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Improving Learning Engagement through the Implementation of Problem-Based Learning (PBL) Model with a Culturally Responsive Teaching (CRT) Approach and Homogeneous Group Discussions

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Abstract: This classroom action research aims to enhance the learning engagement of Grade XII students at SMA Negeri 2 Mataram in studying colligative properties of solutions through the implementation of the Problem-Based Learning (PBL) model, using a Culturally Responsive Teaching (CRT) approach and homogeneous group discussions. The classroom action research was conducted in two cycles. The increase in student engagement was assessed based on changes in student groupings, categorized into Groups 1, 2, 3, and 4. Group 1 represented students with high learning engagement. Before the intervention, 28% or 12 students were in Group 1, which increased to 42% or 15 students by the end of Cycle II. Additionally, no students remained in Group 4, representing those with very low engagement. Homogeneous group discussions fostered increased learning engagement by allowing the teacher to create an environment more responsive to each student's needs. The problem-based learning model combined with the Culturally Responsive Teaching (CRT) approach successfully enhanced student engagement, as the problems presented in learning activities were aligned with real-life situations experienced by the students in their daily lives.

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Introduction

Active learning, which directly involves students in learning, has become a primary focus in enhancing educational effectiveness. One instructional model proven to support increased student engagement is Problem-Based Learning (PBL), which emphasizes real-world problem-solving to cultivate students' analytical and critical thinking skills (Meilasari & Yelianti, 2020). Through PBL, students engage directly in relevant, problem-oriented scenarios, enriching their learning experiences and promoting deeper conceptual understanding (Faqiroh, 2020). PBL has demonstrated positive outcomes in improving learning achievement, as evidenced in chemistry education, where this approach enhances comprehension through interactive and collaborative processes (Suswati, 2021; Zakaria et al., 2019).

In addition to PBL, the Culturally Responsive Teaching (CRT) approach significantly enhances learning engagement, especially in classrooms with diverse cultural backgrounds. CRT seeks to connect instructional content with students' cultural backgrounds, enabling them to

comprehend and appreciate the material more effectively (Idrus & Sohid, 2023). This approach has enhanced students' critical thinking and cognitive skills by embracing and valuing their cultural identities (Surayya & Patonah, 2024). The implementation of CRT across various disciplines has shown its effectiveness in enhancing students' understanding, such as in biology education and language instruction (Mutiaratri et al., 2024; Yeh et al., 2022).

In addition to teaching methods, student grouping strategies also significantly impact learning effectiveness. Homogeneous grouping, where students are grouped based on similar abilities or backgrounds, has supported individual learning outcomes by allowing students to focus on comprehending material without substantial variations in abilities within the group (Ningsih et al., 2023). Homogeneous groups also provide a more comfortable environment for students to engage in healthy competition, boosting their confidence in facing academic challenges (Ningsih, Suseno, & Salim, 2023). While heterogeneous groups better support collaboration and social interaction, homogeneous groups are highly effective in deeply understanding the material being studied.

This study aims to integrate the PBL model with the CRT approach and homogeneous group discussion strategies to explore their synergistic impact on increasing students' engagement in learning activities. Combining PBL and CRT facilitates a more inclusive and adaptive instructional approach that aligns with students' cultural contexts, while homogeneous grouping is expected to help students develop a more profound understanding of the material. Thus, this study is expected to provide empirical contributions to applying effective teaching strategies in multicultural and student-centered education.

Research Method

This study utilized a Classroom Action Research (CAR) approach, which is reflective and collaborative, aimed at improving the quality of classroom teaching practices (Arikunto et al., 2006; Jurubasa et al., 2023). The study was conducted in two cycles, each comprising four primary stages: planning, implementation, observation, and reflection (Kemmis & McTaggart, 2005; Herr & Anderson, 2014). This research adopted a Problem-Based Learning (PBL) model with a Culturally Responsive Teaching (CRT) approach and a homogeneous group discussion strategy. The model aims to enhance student engagement through contextually relevant problems tied to their cultural background, encouraging positive interactions among students with varying levels of understanding.

The study was conducted at SMA Negeri 2 Mataram, with participants consisting of 36 students from Class IPA 1. Each cycle was expected to provide insights into the applied teaching approach's effectiveness and facilitate methodological adjustments to enhance student learning outcomes (Stringer, 2024).

Cycle I

- **Planning**

  The teacher designed a PBL-based lesson plan with a CRT approach at this stage. The planning steps included (a) identifying learning objectives by determining competencies related to the colligative properties of solutions and their cultural relevance, (b) developing context-based problems where the teacher designed real-world issues associated with the colligative properties of solutions that were meaningful within the students' cultural context (Gay, 2018), (c) designing learning activities that foster cultural interaction through

homogeneous group discussions, and (d) creating assessment instruments by developing a rubric to measure student engagement in discussions and mastery of the material.

- **Implementation**
  The teacher implemented the lesson plan by presenting a problem on the colligative properties of solutions students needed to solve collaboratively. Students were grouped according to their comprehension level and collaborative skills, allowing CRT to enrich the learning process through cultural perspectives.
- **Observation**
  Throughout the learning process, the teacher observed student activities using the designed rubric, which included (a) student interaction: engagement in inhomogeneous group discussions and cross-cultural interactions, (b) discussion participation: students' contributions and problem-solving efforts, and (c) conceptual understanding: students' ability to relate concepts to cultural context and real-life applications (Ladson-Billings, 2022).
- **Reflection**
  The teacher and students engaged in joint reflection on the learning process. This reflection analyzed the impact of PBL, CRT, and homogeneous group discussions on students' understanding and engagement. These reflective findings were used to refine strategies for the next cycle.

Cycle II

- **Planning**
  Based on reflections from the first cycle, the teacher revised the lesson plan by adjusting the strategy, approach, or learning material as needed. The focus was on enhancing areas needing improvement, such as enriching problem scenarios and improving the effectiveness of CRT.
- **Implementation**
  The teacher executed the updated lesson plan, drawing from experiences in the first cycle to refine the implementation of PBL and CRT for more effective outcomes.
- **Observation**
  Observations in this cycle focused on changes resulting from the revised strategies. The teacher again used the rubric to assess student engagement, interaction, and understanding, with particular attention to differences between the first and second cycles.
- **Final Reflection**
- The teacher and students held a final discussion to reflect on the observations and experiences throughout the second cycle. This stage involved a deeper analysis of the impact of modifications applied to the student's learning process, subsequently documented as recommendations for more inclusive and effective teaching practice (Banks, 2015).

Data was collected using an assessment rubric containing ten indicators of student engagement and interaction during the learning process, including attendance, participation in discussions, interaction, and collaboration, the contribution of creative ideas, active listening skills, involvement in practical activities, leadership and initiative, application of learned concepts, respect for others' opinions, and adherence to ethical values and responsibility. Data analysis was performed through triangulation of observation results, field notes, and rubric-based assessments

across two cycles. Descriptive analysis was used to determine the level of engagement and the effectiveness of the applied methods (Creswell, 2017).

Results and Discussion

Enhancement of Learning Engagement through PBL and CRT with Homogeneous Groups

The results showed an increase in student engagement across each implemented cycle. The Problem-Based Learning model with a Culturally Responsive Teaching (CRT) approach and homogeneous group discussion strategy effectively enhanced student engagement at SMA Negeri 2 Mataram. This increase was evidenced by the percentage of students in high and medium-engagement groups after each cycle. Before the intervention, only 28% of students were categorized in Group One (high engagement), but this figure rose to 42% by the end of the second cycle (Table 1).

These findings align with the research of Gay (2010), which suggests that CRT effectively connects instructional content with students' cultural contexts, thus increasing motivation and active participation. The PBL model emphasizes context-based learning and has enhanced student engagement, especially when paired with culturally relevant topics (Banks, 2015).

Table 1. Increase in Student Engagement

Group	Criteria	Percentage		
		Pre-Cycle	Cycle I	Cycle II
1	Demonstrates the highest level of engagement, with students displaying order and calmness in the learning process active participation in discussions and independent task completion.	28%	39%	42%
2	High interest and engagement, able to focus during explanations, and actively participating in discussions, yet still requiring assistance to complete tasks.	33%	33%	39%
3	Low interest, easily distracted, with minimal participation in discussions, yet able to improve engagement after reminders.	22%	17%	19%
4	Very low engagement, often inattentive, and unresponsive to prompts, showing little interest in receiving support.	17%	11%	0%

Cycle I Analysis

Applying CRT through the local Sasak tradition of begawe in the first cycl*e* successfully provided a familiar and culturally relevant context for students to understand scientific concepts like solution concentration. This approach made scientific concepts more accessible by linking materials and concentrations with traditional cooking processes, which are significant in Sasak culture. Anderson et al. (2021) noted that integrating local culture in teaching can enrich social interactions and facilitate deeper conceptual understanding, particularly in science education. However, observations indicated that students in Groups Three and Four required further support, particularly to enhance participation in discussions and reduce distractions during learning. Birgili (2015) highlighted that low-engagement groups often struggle to stay actively involved without effective guidance.

Cycle II Analysis

After reflecting on the first cycle, adjustments were made to the worksheets and homogeneous grouping strategy, specifically for students in Groups Three and Four. Atmojo (2012) found that adapting learning materials based on local contexts enriched understanding and fostered a high level of enthusiasm in students. In the second cycle, a more pronounced increase in engagement was observed, with students moving from lower to higher engagement groups. The percentage of students in Group One increased from 39% in the first cycle to 42% in the second, while Group Four showed a reduction to zero by the end of the cycle. The CRT and PBL approach also facilitated active interactions within discussions. Ladson-Billings (2009) noted that when instructional content is relevant to students' lives, they are more motivated to engage critically in discussions, enhancing overall engagement.

This study supports previous research indicating that PBL and CRT approaches significantly increase student engagement (Gay, 2010; Banks, 2015). However, differences were noted in the effectiveness of homogeneous grouping strategies. Idamayanti et al. (2022) reported that heterogeneous groups are generally more effective in fostering collaboration and critical thinking by including students with diverse skills. Nevertheless, this study shows that homogeneous grouping has positive impacts when used in certain contexts, particularly for students needing a supportive environment to develop foundational skills before collaborating in more diverse groups. The incorporation of culturally relevant materials aligned with Faiz et al. (2022), who showed that culturally based learning can enhance students' conceptual understanding and engagement. Although homogeneous grouping can increase engagement, some students may feel isolated within low-engagement groups. Herr & Anderson (2015) observed that group homogeneity can reduce the variety of perspectives necessary for dynamic discussions. Therefore, future research should consider heterogeneous grouping strategies to explore interactions among students with diverse skill levels.

Conclusion

This study demonstrates that applying PBL and CRT with a homogeneous group discussion strategy effectively enhanced student engagement and learning activity at SMA Negeri 2 Mataram. Including local cultural context was a key factor in increasing relevance and engagement in science education. Although homogeneous grouping has limitations regarding perspective variety, the findings show that this strategy effectively supports learning that centers on individual student needs. Future studies are encouraged to explore homogeneous and heterogeneous grouping combinations to understand interactions among students with diverse skills better.

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