of the distribution of learning outcomes in each cycle. By analyzing this graph, the effectiveness of the implemented instructional methods in enhancing students' conceptual understanding of biology can be evaluated.

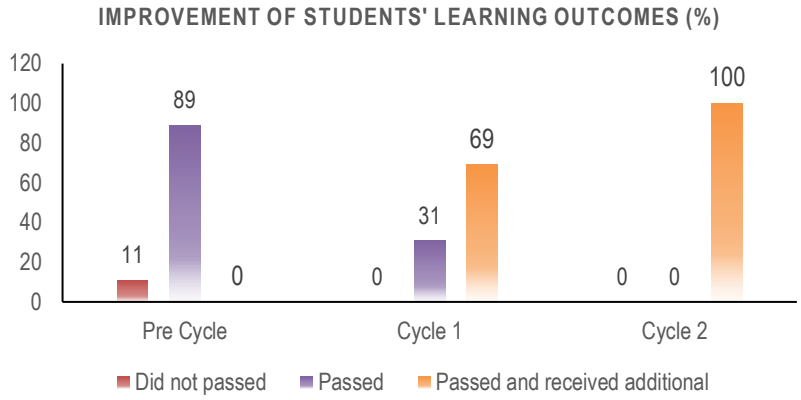

Figure 2. Improvement of Students' Learning Motivation

In terms of learning outcomes, data indicate that in the pre-cycle stage, 11% of students did not achieve mastery. After the implementation of the first cycle, this percentage decreased to 0%, demonstrating a significant improvement. However, to ensure the sustainability of learning outcomes, this study established an additional criterion: mastery with the need for enrichment or further challenges. In the first cycle, 69% of students fell into this category, and in the second cycle, all students (100%) achieved mastery with enrichment, indicating a deeper understanding of biological concepts.

According to researchers, the collaboration between the CRT approach and the role-playing learning model has both advantages and disadvantages. One of its main advantages is that students become more motivated to learn, which facilitates a quicker understanding of the material presented by the teacher. With high motivation, students remain focused during the learning process, ultimately leading to improved academic performance. However, a notable limitation of this collaboration is the time constraints during implementation. Due to limited instructional time, not all groups can participate in role-playing activities within the first cycle, necessitating revisions or reinforcements in the second cycle.

The CRT approach and the role-playing model serve as effective instructional strategies to enhance students' motivation and learning outcomes in the Plantae subject matter. CRT emphasizes the integration of local cultural elements into the learning process, allowing students to comprehend the material in a more contextualized manner. Meanwhile, role-playing fosters a more interactive learning experience by engaging students in role simulations that

are directly related to biological concepts being studied. The combination of these two approaches not only makes the learning process more engaging but also facilitates a deeper and more meaningful understanding of the subject matter.

In Biology education, particularly in the study of Plantae, students often struggle to differentiate the characteristics of various plant groups. This difficulty arises from the abstract nature of the concepts and the lack of direct experience in observing and identifying plant species. The CRT approach aims to bridge students' cultural backgrounds with the learning process, making the material more relevant to them (Tanase, 2020). Through CRT, the lesson content can be connected to local plant diversity familiar to students, such as endemic plants in Maluku, the utilization of plants in daily life, and cultural practices related to vegetation. This approach enables students to recognize the significance of the subject matter in relation to their immediate environment.

The role-playing model allows students to take on the roles of different plant types, such as mosses, ferns, and flowering plants, helping them grasp the distinctive characteristics and ecological roles of each group. Through this activity, students do not merely acquire theoretical knowledge but also experience firsthand how plants adapt, reproduce, and interact within ecosystems. This aligns with Nazarov (2022), who found that role playing enhances students' memory, attention, critical thinking, and communication skills. Furthermore, role playing and simulation-based learning have been shown to improve students' comprehension of complex concepts (Robinson et al. 2021). Additionally, the scenarios developed in Role-Playing exercises can strengthen students' understanding of processes such as photosynthesis, pollination, and symbiotic relationships between plants and other organisms.

Beyond enhancing motivation, this approach also has a significant impact on learning outcomes. Research data indicate that before the implementation of CRT and role-playing, 11% of students had not achieved competency. However, after the second cycle, all students met the competency criteria with the addition of enrichment activities. Enrichment was provided in the form of further exploration of local plant diversity and an analysis of the ecological roles of plants within ecosystems. This enrichment ensured that higher-achieving students received appropriate academic challenges, while those requiring additional support were able to better grasp the material.

Enrichment in education also plays a crucial role in improving the quality of learning. Within the Plantae curriculum, enrichment can be implemented through exploratory projects, such as the development of a digital catalog of local plants or an analysis of economically valuable plant species in the surrounding environment. Additionally, students can be assigned tasks requiring them to analyze the relationship between plant adaptations and their respective habitats. Through this strategy, students can deepen their understanding of biodiversity and the importance of plant conservation within their ecosystems.

Although CRT and role-playing have been proven effective, several challenges remain in their implementation. One major challenge is time constraints in conducting role-playing activities, as not all students may have the opportunity to participate within a single session. Additionally, some students may struggle to understand the given scenarios, particularly when dealing with complex biological concepts. To address these challenges, teachers can implement adaptive grouping strategies, allowing students with a stronger grasp of the material to assist their peers in understanding roles and scenarios.

For future research and implementation, the CRT approach and role-playing model can be further explored in other Biology topics, such as ecology, plant reproductive systems, or genetics. Additionally, the integration of technology in Role-Playing simulations, such as the use of augmented reality (AR) or virtual reality (VR), could serve as a solution to overcome time constraints while providing students with a more immersive learning experience. By incorporating these advancements, this approach can continue to evolve and have a broader impact on Biology education.

CONCLUSION

The application of CRT in combination with the role-playing model was found to be effective in strengthening students' motivation and learning outcomes on the topic of Plantae. The results show a considerable increase in classroom participation, as the majority of students displayed higher levels of motivation and a stronger understanding of the material. By relating instruction to students' cultural backgrounds, the learning process became more meaningful and contextually relevant. Accordingly, integrating CRT with Role-Playing can be regarded as an innovative approach to enhance Biology instruction at the senior high school level.

REFERENCES

Alhanachi, S., De Meijer, L. A. L., & Severiens, S. E. (2021). Improving culturally responsive teaching through professional learning communities: A qualitative study in Dutch pre-vocational schools. *International Journal of Educational Research*, 105, 101698. https://doi.org/10.1016/j.ijer.2020.101698.

Andriani, R., & Rasto, R. (2019). Motivasi belajar sebagai determinan hasil belajar siswa. *Jurnal Pendidikan Manajemen Perkantoran*, 4(1), 80. https://doi.org/10.17509/jpm.v4i1.14958.

Chen, D., & Yang, X. (2017). Improving Active classroom participation of ESL students: Applying culturally responsive teaching strategies. *Theory and Practice in Language Studies*, 7(1), 79. https://doi.org/10.17507/tpls.0701.10.

Handika, R., Syafii, W., & Mahadi, I. (2022). Pengembangan majalah elektronik biologi berbasis multimedia pada materi plantae kelas X SMA/MA. *Bio-Lectura : Jurnal Pendidikan Biologi*, 9(2), 198–205. https://doi.org/10.31849/bl.v9i2.11430.

Khadam, B. M., Hakim, & Choiriyah, S. (2024). Implementation of the Role playing learning method in improving islamic religious education learning outcomes on marriage material for Vocational High School Students. *International Journal of Social Science and Human Research*, 07(03). https://doi.org/10.47191/ijsshr/v7-i03-62.

Latif, R., Mumtaz, S., Mumtaz, R., & Hussain, A. (2018). A comparison of debate and role play in enhancing critical thinking and communication skills of medical students during problem based learning. *Biochemistry and Molecular Biology Education*, 46(4), 336–342. https://doi.org/10.1002/bmb.21124.

Nazarov, R. I. (2022). *Role-Playing as a Method of Teaching a Foreign Languag E*. *3*.

Ndraha, H., Gulo, H., Harefa, A. R., & Waruwu, T. (2024). Pengaruh model pembelajaran role-playing terhadap hasil belajar mata pelajaran biologi di SMA Negeri 1 Gunungsitoli. *LEARNING : Jurnal Inovasi Penelitian Pendidikan dan Pembelajaran*, 4(3), 690–699. https://doi.org/10.51878/learning.v4i3.3208.

Oktivianto, O. I., Hudaidah, H., & Alian, A. (2018). Pengaruh implementasi model pembelajaran role playing dengan media film terhadap motivasi belajar peserta didik dalam pelajaran sejarah materi perang Palembang Kelas X di SMA Srijaya Negara Palembang. *Jurnal Pendidikan (Teori dan Praktik)*, 3(2), 113. https://doi.org/10.26740/jp.v3n2.p113-118.

Putri Ningrat, S., Tegeh, I. M., & Sumantri, M. (2018). Kontribusi Gaya Belajar Dan Motivasi Belajar Terhadap Hasil Belajar Bahasa Indonesia. *Jurnal Ilmiah Sekolah Dasar*, 2(3), 257. https://doi.org/10.23887/jisd.v2i3.16140.

Robinson, G. M., Hardman, M., & Matley, R. J. (2021). Using games in geographical and planning-related teaching: Serious games, edutainment, board games and role-play. *Social Sciences & Humanities Open*, *4*(1), 100208. https://doi.org/10.1016/j.ssaho.2021.100208

Rosifah, D., Masruhim, M. A., & Sukartiningsih, S. (2018). Needs analysis in role playing learning model influence on motivation and biology learning outcome of the students at SMA Negeri 3 Samarinda. *BIODIK*, 4(1), 1–7. https://doi.org/10.22437/bio.v4i1.5503.

Taher, T. (2023). Analisis keterampilan komunikasi dan kolaborasi siswa introvert dengan pendekatan culturally responsive teaching. *Jambura Journal of Educational Chemistry*, 5(1), 21–27. https://doi.org/10.34312/jjec.v5i1.17463.

Takemura, M., & Kurabayashi, M. (2014). Using analogy role-play activity in an undergraduate biology classroom to show central dogma revision. *Biochemistry and Molecular Biology Education*, 42(4), 351–356. https://doi.org/10.1002/bmb.20803.

Tanase, M. (2020). Is good teaching culturally responsive? *Journal of Pedagogical Research*, 4(3), 187–202. https://doi.org/10.33902/JPR.2020063333.