Effect of Inquiry Learning and Culturally Responsive Teaching and Mathematical Problem Solving

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Article Info	ABSTRACT
	The low level of students' mathematical problem-solving ability remains a major issue in mathematics learning, particularly when instructional practices fail to actively engage students and to integrate cultural contexts relevant to their daily lives. This study was motivated by the limited integration of the Inquiry Learning Model with the Culturally Responsive Teaching (CRT) approach, especially within Islamic boarding school settings, and by the suboptimal achievement in solving problems related to the System of Linear Equations in Three Variables. This research aimed to examine (1) whether there is a significant effect of the Inquiry Learning Model integrated with CRT on students' mathematical problem-solving ability, and (2) the magnitude of such an effect. A quasi-experimental method with a posttest-only control group design was employed. The population consisted of all tenth-grade female students of SMA Terpadu Riyadlul 'Ulum in the 2025/2026 academic year. Samples were selected through purposive sampling and cluster random sampling, resulting in class X-1 as the experimental group and class X-4 as the control group. The instrument was an essay test constructed based on Polya's four problem-solving indicators and validated by experts. Data were analyzed using the Shapiro–Wilk normality test, Levene's homogeneity test, Independent Samples t-test, and coefficient of determination. The findings revealed a significant difference between the experimental and control groups ($p = 0.000 < 0.05$). The coefficient of determination ($R^2 = 0.436$) indicates that 43.6% of the variance in mathematical problem-solving ability was explained by the applied learning model, which falls into a moderate effect category. Thus, the integration of the Inquiry Learning Model with the CRT approach significantly enhances students' mathematical problem-solving ability and is recommended as an effective contextual learning alternative in mathematics education.

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Introduction

Education constitutes a deliberate and systematic endeavor to sustain human civilization by transmitting values, knowledge, skills, and cultural heritage to subsequent generations (Mahmud, 2022). Within mathematics education, mathematical problem-solving ability is recognized as a fundamental objective, as explicitly stated in the Regulation of the Minister of National Education No. 22 of 2006. In formal educational settings, mathematics instruction is not solely intended to develop students' cognitive competencies; it also influences their affective development and fosters logical and rational modes of thinking grounded in sound reasoning principles (Allimin et al., 2024). Mathematical problem-solving ability encompasses several interconnected processes, including comprehending the problem, formulating an appropriate mathematical model, executing solution strategies, and evaluating the validity of the obtained solution (Setiawati et al., 2023).

Mathematical problem-solving ability is an essential competency that students must possess in order to navigate increasingly complex academic and real-life challenges. However, empirical evidence indicates that students' performance in solving mathematical problems remains relatively low (Putri et al., 2024). This limitation is often attributed to insufficient active engagement during instructional activities and the limited integration of learning materials with students' socio-cultural contexts (Yulitya & Samosir, 2024). Consequently, innovative instructional approaches are required to enhance this competency. Classroom realities further demonstrate that students experience particular difficulty when confronted with contextual and non-routine problems. Preliminary observations conducted in Grade XII at SMA Terpadu Riyadlul 'Ulum revealed that students' mathematical problem-solving performance was still unsatisfactory, as reflected in the results summarized in Table 1, which illustrates the overall level of students' problem-solving proficiency.

Table 1. Preliminary Observation Results of Students' Mathematical Problem-Solving Ability

No	Problem-Solving Steps	Presentase (%)	Categori
1	Understanding The Problem	66,67	Moderate
2	Devising a Problem-Solving Plan	63,10	Low
3	Implementing the Problem-Solving	61,90	Low
4	Reviewing the Solution	2,38	Very Low
	Mean Score	48,51	Very Low

The test results indicated that students' average mathematical problem-solving performance reached only 48.51%, which falls within the very low category. The weakest performance was observed in the stage of reviewing solutions, with an achievement rate of merely 2.38%. This limited proficiency is associated with the predominance of teacher-centered instructional practices Syamsinar et al., (2023) and the insufficient alignment of learning materials with students' cultural backgrounds and real-life experiences (Mahmud, 2022; Putri et al., 2024).

Interviews conducted with a mathematics teacher at SMA Terpadu Riyadlul 'Ulum further confirmed that students' problem-solving ability remains unsatisfactory. Although some students are able to formulate solution strategies, they frequently encounter difficulties when executing the planned procedures. This issue is attributed to instructional approaches that still position teachers as the primary source of knowledge. In practice, cooperative learning has been predominantly implemented during classroom instruction. One strategic effort to enhance students' mathematical problem-solving ability is the introduction of instructional innovation through the Inquiry Learning Model. This model positions students as active agents in

constructing knowledge through both independent and collaborative investigations (Ardani, 2024). Previous empirical studies have demonstrated that inquiry-based instruction significantly improves students' problem-solving skills and learning motivation (Novia Uma Khoirunnisa et al., 2024; Nurfadillah et al., 2025). Nevertheless, its effectiveness can be further optimized by incorporating pedagogical approaches that acknowledge and integrate students' cultural backgrounds, particularly in Islamic boarding school contexts where cultural identity is both distinctive and deeply embedded.

The Culturally Responsive Teaching (CRT) approach offers a pedagogical framework that integrates students' cultural experiences as an essential component of the learning process. Rather than merely recognizing cultural diversity, CRT actively utilizes it as a bridge for constructing meaningful mathematical understanding. In the context of Islamic boarding schools, cultural practices such as the use of Arabic and English, Qur'anic memorization (tahfidz), public speaking activities (muhadloroh), and the study of classical Islamic texts can serve as authentic contexts for designing relevant mathematical (Ernawati et al., 2024; Gay, 2018). This approach fosters an inclusive learning environment, enhances student engagement, and facilitates conceptual comprehension by situating mathematical ideas within student lived experiences (Abdulrahim & Orosco, 2020). Therefore, integrating inquiry-based learning with CRT is expected to promote not only cognitive development but also cultural relevance in mathematics instruction.

Several previous studies support the effectiveness of these approaches. Research by Nurfadillah et al., (2025) demonstrated that inquiry learning significantly influences students' mathematical problem-solving ability. Similarly, Nazmihaolah et al., (2025) reported that the CRT approach has a significant positive impact on students' mathematical literacy. However, empirical investigations that simultaneously integrate both inquiry learning and CRT—particularly within Islamic boarding school settings—remain limited. This study addresses that gap by combining the Inquiry Learning Model with the Culturally Responsive Teaching approach in teaching the topic of Systems of Linear Equations in Three Variables. This integration is expected to enhance students' mathematical problem-solving ability while fostering inclusive, contextualized, and culturally meaningful learning experiences aligned with students' identities.

Based on the foregoing rationale, this study aims to determine whether the implementation of the Inquiry Learning Model integrated with the Culturally Responsive Teaching approach significantly affects students' mathematical problem-solving ability, and to examine the magnitude of its effect. The findings are expected to provide practical implications for educators in designing culturally responsive mathematics instruction and to contribute theoretically to the discourse on integrating cultural approaches within inquiry-based learning frameworks.

Method

Research Design

This This study employed a quasi-experimental approach utilizing a posttest-only control group design. Such a design was selected due to practical constraints commonly encountered in educational research, where full control over extraneous variables and complete random assignment are often not feasible. The posttest-only control group design enables the researcher to examine the effect of a specific instructional treatment without administering a pretest. The analysis was conducted by comparing posttest outcomes between the experimental group, which received instruction through the Inquiry Learning Model integrated with the

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Culturally Responsive Teaching (CRT) approach, and the control group, which was taught using the Problem-Based Learning (PBL) model combined with a scientific approach.

Population and Sample

The population consisted of all Grade X female students at SMA Terpadu Riyadlul 'Ulum in the 2025/2026 academic year, totaling 201 students distributed across seven classes. Sampling was conducted using purposive sampling, taking into consideration the school's policy of separating classes by gender. Subsequently, two classes were selected through cluster random sampling: Class X-1 was assigned as the experimental group, while Class X-4 served as the control group.

Instrument

The research instrument comprised one open-ended test item designed to measure students' mathematical problem-solving ability on the topic of Systems of Linear Equations in Three Variables. The test item was constructed based on Polya's four stages of problem solving: (1) understanding the problem, (2) devising a plan, (3) carrying out the plan, and (4) reviewing the solution. To enhance contextual relevance, the problem was embedded within an Islamic boarding school setting through the theme of the "Santri Condong Art Performance," ensuring alignment with students' cultural experiences. The detailed test blueprint and the complete problem-solving assessment item are presented in the research documentation.

Table 2. Blueprint of the Mtahematical Problem-Solving Ability Test

Learning Outcomes	Learning Objectives	Assessed Aspects	Item Number	Maximum Score
Modeling contextual problems into systems of three-variable linear equations and determining their solutions.	Solving and formulating problems related to Systems of Linear Equations in Three Variables (SLETV) and interpreting the obtained solutions	1. Understanding the problem 2. Devising a problem-solving strategy 3. Implementing the solution strategy 4. Reviewing and verifying the solution	1	10

Table 3. Mathematical Problem-Solving Ability Test Items for Students

Number	Item
1.	The *Santri Condong Art Performance* is one of the most highly anticipated annual events among students at Pesantren Condong, as it provides a platform for them to express and develop their artistic talents and creative abilities. The organizing committee for the *Santri Condong Art Performance 8.0* consists of Grade XI and Grade XII students of SMA Terpadu Riyadlul 'Ulum for the 2025–2026 academic year. For this event, the committee plans to offer three activity packages for female students: the Flok Song Package, the Nusantara the Musical Package, and the Flow Bade Dance Package. The total budget allocated from the committee's internal fund amounts to IDR 1,000,000. Each package requires a different implementation cost. Based on the committee's planning meeting, the following financial information was obtained: • The total cost of organizing two Flok Song Packages and one Nusantara the Musical Package is IDR 600,000. • The total cost of organizing one Flok Song Package and two Flow Bade Dance Packages is IDR 550,000.

- The total cost of organizing one Nusantara the Musical Package and one Flow Bade Dance Package is IDR 350,000.

Given the available budget, determine whether the committee can organize each package exactly once and whether any remaining funds would be left after implementation.

Questions:
  a. Identify the known information and the quantities to be determined in the problem
  b. Specify the method that will be employed to solve the problem and formulate it into an appropriate mathematical model.
  c. Solve the problem using the method selected in part (b).
  d. Verify the correctness of the solution obtained in part (c) using an alternative method.

Prior to its implementation, the research instrument underwent validity and reliability testing procedures. Furthermore, the instrument was subjected to expert judgment by a lecturer in Mathematics Education at Universitas Siliwangi to ensure its content appropriateness. A pilot test was also administered to Grade XI students to evaluate its feasibility, accuracy, and consistency in measuring the intended constructs.

Instrument Validity Testing

Construct validity analysis was conducted using Software Statistics . The resulting correlation coefficients were subsequently interpreted according to Guilford's validity classification criteria (Haq, 2022), as presented in Table 4.

Table 4. Table of Validity Classification

Interval	Category
$0{,}80 < r_{xy} \le 1{,}00$	Very High
$0{,}60 < r_{xy} \le 0{,}80$	High
$0{,}40 < r_{xy} \le 0{,}60$	Moderate
$0{,}20 < r_{xy} \le 0{,}40$	Low
$0{,}00 < r_{xy} \le 0{,}20$	Very Low

After determining the validity criteria for each test item, a significance test was subsequently conducted to assess the statistical significance of the obtained correlation coefficients. Table 5 presents the results of the instrument validity analysis performed using Software Statistics .

Table 5. Result of Instrument Validity Testing

Item Number	Correlation Coefficient (r)	n	p-value	Significance Level (α)	Decision	Strength of Assosiation
(1a) UP	0,905	22				
(1b) DS	0,920	22	0,000	0,05	Valid	Very High
(1c) IS	0,874	22				
(1d) RV	0,806	22				

The decision regarding item validity was made by referring to the classification criteria presented in Table 4 and by considering the corresponding p-values. Based on this analysis, all four test items were concluded to meet the validity requirements. In addition, the results of the expert validation conducted by a lecturer with relevant expertise in Mathematics Education are summarized in Table 6.

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Table 6. Result of Expert Validation

First Validation	Second Validation
Revise and elaborate unclear wording to enhance clarity; refine the problem statements to ensure precision and completeness; and provide the corresponding solution key.	The test item is deemed appropriate for use.

Instrument Reliability Testing

Reliability analysis was conducted to determine the consistency of the measurement instrument. This procedure assesses whether the instrument yields stable and dependable results when administered repeatedly under similar conditions. In this study, reliability testing was performed using Software Statistics , as presented in Table 7.

Table 7. Instrument Reliability Classificaion

Interval	Category
$0,80 < r_{11} \le 1,00$	Very High
$0,60 < r_{11} \le 0,80$	High
$0,40 < r_{11} \le 0,60$	Moderate
$0,20 < r_{11} \le 0,40$	Low
$-1,00 < r_{11} \le 0,20$	Very Low

The results of the reliability testing are presented in Table 8, which were obtained using Software Statistics .

Table 8. Result of Reliability Testing

Cronbach's Alpha	N	Decision	Level of Reliability
0,855	4	Reliabel	Very High

The reliability analysis results, displayed in Table 8, indicate a Cronbach's Alpha coefficient of 0.855. This value reflects a very high level of internal consistency, suggesting that the instrument demonstrates strong reliability. Therefore, the instrument is considered consistent and appropriate for use as a data collection tool in this research.

Data Collecting and Data Analysis

Data were collected through the administration of a posttest to both the experimental and control groups after the completion of the instructional intervention. The posttest served as the primary instrument for measuring students' mathematical problem-solving ability. Subsequently, the collected data were analyzed using both descriptive and inferential statistical techniques. The initial stage of analysis involved testing the normality of data distribution using the Shapiro–Wilk test. If the data were found to be normally distributed, the analysis proceeded with a homogeneity test using Levene's Test to examine the equality of variances between groups. Upon satisfying these prerequisite assumptions, hypothesis testing was conducted using the Independent Samples t-test to determine whether a statistically significant difference existed between groups. In addition, the Coefficient of Determination (R^2) was calculated to assess the magnitude of the effect of implementing the Inquiry Learning Model integrated with the Culturally Responsive Teaching approach on students' mathematical problem-solving ability.

Research Results

Descriptive Statistics

The results of the descriptive statistical analysis, conducted using Software Statistics , are presented in Table 9. This analysis provides an overall depiction of the data characteristics collected in the present study.

Table 9. Descriptive Statistical Analysis

Class	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Experimental	27	5	5	10	7.93	1.238	1.533
Control	28	5	3	8	5.64	1.393	1.942

Based on the results of the descriptive statistical analysis, the experimental group obtained a mean score of 7.93, whereas the control group achieved a mean of 5.64, yielding a mean difference of 2.34. This finding indicates a substantial disparity in mathematical problem-solving ability between the two groups.

Normality Test

Prior to conducting parametric statistical analysis, the posttest data from both the experimental and control groups were subjected to a normality assumption test. The distribution of the data was examined using Software Statistics through the Shapiro–Wilk test, as the sample size in each group was fewer than 50 participants. The results of the normality analysis are presented in Table 10.

Table 10. Result of the Shapiro-Wilk Normality Test

Measure	Class	Statistic	df	Sig.	Interpretation
Posttest	Experimental Class	0.935	27	0.094	Normally distributed
	Control Class	0.935	28	0.083	Normally distributed

The normality test results indicate that the significance value for the experimental group posttest was 0.094, while that of the control group was 0.083. Both values exceeded the threshold of 0.05, indicating that the posttest data for both groups were normally distributed.

Homogenitiy Test

The homogeneity of variance was examined using Levene's Test to determine whether the variances of the experimental and control groups were statistically equivalent.

Table 11. Result of Levene's Test for Homogenity of Variance

Measure	Levene Statistic	df1	df2	Sig.	α	Decision
Posttest Score	1.500	1	53	0.226	0.05	H_0 accepted

The posttest homogeneity analysis presented in Table 11 shows a significance value of 0.226, which is greater than 0.05. This finding indicates that the variances of the posttest scores for both groups can be considered homogeneous.

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Mean Difference Test

Hypothesis testing was conducted using the Independent Samples t-test to determine whether there was a statistically significant difference in mathematical problem-solving ability between the experimental and control groups.

Table 12. Results of the Independent Samples t-test

Equal Variances Assumed	Levene's Test for Equality of Variances		t-test for Equality of Means					
	F	Sig.	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	Lower
	1,500	0,226	6,415	53	0,000	2,283	0,356	1,569

Based on the results of the Independent Samples t-test performed using Software Statistics , the two-tailed significance value was 0.000, which is less than 0.05. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted. This indicates a statistically significant difference between the experimental and control groups. The findings demonstrate that students who participated in inquiry-based learning integrated with the Culturally Responsive Teaching approach achieved higher mathematical problem-solving ability than those who received Problem-Based Learning with a scientific approach. Thus, it can be concluded that the implementation of the Inquiry Learning Model combined with the Culturally Responsive Teaching approach has a significant effect on students' mathematical problem-solving ability.

Coefficient of Determination

The analysis presented in Table 13 yielded an R Square (R^2) value of 0.436. This indicates that the implementation of the Inquiry Learning Model integrated with the Culturally Responsive Teaching approach accounts for 43.6% of the variance in students' mathematical problem-solving ability. The remaining 56.4% is attributable to other factors beyond the scope of the variables examined in this study.

Table 13. Coefficient of Determination (R^2) Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,660[a]	0,436	0,425	1,303

a. Predictors: (Constant), class

Discussion

The findings of this study indicate that the implementation of the Inquiry Learning Model integrated with the Culturally Responsive Teaching (CRT) approach exerts a statistically significant effect on students' mathematical problem-solving ability in the topic of Systems of Linear Equations in Three Variables. Students in the experimental group demonstrated superior performance compared to those in the control group, both in terms of mean scores and consistency of problem-solving outcomes. This result suggests that integrating inquiry-based learning with culturally relevant contexts fosters a more meaningful and effective mathematics learning process. The coefficient of determination value of 43.6% falls within the moderate

effect category. This finding is consistent with Sanjaya's theoretical perspective (Murtadho, 2024), which posits that the success of inquiry-based learning is strongly influenced by students' readiness, prior knowledge, and the teacher's capacity to provide structured guidance. Similarly, Sonya (2020) emphasizes that one limitation of the inquiry model lies in students' limited experience with independent learning, which may hinder their ability to optimally develop problem-solving strategies.

The primary strength of inquiry-based instruction lies in actively engaging students in constructing knowledge through questioning, investigation, and independent as well as collaborative discovery. When combined with the CRT approach, students are not merely guided to identify mathematical concepts but are also encouraged to connect these concepts with their cultural experiences and values within the Islamic boarding school environment. Such contextual alignment facilitates deeper comprehension, enabling students to interpret problems, formulate mathematical models, and derive solutions in a more meaningful and situational manner. These findings are aligned with Vygotsky's social constructivist theory, which asserts that knowledge is actively constructed through the interaction between new experiences and existing prior knowledge (Tanjung et al., 2025). In this study, elements of Islamic boarding school culture were systematically integrated into mathematics instruction through the CRT approach, allowing students to connect abstract concepts with authentic lived experiences. CRT thus functioned as a mediating framework that bridged mathematical abstraction and students' socio-cultural realities, transforming problem-solving processes from mechanical procedures into reflective and meaningful activities. This transformation was reflected in students' improved ability to understand problems, design solution strategies, and evaluate their results critically.

The present findings are further supported by prior empirical research. Novia Uma Khoirunnisa et al., (2024) reported that inquiry-based learning enhances students' problem-solving skills while simultaneously fostering motivation, self-confidence, and active participation. Hasanah & Amir, (2024), as well as Nurfadillah et al., (2025), similarly confirmed the significant influence of inquiry learning on mathematical problem-solving ability. In addition, Andelia et al., (2024) demonstrated that culturally responsive teaching effectively improves mathematical understanding by strengthening student engagement and contextualizing mathematical concepts within relevant cultural frameworks. Moreover, CRT has been widely recognized as a pedagogically appropriate and empirically supported strategy for strengthening students' mathematical competence, particularly when learning is anchored in culturally relevant contexts. Ernawati et al., (2024) argue that culturally responsive instruction leverages students' cultural characteristics and experiences as strategic resources for more effective teaching. This position is reinforced by Nuha et al., (2025) and Mu'awanah et al., (2024), who found that the implementation of CRT significantly enhances students' mastery of mathematical topics, particularly in integer and exponential number concepts.

The progressive development of students' problem-solving ability in the experimental class was also evident across instructional sessions. During the initial meeting, students began identifying contextual problems grounded in Islamic boarding school culture. By the second and third sessions, students were capable of planning and executing solution strategies using elimination, substitution, and combined methods. By the fourth session, they demonstrated the ability to apply matrix determinant methods and verify results through alternative procedures. These developments indicate not only procedural mastery but also flexible and reflective mathematical thinking. Additionally, the relatively homogeneous score distribution in the experimental group suggests that inquiry-based learning integrated with CRT not only improved overall achievement but also reduced disparities in ability among students. This observation aligns with previous studies indicating that culturally contextualized and

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responsive learning approaches enhance engagement, motivation, and the quality of mathematical reasoning. Consequently, the integration of inquiry learning and CRT may be regarded as a relevant response to challenges in mathematics education, where the subject is often perceived as abstract and difficult. Nevertheless, successful implementation of this integrated model requires educators to possess adequate pedagogical competence, particularly in designing culturally relevant learning contexts and facilitating inquiry processes effectively. Without careful planning and instructional readiness, the potential benefits of this approach may not be fully realized. Therefore, strengthening teachers' pedagogical expertise constitutes a crucial factor in ensuring the effective application of inquiry-based learning integrated with CRT.

Conclusion

Based on the data analysis and discussion, it can be concluded that the Inquiry Learning Model integrated with the Culturally Responsive Teaching approach has a significant effect on students' mathematical problem-solving ability in the topic of Systems of Linear Equations in Three Variables. The research data satisfied the assumptions of normality and homogeneity, thereby justifying the application of parametric statistical analysis. The hypothesis testing results revealed a significant difference between students who experienced inquiry-based learning integrated with CRT and those who received conventional instruction. The coefficient of determination value of 43.6% indicates a moderate contribution of the integrated instructional model to the enhancement of students' mathematical problem-solving ability. These findings confirm that mathematics instruction that combines inquiry processes with culturally relevant contexts supports deeper, more systematic, and more applicable conceptual understanding. This study is limited by its scope, as it involved only one educational institution and focused on a single instructional topic. Furthermore, the relatively short duration of the intervention does not allow for comprehensive evaluation of long-term impacts on students' problem-solving development. Future research is therefore recommended to involve broader samples, employ longitudinal designs, and investigate additional non-cognitive variables such as learning motivation and attitudes toward mathematics. Overall, the findings suggest that the Inquiry Learning Model integrated with the Culturally Responsive Teaching approach represents a viable alternative instructional strategy that is contextual, inclusive, and responsive to students' cultural characteristics, particularly in efforts to enhance mathematical problem-solving ability.

Acknowledgments

Conflict of Interest

The author declares no conflict of interest.

Authors' Contributions

W.A.B conceptualized the research idea and was responsible for data collection. The other two authors, H.P. and S.M.W., actively contributed to the development of the theoretical framework, research methodology, data organization and analysis, discussion of findings, and approval of the final manuscript. All authors confirm that the final version of this manuscript has been reviewed and approved. The percentage contributions to the conceptualization, preparation, and revision of the manuscript are as follows: W.A.B.: 60%, H.P.: 20%, and S.M.W.: 30%.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author [H.P.] upon reasonable request.

References

Abdulrahim, N. A., & Orosco, M. J. (2020). Culturally Responsive Mathematics Teaching: A Research Synthesis. *Urban Review*, *52*(1), 1–25. https://doi.org/10.1007/s11256-019-00509-2

Allimin, M. U., Ajaran, T., Mu, M., & Tahun, A. (2024). *Pemetaan Gaya Berpikir Siswa Kelas VIII Reguler Madrasah*. *May*. https://doi.org/10.12928/admathedust.v11i1.28616

Andelia, I. S. K., Setianingsih, R., & Jannah, F. (2024). Penerapan Problem-Based Learning dan Pendekatan Culturally Responsive Teaching pada Materi Segi Empat untuk Meningkatkan Hasil Belajar Peserta Didik Kelas VII. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *8*(2), 1552–1531. https://doi.org/10.31004/cendekia.v8i2.3242

Ardani, D. A. P. (2024). Peningkatan Kemampuan Pemecahan Masalah Matematika Melalui Pembelajaran Berbasis Masalah di Kelas 7F SMPN 1 Tarik. *Postulat : Jurnal Inovasi Pendidikan Matematika*, *4*(2), 248. https://doi.org/10.30587/postulat.v4i2.7081

Astuti, N. V. (2020). Pengaruh Penggunaan Model Pembelajaran Inkuiri dengan Menggunakan Media POP-UP BOOK terhadap Hasil Belajar Siswa Kelas IV di SDN 07 Bengkulu Tengah. *Otonomi*, *20*, 396–406.

Ernawati, T., Rosana, D., Atun, S., & . S. (2024). Exploration of Culturally Responsive Teaching and Problem-Based Learning in The Diverse Learning of Prospective Science Teachers. *International Journal of Religion*, *5*(3), 353–365. https://doi.org/10.61707/t1bg2083

Gay, G. (2018). *Culturally Responsive Teaching: Theory, Research, and Practice, Third Edition*. Teachers College Press. https://books.google.co.id/books?id=uD9qDwAAQBAJ

Haq, V. A. (2022). Menguji Validitas dan Reliabilitas pada Mata. *An-Nawa: Jurnal Studi Islam*, *04*(01), 11–24.

Hasanah, J., & Amir, Z. (2024). Pengaruh Penerapakn Pembelajaran Inquiry Based Learning Terhadap Kemampuan Berpikir Kritis Matematis ditinjau dari Self Confidence Siswa. *Journal for Research in Mathematics Learning) P*, *7*(1). http://dx.doi.org/10.24014/juring.v7i1.25997

Mahmud, R. (2022). *Dasar-Dasar Ilmu Pendidikan: Hakikat Ilmu Pendidikan*.

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Mu'awanah, N., Riani, D. K., Mampouw, H. L., & Wacana, K. S. (2024). *Penggunaan pendekatan CRT (Culturally Responsive Teaching) pada materi bilangan bulat untuk meningkatkan hasil belajar siswa kelas VII SMP Negeri 3 Salatiga. 6*(6), 265–273.

Murtadho, C. (2024). *Pengaruh Model Pembelajaran Inkuiri terhadap Hasil Belajar IPAS Siswa Kelas IV SDN 01 Semuli Raya.* 167–186. https://repository.metrouniv.ac.id/id/eprint/10543/

Nazmihaolah, H., Hidayat, E., Natalliasari, I., & Siliwangi, U. (2025). *Pengaruh Pendekatan Culturally Responsive Teaching terhadap Literasi Matematis pada Materi Aritmetika Sosial.* 730–741. https://doi.org/10.31537/laplace.v8i2.2707

Novia Uma Khoirunnisa, M.Isbatul Haqi, & Mohammad Sayful Anam. (2024). Enhancing Problemsolving Skills in Mathematics Through Inquirybased Learning: A Case Study in High School Education. *International Journal of Mathematics and Science Education*, *1*(2), 26–32. https://doi.org/10.62951/ijmse.v1i2.89

Nuha, K. U., Riani, D. K., & Mampouw, H. L. (2025). *Peningkatan Hasil Belajar Melalui Pendekatan Culturally Responsive Teaching Pada Peserta Didik Kelas VIII Materi Bilangan Berpangkat.* *7*(1), 28–38. https://journal.upgris.ac.id/index.php/imajiner/article/view/20066/9860

Nurfadillah, Ahmad Talib, & Hisyam Ihsan. (2025). Pengaruh Penerapan Model Pembelajaran Inkuiri terhadap Kemampuan Pemecahan Masalah Matematis Siswa Kelas VIII UPT SPF SMP Negeri 13 Makassar. *Issues in Mathematics Education (IMED)*, *9*(1), 51–63. https://doi.org/10.35580/imed.v9i1.6693

Putri, N. S., Firmansyah, E., Chairy, B., Bustaren, R., & Rahmawati, F. (2024). *Peningkatan Kemampuan Berpikir Kritis Matematis Melalui Model Problem Based Learning dengan Pendekatan Culturally Responsive Teaching dan Teaching at the Right Level.* *5*(2), 83–96. https://vm36.upi.edu/index.php/JMER/article/viewFile/78906/31819

Setiawati, D., Safira, D., & Kartika, Y. (2023). Penerapan Model Pembelajaran Kooperatif Tipe Teams Games Tournament Untuk Meningkatkan Kemampuan Komunikasi Matematis Siswa. *Asimetris: Jurnal Pendidikan Matematika Dan Sains*, *4*(1), 51–58. https://doi.org/10.51179/asimetris.v4i1.1990

Syamsinar, S., K, G., Asmawati, A., & Ahmad, A. K. (2023). Model Pembelajaran Problem Based Learning (Pbl) Terhadap Kemampuan Pemecahan Masalah Matematika Siswa. *Al-Irsyad Journal of Mathematics Education*, *2*(2), 91–102. https://doi.org/10.58917/ijme.v2i2.71

Tanjung, Y. I., Festiyed, Diliarosta, S., Asrizal, Arsih, F., Fadillah, M. A., & Makrooni, G. (2025). Culturally Responsive Teaching in Science Education and its Relationship with Technopreneurship. *APTISI Transactions on Technopreneurship*, *7*(2), 387–399. https://doi.org/10.34306/att.v7i2.563

Yulitya, A., & Samosir, K. (2024). Penerapan Model Pembelajaran Inkuiri untuk Meningkatkan Kemampuan Pemecahan Masalah Siswa. *Kognitif: Jurnal Riset HOTS Pendidikan Matematika*, *4*(1), 225–245. https://doi.org/10.51574/kognitif.v4i1.1359

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