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Improving Cognitive Learning Outcomes through the Implementation of a Culturally Responsive Teaching Approach at SMA Negeri 5 Banda Aceh

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Abstract: Today, learning is presented with various innovations that are according with the new paradigm, including in biology subject. The coordination system is one of complicated materials, so it requires an innovation that is oriented towards ethnopedagogy. This study aims to determine the increase in cognitive learning outcomes of class XI students through learning the coordination system using the Culturally Responsive Teaching (CRT) approach. The approach used in this study is a quantitative approach with the Classroom Action Research (CAR) type by using two learning cycles consisting of the stages of planning, implementing, observing and reflecting. This research was carried out by using test techniques in each cycle. Data analysis used a quantitative descriptive analysis which identified learning outcomes as class average scores and classical completeness percentages (KK). The results of the study showed that the CRT approach can improve student's cognitive learning outcomes. This can be seen from the percentage of households in the first cycle of 88.9% and increased to 92.6% in the second cycle. Based on the results of this study it can be concluded that the CRT approach is able to improve cognitive learning outcomes of students in class XI SMAN 5 Banda Aceh.

Keywords: New Paradigm, Culturally Responsive Teaching (CRT), Cognitive Learning Outcomes.

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INTRODUCTION

Education is a process aimed at influencing learners so that they are able to adapt to their environment and bring about changes within themselves. Education can be pursued through learning processes in order to achieve the desired changes in the domain of knowledge.

In every learning process, there is an expectation that students will achieve good learning outcomes. However, in reality, the learning outcomes attained by students are not always optimal or in accordance with expectations. The standard for determining whether learning outcomes are considered good or not is measured by the Minimum Mastery Criteria (Kriteria Ketuntasan Minimal/KKM), which has been established as a benchmark for the success of the learning process. Furthermore, learning outcomes serve as a basis for

evaluating the implementation of the learning process, as students' learning outcomes reflect their abilities and overall quality (Nurhasanah & Sobandi, 2016, p. 129).

The rapid development of the times, accompanied by advances in science and technology as well as swift social changes, requires teachers to recognize and keep pace with every transformation occurring in the field of education in accordance with their respective areas of expertise (Simbolon, 2014, p. 14).

In line with these changes, the Indonesian education curriculum must also adapt in order to maintain relevance between technological advancements and learning processes. The curriculum currently implemented in the Indonesian education system is the *Merdeka Curriculum*, which is often referred to as the new learning paradigm.

The new learning paradigm represents a learning practice that is centered on students. It encompasses competency standard mapping, independent learning (*Merdeka Belajar*), and minimum competency assessment. These three components are interconnected and mutually influential. Within this paradigm, the *Pancasila Student Profile* serves as a guiding framework that directs all policies and reforms within the Indonesian education system, including learning and assessment practices (Kemendikbudristek, 2021, p. 1).

As stated by Oktavianti and Yuni (2018, p. 150), the curriculum in Indonesia has undergone several changes, in which current learning practices are expected to incorporate ethnopedagogical content that emphasizes local wisdom values for students. Ethnopedagogy-oriented learning is essential to implement, considering that Indonesia is a multicultural nation. Moreover, rapid technological development is feared to contribute to cultural shifts within Indonesian society. Therefore, to address these challenges, it is necessary to implement learning through a Culturally Responsive Teaching (CRT) approach.

Culturally Responsive Teaching is a learning approach that emphasizes equal rights for all students to receive instruction without discrimination based on their cultural backgrounds (Gay, 2000). Consequently, further Classroom Action Research (CAR) is required to examine the impact of the CRT approach on students' learning outcomes.

METHODS

This study was conducted at SMA Negeri 5 Banda Aceh and involved 27 students from class XI IPA 1 as the research sample. The implementation of the research took place over a one-week period, from May 16 to May 23, 2023. The selection of the research site and participants was based on preliminary observations indicating the need to improve students' learning outcomes as well as the quality of the learning process through the application of a more contextually relevant instructional approach.

The research employed a quantitative approach using the Classroom Action Research (CAR) design. This design was chosen because it allows teachers and researchers to systematically improve instructional practices through reflective cycles of action. The study was carried out in two cycles, each of which consisted of a single learning meeting with a time allocation of 2 × 45 minutes. The implementation of two cycles was intended to identify improvements in students' learning outcomes after the application of the Culturally Responsive Teaching (CRT) approach and to determine whether the desired learning mastery had been achieved.

Data collection in this study primarily utilized test techniques, which were administered at the end of each cycle. The tests were designed to measure students' cognitive learning outcomes after participating in learning activities based on the CRT approach combined with the Problem-Based Learning (PBL) model. In addition to measuring learning outcomes, the implementation of Classroom Action Research in this study also aimed to enhance the overall quality of the learning process by integrating cultural elements that were relevant to students' social and cultural backgrounds.

The procedures applied in Cycle I and Cycle II followed the same systematic stages to ensure consistency in the research process. Prior to the implementation of learning

activities, the teacher prepared instructional plans in the form of teaching modules that were aligned with the curriculum and learning objectives. Evaluation instruments in the form of multiple-choice tests, complete with answer keys, were also developed to assess students' mastery of the learning material. Furthermore, student worksheets (LKPD) were prepared to support group-based learning activities on the topics of the hormonal system in Cycle I and the sensory system in Cycle II.

The learning process in each cycle began with preliminary activities, which included greeting students, leading a prayer, checking attendance, and conducting apperception activities to connect prior knowledge with the new material. During the core learning activities, the teacher presented instructional materials in the form of articles related to the hormonal system and sensory system. These materials were designed by incorporating cultural elements that were familiar to students in order to reflect the principles of the Culturally Responsive Teaching approach. Students were then organized into small groups and engaged in learning activities using the Problem-Based Learning model. Through group discussions, students collaboratively analyzed the problems presented in the learning materials and completed the worksheets provided by the teacher.

At the end of each learning cycle, the teacher conducted closing activities, which included administering a post-test in the form of multiple-choice questions to measure students' learning outcomes. Students were also asked to summarize the learning content to reinforce their understanding of the material. The lesson was concluded with a closing greeting. The results of the post-tests were then analyzed to evaluate the effectiveness of the learning process in each cycle.

The success parameters of this study were determined based on students' learning mastery in each cycle. Learning mastery at the individual level was indicated by students achieving scores that met or exceeded the Minimum Mastery Criteria (KKM), which was set at 75. In addition to individual mastery, classical mastery was also used as an indicator of learning success. Learning was considered complete at the classical level if at least 75% of students achieved scores of 75 or higher.

Data analysis was conducted using descriptive quantitative analysis techniques to describe students' learning outcomes in detail. The analysis included the calculation of individual student scores, the class mean score, and the percentage of classical mastery. Individual student scores were calculated by dividing the number of correct answers by the total number of questions and multiplying the result by 100. The mean learning outcome score was obtained by dividing the total score of all students by the number of students, as suggested by Sudjana (2006). Furthermore, the percentage of classical mastery was calculated by dividing the number of students who achieved mastery learning by the total number of students and multiplying the result by 100%, in accordance with the formulation proposed by Imansari and Ina (2017).

Based on these analytical procedures, a student was categorized as having achieved mastery learning if they obtained an individual score of at least 75. Meanwhile, learning was considered successful at the classical level if a minimum of 75% of students reached the established mastery criterion. This framework provided a clear and systematic basis for evaluating the effectiveness of the Culturally Responsive Teaching approach implemented in this study.

RESULTS

The results of this study were obtained through the implementation of Classroom Action Research (CAR) conducted in two learning cycles involving 27 students of class XI IPA 1 at SMA Negeri 5 Banda Aceh. Each cycle was carried out through systematic stages consisting of planning, action implementation, observation, and reflection. At the end of each cycle, a cognitive achievement test in the form of multiple-choice questions was administered to measure students' learning outcomes after participating in biology learning using the *Culturally Responsive Teaching* (CRT) approach.

In Cycle I, learning activities focused on the topic of the human endocrine system, which was integrated with local cultural contexts familiar to the students. Based on the results of the post-test administered at the end of Cycle I, the class obtained an average score of 82.6. Out of 27 students, 24 students (88.9%) achieved scores equal to or higher than the Minimum Mastery Criterion (MMC) of 75, while 3 students (11.1%) had not yet met the mastery criterion. These results indicate that, at the classical level, learning in Cycle I had reached mastery; however, a small number of students still required additional guidance and instructional improvement.

The findings of Cycle I demonstrate that the implementation of the CRT approach had a positive impact on students' cognitive learning outcomes. Nevertheless, reflections on Cycle I revealed that several students experienced difficulties in linking abstract concepts of the endocrine system with specific biological phenomena. This condition suggested the need for strengthening contextual explanations and optimizing group discussions in the subsequent cycle.

In Cycle II, the learning process was continued with the topic of the human sensory system, which was again contextualized through students' cultural experiences and daily life practices. The post-test results in Cycle II showed a clear improvement in learning outcomes. The class average score increased to 84.45. The number of students who achieved mastery increased to 25 students (92.6%), while only 2 students (7.4%) remained below the MMC.

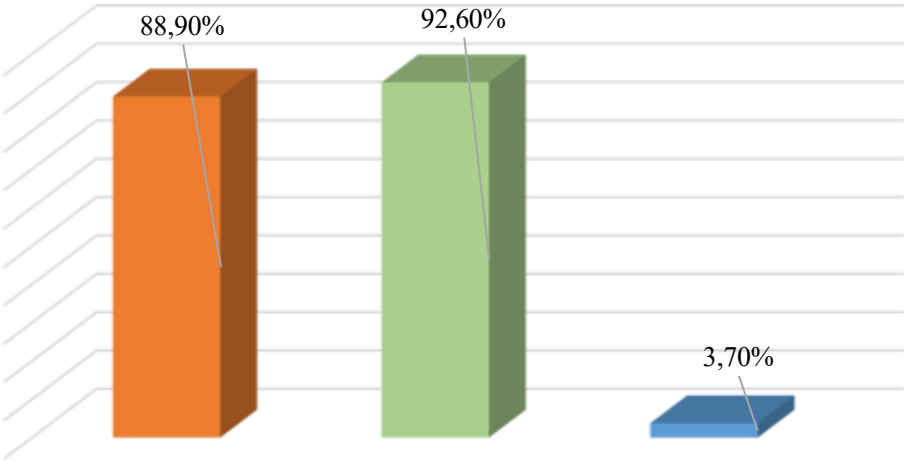

Figure 1. Recapitulation of Students' Learning Outcomes

The improvement in both the average score and the percentage of classical mastery from Cycle I to Cycle II indicates that the instructional revisions implemented—particularly the reinforcement of cultural relevance and experiential learning—contributed significantly to students' conceptual understanding. Overall, the increase of 3.7% in classical mastery demonstrates the effectiveness of the CRT approach in enhancing students' cognitive learning outcomes.

The improvement in students' cognitive learning outcomes across the two cycles indicates that the *Culturally Responsive Teaching* approach is capable of creating more meaningful and engaging learning experiences. Biology learning that is closely connected to students' cultural backgrounds and daily experiences helps transform abstract concepts into more concrete and comprehensible knowledge. This finding is consistent with the nature of biology learning, which emphasizes the relationship between scientific concepts and real-life phenomena.

In Cycle I, the integration of local cultural elements into the learning of the endocrine system provided initial stimulation for students to understand the role of hormones in everyday life. Examples drawn from the surrounding environment and local wisdom helped students relate biological concepts to their prior knowledge. The activation of prior

knowledge played an important role in supporting students' conceptual construction and comprehension.

However, reflective analysis of Cycle I revealed that not all students were able to optimally construct understanding through group discussions. This limitation was influenced by differences in academic ability and varying levels of participation among group members. Therefore, in Cycle II, the teacher implemented improvements by providing more structured discussion guidelines, clarifying students' roles within groups, and strengthening cultural contexts that were more closely related to students' sensory and lived experiences.

In Cycle II, learning about the sensory system that was linked to local cultural practices—such as traditional cuisine and daily habits—proved effective in increasing student engagement. Students were not only able to understand the functions of sensory organs theoretically but were also able to explain their roles in experiencing and appreciating cultural characteristics of their region. Active participation and the sharing of personal experiences during learning activities indicate the occurrence of deeper learning processes.

The improvement in learning outcomes in Cycle II also suggests that the CRT approach supports the principles of the new learning paradigm, which emphasizes student-centered learning. Students were positioned not merely as recipients of information but as active participants who constructed knowledge based on their cultural and social backgrounds. This learning orientation strengthened students' motivation and sense of ownership over the learning process.

From a theoretical perspective, the findings of this study support the view that external factors—such as instructional strategies and the relevance of learning materials to students' real-life contexts—have a significant influence on learning outcomes. The CRT approach functions as a bridge between academic knowledge and local culture, making learning more inclusive and responsive to student diversity.

Thus, the increase in class average scores and classical mastery percentages in this study reflects not only quantitative success but also improvements in the quality of the learning process. The CRT approach was proven to create a conducive learning environment, enhance conceptual understanding, and encourage active student involvement in biology learning.

Based on this analysis, it can be concluded that the consistent and well-planned implementation of *Culturally Responsive Teaching* has a positive impact on students' cognitive learning outcomes. This approach is therefore recommended as an alternative instructional strategy in biology learning, particularly for topics with high levels of conceptual complexity that require deep understanding.

DISCUSSION

Biology is a subject that is closely related to everyday life; therefore, it is inseparable from human existence. Biology examines living organisms, the environment, and the interactions between the two. Biology learning emphasizes direct experience to enable students to recognize and understand their surrounding environment through processes of inquiry and hands-on activities (Lestari & Hani, 2020, p. 57).

The research findings obtained after the implementation of biology learning in Cycles I and II using the Culturally Responsive Teaching (CRT) approach were analyzed based on the data presented in the previous tables (Tables 1 and 2). The improvement observed from Cycle I to Cycle II indicates that learning through the CRT approach was effective in enhancing students' learning outcomes, as measured by cognitive tests in the form of multiple-choice questions. This improvement is evident from the comparison of learning outcome percentages, which were accumulated into the percentage of classical mastery (KM). In Cycle I, the classical mastery percentage reached 88.9%, while in Cycle II it increased to 92.6% (Table 3). In Cycle I, 24 students achieved mastery learning by obtaining

scores above the Minimum Mastery Criteria (KKM) of 75, whereas in Cycle II the number of students achieving mastery increased to 25 out of a total of 27 students.

The improvement in students' learning outcomes in each cycle, as indicated by the achievement of the established mastery criteria, was influenced by various positive factors that provided constructive stimulation for students. These influencing factors can be categorized into internal and external factors, including students' motivation and the use of instructional media during the learning process (Moh & Hernik, 2017, p. 493).

Learning implemented through the Culturally Responsive Teaching (CRT) approach is commonly referred to as ethnopedagogy. This is in line with the explanation of Oktavianti and Yuni (2018, p. 151), who state that ethnopedagogy reflects the integration of local content in learning, often described as local wisdom-based learning. The development of local wisdom in learning is guided by four principles: (1) alignment with students' developmental stages, (2) competency needs, (3) flexibility in types, forms, and scheduling of implementation, and (4) relevance and usefulness for national interests in addressing global challenges. Ethnopedagogical learning implemented in this study was intended to introduce, preserve, and develop local culture among students, thereby fostering a sense of patriotism and national identity.

To achieve these objectives, learning activities must be connected to local culture or local wisdom that aligns with the dominant ethnic background of students in the classroom. In Cycle I, cultural concepts integrated into learning about the hormonal system were related to the benefits of betel leaves (*Piper betle*), which are commonly found around students' homes and traditionally used as a natural antibiotic to prevent chronic vaginal discharge caused by hormonal and microbial factors. In addition, the teacher provided examples of traditional practices in which aloe vera (*Aloe vera*) was used as a natural alternative to shampoo. Aloe vera is known for its properties in thickening, softening, and maintaining hair pigmentation. Hair growth is associated with the secretion of growth hormones in the body. Therefore, aloe vera can serve as an affordable, environmentally friendly, and easily accessible alternative treatment for individuals experiencing growth hormone-related issues.

Building upon the cultural concepts introduced in Cycle I, learning activities in Cycle II also integrated local wisdom values within the context of the sensory system. Students were asked to identify connections between sensory organs and culture. Most students mentioned that the nose, as the organ of smell, enables individuals to enjoy the aroma of traditional regional dishes such as *mie Aceh*, *keumamah*, and *kuah beulangong*, which are rich in spices and represent distinctive features of Acehnese cuisine. Additionally, students associated the tongue, as the organ of taste, with the ability to experience the flavors of these traditional foods.

The observed enthusiasm demonstrated by students during the learning process indicates a strong understanding of the material presented. Consequently, this type of learning experience creates a meaningful and lasting impression on students, as they engage in learning activities that are closely connected to their real-life experiences.

CONCLUSION

Based on the Classroom Action Research (CAR) that has been conducted, it can be concluded that learning through the Culturally Responsive Teaching (CRT) approach is effective in improving students' cognitive learning outcomes. This conclusion is supported by the increase in the percentage of classical mastery (KM) across each cycle. In Cycle I, the classical mastery percentage was 88.9%, whereas in Cycle II it increased by 3.7% to reach 92.6%. This improvement demonstrates that the implementation of the CRT approach has a positive impact on students' learning outcomes.

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