

DOI: 10.5281/zenodo.19671910

DESIGNING A CULTURALLY RESPONSIVE LITERACY MODEL FOR PRIMARY SCHOOLS: A DESIGN-BASED RESEARCH STUDY FROM YOGYAKARTA, INDONESIA

Sekar Purbarini Kawuryan^{1*}, Supartinah², Irfan Wahyu Prananto³ and Ade Gusti Ningsih⁴

¹Department of Primary Education, Universitas Negeri Yogyakarta, Indonesia. Email: sekarpurbarini@uny.ac.id Orcid ID: <https://orcid.org/0000-0002-5711-3888>

²Department of Primary Education, Universitas Negeri Yogyakarta, Indonesia. Email: supartinah@uny.ac.id Orcid ID: <https://orcid.org/0000-0002-4568-7008>

³Department of Primary Education, Universitas Negeri Yogyakarta, Indonesia. Email: irfan.wahyu@uny.ac.id Orcid ID: <https://orcid.org/0000-0003-1628-5197>

⁴Department of Primary Education, Universitas Negeri Yogyakarta, Indonesia. Email: adegusti.2023@student.uny.ac.id Orcid ID: <https://orcid.org/0009-0000-2526-1782>

Received: 13/03/2026

Accepted: 02/04/2026

Corresponding Author: Sekar Purbarini Kawuryan
(sekarpurbarini@uny.ac.id)

ABSTRACT

This study developed and validated a Cultural Literacy Model (CLM) for primary schools in Yogyakarta using a Design-Based Research (DBR) approach consisting of five iterative stages: integration, organization, facilitation, construction, and evaluation. The model integrates local wisdom with culturally responsive teaching principles to enhance empathy, reflection, and collaboration among teachers and students. Data were collected from 14 teachers and 308 students through surveys, observations, and focus group discussions. Quantitative findings indicate a substantial increase in teacher self-efficacy (from $M = 3.6$ to 4.2), while qualitative evidence revealed improvements in dialogic interaction and student inclusivity. The iterative refinement resulted in a dynamic and cyclical model that embeds continuous reflection and contextual adaptation. The CLM extends Gay's and Siwatu's frameworks of culturally responsive pedagogy within Indonesia's Pendidikan Khas Keajaiban context, positioning culture as the foundation of learning and a catalyst for global citizenship and sustainable character education.

KEYWORDS: Cultural Literacy, Design-Based Research, Culturally Responsive Teaching, Local Wisdom, Primary Education.

1. INTRODUCTION

In the twenty-first century, education systems around the world are increasingly challenged to cultivate learners who are not only academically competent but also culturally literate and socially empathetic. Rapid globalization and increasing intercultural interaction have positioned cultural literacy as a core competency for democratic citizenship (Leite, 2021; Kobakhidze, 2021). Within this context, schools are expected to go beyond traditional cognitive outcomes by nurturing students' ability to engage with diversity, negotiate meaning across cultures, and construct identities rooted in mutual respect (Chandir & Gorur, 2021). Such competencies are at the heart of the United Nations' Sustainable Development Goals 4.7, which calls for education systems to promote sustainable development, global citizenship, and appreciation of cultural diversity (Edwards et al., 2020; Kohl & Hopkins, 2020).

However, in practice, cultural literacy has often been marginalized in the formal curriculum, particularly in developing countries where educational reforms are largely oriented toward measurable academic outcomes (Mandarani et al., 2024; Nurman et al., 2022). In Indonesia, a country renowned for its extraordinary cultural diversity with more than 1,300 ethnic groups and hundreds of local languages, the paradox is striking (Ministry of Cultural Affairs, 2025). While cultural pluralism is celebrated as a national identity, classroom instruction tends to be uniform and exam-oriented, leaving limited space for students to meaningfully engage with their own local cultures. The implementation of the 2013 Curriculum and later the Merdeka Curriculum has indeed emphasized character education through the "*Profil Pelajar Pancasila*," yet empirical evidence shows that many teachers struggle to operationalize these ideals into daily teaching practices that reflect cultural inclusivity and responsiveness (Fauziah et al., 2023; Halim et al., 2024).

The challenge becomes even more apparent in primary education, where foundational attitudes toward diversity are formed. Teachers, who serve as key mediators of cultural values, often have limited knowledge about their students' cultural backgrounds or lack pedagogical strategies to integrate cultural perspectives into lessons (Gere et al., 2009; Afifuddin et al., 2025; Rima et al., 2024). Douglas (2020) argues that teachers' self-efficacy in culturally responsive teaching strongly determines their ability to engage students from diverse cultural groups. In the Indonesian context, this challenge is

amplified by heterogeneous classrooms that mix children from different ethnic, linguistic, and religious backgrounds, especially in urban centers like Yogyakarta. As a result, the absence of culturally responsive pedagogies may inadvertently lead to cultural alienation among students and perpetuate a form of "hidden curriculum" that privileges dominant cultural norms (Sawitri et al., 2021; Cruz et al., 2019).

Yogyakarta provides an illuminating context for examining this issue. Known nationally as the "City of Culture," it has long been a center for arts, heritage, and education. Local government initiatives, such as the *Buku Panduan Pendidikan Khas Kejojagaan* (Dwijonagoro et al., 2023), explicitly promote the integration of cultural values into school life, focusing on tolerance, empathy, and community harmony. Nevertheless, many schools continue to prioritize cognitive achievement and standardized testing, causing the cultural dimension of education to be sidelined (Surahman & Salmon, 2023; Ediyanto et al., 2020). Observations and preliminary data gathered prior to this study confirmed that teachers generally express a positive attitude toward cultural education but are uncertain about how to translate these values into classroom practice. Teachers' beliefs and confidence levels, their *culturally responsive teaching self-efficacy*, remain inconsistent across schools and grade levels, which directly impacts students' opportunities to experience inclusive and culturally meaningful learning.

To address these challenges, there is a pressing need to design an instructional framework that helps teachers integrate local wisdom into curriculum-based learning in a systematic, practical, and empirically tested way. Previous models of multicultural or global education have been developed in global contexts (Jin et al., 2023; Comstock et al., 2023) and often emphasize intercultural dialogue, social justice, or equity in classroom settings. However, these models may not directly fit the sociocultural realities of Southeast Asian classrooms, where cultural learning is embedded in communal values, religious traditions, and oral practices rather than explicit critical discourse (Van Le, 2024; Grothaus & Richter, 2020). Therefore, an indigenous adaptation that draws from local wisdom and the lived cultural experiences of students becomes essential (Jusni et al., 2023).

Local wisdom defined as community-based knowledge and values transmitted across generations. Integrating local traditions, arts, and rituals into modern classroom learning not only enriches students' understanding of their heritage

but also strengthens their sense of belonging and social empathy (Lestari et al., 2024; Arjaya et al., 2024). For instance, in Yogyakarta, communal practices such as *gotong royong* (mutual cooperation) and *kekancan salawase* (eternal friendship) embody the essence of cultural harmony and democratic participation. When appropriately incorporated into classroom activities, these practices can serve as authentic entry points for developing students' dialogic and reflective skills. Nevertheless, empirical studies examining how such local wisdom can be systematically transformed into a structured pedagogical model remain scarce (Fauziah et al., 2023; Lestari et al., 2024).

Given this gap, the present research seeks to contribute by developing and evaluating a Cultural Literacy Model (CLM) tailored for Indonesian primary schools. The model is grounded in the principles of *Design-Based Research* (DBR), which emphasizes iterative cycles of design, implementation, reflection, and revision to create educational innovations that are both theoretically grounded and practically effective (Brown, 1992; Joseph, 2004; Kelly, 2014). Through collaboration between Universitas Negeri Yogyakarta (UNY) and the Yogyakarta City Education Office, the study involved 13 public primary schools representing diverse cultural settings. Teachers participated in workshops, focus group discussions, and teaching experiments to co-design and test culturally responsive lesson plans that integrated themes of diversity, social responsibility, and cultural ownership.

The CLM consists of five sequential yet interconnected stages: Integration, Organization, Facilitation, Construction, and Evaluation. Each stage is designed to guide teachers and students through a dialogic learning process that links cultural knowledge with reflective inquiry. The *Integration* stage connects curricular content with students' lived experiences; *Organization* fosters collaborative learning groups; *Facilitation* ensures guided exploration; *Construction* engages students in synthesizing and negotiating cultural meanings; and *Evaluation* promotes critical reflection through feedback and self-assessment. The model thus operationalizes the essence of culturally responsive pedagogy by making culture both a medium and an outcome of learning.

By implementing and analyzing this model through teaching experiments, this research aims to answer three central questions:

1. How confident are primary school teachers in applying culturally responsive practices?

2. How does the implementation of the Cultural Literacy Model influence students' discussion, reasoning, and empathy?
3. What pedagogical challenges and reflective insights emerge from teachers during model implementation?

Addressing these questions is significant for three reasons. First, it provides empirical evidence on the feasibility and impact of a localized cultural literacy framework within primary education. Second, it enriches global discourse on culturally responsive pedagogy by offering a model grounded in non-Western traditions and collective learning values. Third, it offers practical implications for policymakers, teacher educators, and curriculum developers seeking to balance standardization with cultural contextualization in education.

In summary, this study positions cultural literacy not merely as an enrichment topic but as a fundamental pedagogical orientation for humanizing education. By bridging *local wisdom* and *modern classroom practice* through Design-Based Research, the Cultural Literacy Model aspires to transform schools into spaces where diversity is celebrated, empathy is practiced, and identity is cultivated through meaningful cultural dialogue. The following sections elaborate on the conceptual foundations, methodological design, and empirical findings of this study, which collectively aim to advance both theoretical understanding and practical innovation in cultural literacy education.

2. LITERATURE REVIEW

2.1. The Concept of Cultural Literacy

Cultural literacy has evolved from a narrow conception of cultural knowledge into a multidimensional construct encompassing social, ethical, and dialogical competencies. Hirsch et al. (1987) originally defined cultural literacy as the ability to understand shared symbols, texts, and references within a culture. However, later scholars have expanded this definition to include critical and participatory elements, where individuals are not only aware of cultural references but are also able to engage meaningfully and ethically across cultural differences (Astratova & Rubene, 2024; Kobakhidze, 2021).

In contemporary discourse, cultural literacy is closely related to *intercultural competence* and *global citizenship education*, emphasizing tolerance, empathy, and reflexivity (Lau & Rodgers, 2021; Mansilla & Wilson, 2020). Within educational contexts, it refers to students' ability to interpret cultural meanings, appreciate diversity, and

negotiate social interactions within and beyond their communities. Therefore, cultural literacy is not merely about transmitting cultural facts but about cultivating dispositions that allow learners to critically engage with the world around them.

At the primary school level, developing cultural literacy lays the groundwork for democratic participation and mutual respect. Through dialogic activities, such as collaborative projects, storytelling, and reflective discussions, students learn to listen, empathize, and construct shared meanings (Cook et al., 2022). This dialogic perspective aligns with Vygotskian sociocultural theory, which posits that learning is mediated by social interaction and cultural tools. Thus, cultural literacy in education must be seen as a *dynamic process* rather than a static body of knowledge, an ongoing negotiation between identity, community, and learning (Nardo, 2021; Layen & Hattingh, 2018).

2.2. Culturally Responsive Teaching (CRT)

Culturally Responsive Teaching (CRT) provides the theoretical foundation for linking cultural literacy with pedagogical practice. Pinneo (2020) defines CRT as the use of cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for more effective teaching. CRT is premised on the belief that students learn best when their cultural contexts are acknowledged, valued, and integrated into instruction. This approach challenges the notion of “cultural neutrality” in schooling and positions teachers as cultural mediators rather than mere transmitters of content.

Siwatu (2015) operationalized this construct through the development of the *Culturally Responsive Teaching Self-Efficacy Scale (CRTSE)*, which measures teachers’ confidence in implementing culturally relevant strategies, such as modifying instruction, managing diverse classrooms, and using multicultural materials. Research indicates that teachers with higher CRT self-efficacy are more likely to design inclusive lessons, utilize local examples, and create supportive learning environments (Comstock et al., 2023; Mahali & Sevigny, 2021; Adegbola, 2022). Conversely, teachers with low efficacy often experience discomfort or uncertainty in addressing cultural issues, resulting in superficial or tokenistic practices.

From a theoretical standpoint, CRT draws from three interrelated principles: (1) constructivist learning, emphasizing that knowledge is co-constructed through interaction; (2) critical pedagogy, encouraging reflection on power and representation; and (3) multicultural education,

promoting equity and respect for differences (Pinneo 2020; Siwatu, 2015). These foundations collectively assert that culture is not peripheral to learning, it is central to cognition, motivation, and identity formation.

In the context of Indonesia, where classrooms are characterized by ethnic, linguistic, and religious diversity, CRT offers an essential lens for redefining teaching professionalism. Yet, despite its relevance, empirical studies show that many Indonesian teachers remain uncertain about how to implement CRT principles in daily practice. This gap between theoretical understanding and practical enactment underscores the need for systematic professional development and model-based guidance, an issue the present study aims to address through the Cultural Literacy Model (CLM).

2.3. Local Wisdom and Contextual Learning in Indonesian Education

Local wisdom, or *kearifan lokal*, refers to community-based knowledge, values, and practices that have evolved through generations as adaptive responses to environmental and social challenges. In educational discourse, local wisdom is increasingly recognized as a resource for contextual and character-based learning (Aulia et al., 2024; Shufa & Adj, 2024; Sakti et al., 2024). It encapsulates both tangible heritage, such as crafts, rituals, and traditional arts, and intangible heritage, including moral values, collective norms, and social ethics.

Integrating local wisdom into schooling aligns with Indonesia’s philosophical foundation of *Bhinneka Tunggal Ika* (Unity in Diversity), reinforcing students’ awareness of cultural pluralism. In primary education, this integration serves multiple purposes: strengthening identity, fostering social harmony, and grounding abstract curriculum concepts in lived experience. For example, the Yogyakarta Education Office’s *Buku Panduan Pendidikan Khas Kejojjaan* (Dwijonagoro et al., 2023) explicitly promotes sub-values such as *toleransi*, *empati*, and *kekancaan salawase* (lifelong friendship) as educational ideals. These values can be operationalized through collaborative projects, traditional games, or storytelling that reflect students’ cultural environments.

Nevertheless, despite policy support, teachers often face challenges in translating local wisdom into systematic pedagogical design. Previous research (Rummar, 2022; Fitrianto & Farisi, 2025) highlights three common obstacles: (1) the dominance of academic achievement metrics that marginalize affective learning; (2) limited teacher capacity to

design culturally contextualized lessons; and (3) the absence of structured instructional models. The result is a fragmentation between curricular policy and classroom practice.

This study situates local wisdom not as an enrichment material but as a core pedagogical foundation. By embedding it within a structured framework, supported by theoretical grounding from CRT and practical tools from Design-Based Research, it becomes possible to transform cultural heritage into living pedagogy. Such transformation also resonates with the broader agenda of *Education for Sustainable Development (ESD)*, which encourages schools to connect learning with local culture, environment, and community well-being.

2.4. Design-Based Research as a Framework for Educational Innovation

Design-Based Research (DBR) has emerged as a methodological paradigm suited to bridging theory and practice in complex educational settings (Brown, 1992; Joseph, 2004; Kelly, 2014). Unlike traditional experimental designs that isolate variables, DBR embraces the complexity of classrooms as living systems. It involves iterative cycles of design, implementation, evaluation, and refinement, conducted collaboratively with practitioners. The goal is not merely to test hypotheses but to generate design principles that are both contextually grounded and theoretically informed.

In the field of pedagogy, DBR allows researchers to co-construct interventions with teachers, observe their implementation in authentic contexts, and refine models based on empirical feedback. This recursive process produces both practical innovation and theoretical contribution. Kelly (2024) notes that DBR is particularly effective in developing educational models that require cultural adaptation, because it values the voices of practitioners and learners as co-designers.

The present study adopts DBR as the overarching framework for developing the Cultural Literacy Model (CLM). Each stage, Integration, Organization, Facilitation, Construction, and Evaluation, corresponds to a phase in the DBR cycle. Through iterative testing across 13 schools, the model evolves from conceptual prototype to empirically validated practice. The participatory nature of DBR ensures that teachers' experiences, constraints, and reflections directly shape the model's structure, thus enhancing its ecological validity and scalability.

Moreover, the application of DBR in this context contributes to the international literature by offering an example of *context-sensitive innovation* in the

Global South. While most DBR studies are conducted in technologically advanced or Western educational systems, this research demonstrates how the methodology can support culturally grounded pedagogy in developing contexts. It thereby broadens the scope of DBR beyond digital learning environments, reinforcing its utility as a transformative approach for local and indigenous education systems.

3. METHODOLOGY

3.1. Study Design and Context

This study employed a DBR methodology, which is particularly suited for developing and refining educational models through iterative collaboration between researchers and practitioners (Brown, 1992; Joseph, 2004; Kelly, 2014). The DBR approach was selected to ensure that the CLM being developed is both theoretically grounded and contextually relevant to the real-world dynamics of Indonesian classrooms. DBR enables the alignment of design principles, instructional practices, and learning outcomes through cycles of *design, implementation, reflection, and redesign*.

This study focuses on the pedagogical transformations required for cultural literacy instruction in elementary schools. Participating teachers shared their existing practices in teaching cultural literacy while engaging in a collaborative reflective process with the researchers to deepen their theoretical understanding. The DBR process in this study followed four iterative cycles: (1) design of the initial CLM prototype, (2) classroom implementation, (3) systematic reflection through observations and FGDs, and (4) model refinement. Each cycle informed subsequent revisions, ensuring that the model evolved in response to empirical classroom evidence and teacher feedback.

The problem-solving process began with initial meetings between the researchers and teachers at the school. Classroom observations were then conducted to examine how teachers interpreted and enacted cultural literacy instruction in practice. Subsequently, the researchers and teachers co-designed lesson plans for the following iteration across four sessions. Teachers documented their experiences through brief written reflections. In the next phase, teachers implemented the cultural literacy lessons, reflected on their practices, and collaboratively refined the lesson packages with the research team. This cycle of implementation and guided reflection was repeated across subsequent iterations.

The research was conducted between March and

September 2025 in Yogyakarta, Indonesia, a province widely recognized for its cultural heritage and progressive educational policy. The study formed part of a collaborative program between Universitas Negeri Yogyakarta (UNY) and the Yogyakarta City Office of Education, Youth, and Sports (DIKPORA), formalized through a Memorandum of Agreement (MoA) B/504/UN34.11/HK.01.01/2025 and Institutional Agreement (IA).

The study context is characterized by cultural pluralism: schools in urban Yogyakarta serve students from diverse ethnic and linguistic backgrounds. The research thus provided a rich setting for testing a pedagogical model that integrates local wisdom into modern curricula. The

CLM itself was structured into five interrelated stages, Integration, Organization, Facilitation, Construction, and Evaluation, each representing a pedagogical progression from cultural awareness toward reflective cultural action. Figure 1 summarizes the conceptual cycle of the research design, illustrating the integration between DBR phases and the instructional stages of the Cultural Literacy Model.

To enhance reproducibility, the CLM is operationalized through structured lesson plans, observation rubrics, and reflective protocols, which can be adapted across different cultural and educational contexts.

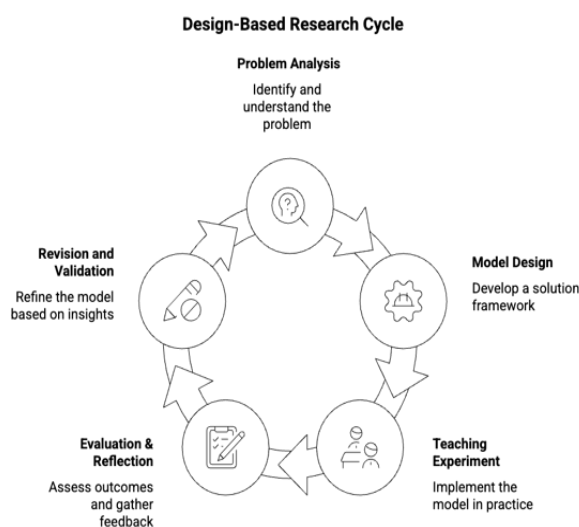


Figure 1: Conceptual Cycle of DBR.

Across the two DBR cycles, the CLM underwent systematic refinement. In the first cycle, challenges related to time management and group dynamics were identified. In response, the second cycle incorporated scaffolding tools, structured discussion guidelines, and differentiated grouping strategies, resulting in improved student participation and teacher efficacy.

3.2. Participants

This study involved 14 primary school teachers (grades IV–VI) and 308 students aged between 9 and 12 years, drawn from 13 public primary schools under the Yogyakarta City Education Office. The schools were selected purposively to represent diverse geographical locations and socio-cultural characteristics across the city's districts.

Teacher participants were recruited purposively to ensure their relevance and contribution to the study objectives. Each teacher met three key criteria

reflecting both professional competence and readiness for collaborative innovation. They were (1) actively engaged in school-based literacy or character education programs, (2) willing to participate in all stages of the study including workshops, focus group discussions, and classroom implementation, and (3) had a minimum of five years of teaching experience, ensuring sufficient pedagogical expertise and classroom management skills. These criteria ensured that participating teachers were experienced practitioners capable of critically engaging in the co-design and application of the Cultural Literacy Model (CLM).

The student participants represented Yogyakarta's culturally plural learning environment, encompassing a wide range of ethnic, linguistic, and socioeconomic backgrounds. Their participation extended beyond passive involvement, as they actively engaged in dialogic and collaborative learning activities designed to foster empathy, critical thinking, and cultural understanding. This

heterogeneity provided a valuable context for examining how the CLM operates in authentic classroom conditions characterized by differing levels of prior knowledge and communication styles.

All participation was voluntary and conducted in accordance with ethical research protocols. Written informed consent was obtained from teachers, school

principals, and parents or guardians of the students to ensure that the research process remained educationally beneficial, inclusive, and non-intrusive. A comprehensive overview of the research participants is presented in Table 1 to illustrate the composition and roles of all stakeholders involved in the study.

Table 1: Profile of Research Participants.

Participant Group	Description	Number	Role in Research
Teachers	Grade IV–VI classroom teachers from 13 schools	14	Model co-designers, implementers, and reflectors
Students	Primary school pupils (9–12 years old)	308	Participants in teaching experiment lessons
School Principals	Heads of participating schools	13	Institutional facilitators
Education Office Representatives	Officials from DIKPORA Yogyakarta	2	Policy liaison and field coordination

3.3. Data Collection Procedures And Instruments

Data in this study were collected using a mixed-method approach, combining quantitative and qualitative techniques to strengthen triangulation and ensure methodological rigor. The integration of multiple instruments allowed the researchers to capture both the measurable shifts in teacher efficacy and the nuanced processes of cultural literacy development among students.

Quantitative data were obtained through the Culturally Responsive Teaching Self-Efficacy (CRTSE) Scale developed by Siwatu (2015) and adapted for the Indonesian context. The instrument comprised 35 items distributed across four dimensions: (1) adaptation of instruction, (2) student engagement and motivation, (3) reflection and curriculum modification, and (4) community and cultural integration. Teachers rated their confidence on a five-point Likert scale ranging from 1 (“not confident at all”) to 5 (“very confident”). Content validity was established through expert judgment by three educational researchers specializing in multicultural pedagogy, producing Item-Content Validity Index (I-CVI) values between 0.87 and 0.94, indicating high relevance. The reliability test yielded a Cronbach’s Alpha coefficient of 0.91, confirming excellent internal consistency. The instrument was administered twice, before the implementation of the Cultural Literacy Model (pre-assessment) and after the completion of two teaching experiment cycles (post-assessment).

Qualitative data were obtained primarily through classroom observations, teacher reflection journals, and focus group discussions (FGDs). Classroom observations were designed to examine how students engaged in cultural literacy practices during the implementation of the model. An observation rubric consisting of three proficiency

levels, Beginning, Developing, and Sophisticated, was used to code behavioral indicators of dialogue, empathy, and collaboration. Data were collected through structured field notes and video recordings by trained research assistants and co-researchers. Inter-rater reliability testing using Cohen’s Kappa ($\kappa = 0.82$) indicated substantial agreement among observers.

To complement classroom data, teachers maintained reflective journals after each teaching experiment cycle to record pedagogical experiences, student responses, and perceived challenges. These reflections were elaborated through two rounds of FGDs facilitated by the research team, which served to validate observation findings, identify barriers to implementation, and co-generate recommendations for refining the model.

Additionally, document analysis was conducted on lesson plans, student worksheets (LKPD), and relevant school policy documents. This analysis provided contextual evidence of how cultural content was embedded within instructional design and classroom practice, ensuring that the model’s development was firmly grounded in authentic curricular realities.

3.4. Data Analysis

Data analysis in this study followed a convergent mixed-method design, in which quantitative and qualitative data were analyzed independently and subsequently integrated during interpretation to provide a comprehensive understanding of the findings (Creswell & Creswell, 2018). This approach enabled the researchers to examine measurable changes in teacher efficacy while simultaneously exploring the pedagogical processes underlying the implementation of the Cultural Literacy Model (CLM).

Quantitative data derived from the Culturally

Responsive Teaching Self-Efficacy (CRTSE) Scale were processed using SPSS version 29. Descriptive statistical analyses, comprising mean scores, standard deviations, and percentage changes, were performed to identify trends in teacher efficacy before and after the implementation of the CLM. Comparative analysis of pre- and post-test results across the four CRTSE dimensions allowed the researchers to infer shifts in teachers' confidence and pedagogical adaptability.

Qualitative data from classroom observations, teacher reflection journals, and focus group discussions (FGDs) were analyzed through thematic analysis following the six-phase framework proposed by Braun and Clarke (2021). The process included: (1) familiarization with data through transcription and repeated readings, (2) generation of initial codes, (3) identification of potential themes, (4) review and refinement of thematic patterns, (5) definition and naming of themes, and (6) production of analytical narratives supported by direct quotations. Coding employed both deductive and inductive strategies, deductive coding based on theoretical categories such as dialogue, empathy, and reflection, while inductive coding allowed new themes to emerge organically from teachers' narratives. All qualitative data were managed using NVivo 14 software, which facilitated data organization, code visualization, and the identification of theme frequencies across sources.

Integration of quantitative and qualitative findings was conducted through methodological triangulation, ensuring internal consistency and interpretive validity. Quantitative trends in teacher efficacy were compared with qualitative insights from classroom and teacher reflections to confirm alignment between observed practices and self-reported confidence. The credibility of the analysis was enhanced through member checking, where participants reviewed summaries of findings for accuracy, and peer debriefing among the research team to ensure analytical transparency. Dependability and confirmability were maintained through a systematic audit trail documenting all coding decisions, data transformations, and interpretive procedures.

This combined analytical strategy provided a robust foundation for interpreting both the numerical and narrative dimensions of the data, thereby capturing not only how much change

occurred in teachers' efficacy and classroom engagement, but also how and why such changes emerged within the pedagogical context of the Cultural Literacy Model.

3.5. Ethical Considerations

All procedures adhered to ethical research standards in educational settings. Informed consent was obtained from teachers, parents, and school administrators. Student participation was voluntary and did not affect academic evaluation. Data were anonymized and securely stored in compliance with UNY's ethical guidelines for human subjects research.

4. RESULTS

The results of this study are presented according to the five iterative stages of Design-Based Research (DBR) used in developing and validating the Cultural Literacy Model (CLM). Each stage produced both quantitative data on teacher self-efficacy and qualitative insights from classroom observations, student interactions, and teacher reflections. The findings demonstrate consistent improvements across all DBR stages, supported by both quantitative and qualitative data.

The quantitative analysis of the Culturally Responsive Teaching Self-Efficacy (CRTSE) Scale revealed a consistent improvement across all dimensions following the implementation of the Cultural Literacy Model (CLM). The pre-post comparison demonstrated that teachers' overall confidence in applying culturally responsive pedagogy increased from the *moderate* to *high* category.

Specifically, teachers showed notable progress in their ability to adapt instructional content to the cultural backgrounds of students, facilitate inclusive classroom discussions, and critically reflect on curriculum materials. The most substantial improvement occurred in the dimension of "Reflecting and Revising Content", with an increase of 21.8%, indicating that teachers became more aware of and proactive in addressing cultural bias and integrating local wisdom into their lesson designs. The "Engaging Students" dimension also recorded a significant improvement of 12.5%, reflecting stronger efforts to encourage empathy and dialogue during learning activities.

Table 2: Summary of Teacher Self-Efficacy Improvement (N = 14).

CRTSE Dimension	Pre-Mean	Post-Mean	Δ (%)	Interpretation
Adapting Instruction	3.8	4.2	+10.5	Moderate improvement

Engaging Students	4.0	4.5	+12.5	Significant improvement
Reflecting and Revising Content	3.2	3.9	+21.8	High improvement
Integrating Community Context	3.4	4.0	+17.6	Moderate improvement
Overall Mean	3.6	4.2	+16.1	Positive improvement across dimensions

The increase in overall mean score from 3.6 to 4.2 demonstrates that teachers not only gained theoretical understanding of culturally responsive pedagogy but also developed practical competence in embedding it within classroom activities. These gains were corroborated by teacher reflections and observational data, suggesting that professional learning within the DBR framework effectively strengthened both knowledge and confidence in cultural literacy instruction.

4.1. Integration: Needs Analysis and Contextual Adaptation

The integration stage examined teachers' initial perceptions and confidence in implementing culturally responsive pedagogy, while identifying school-specific contextual needs. Cultural literacy learning necessitates integrating students' ethnic and cultural diversity and leveraging their experiences to construct meaningful learning contexts. Teachers draw on students' social and cultural knowledge to connect prior and new experiences, thereby enhancing comprehension.

Quantitative data from the pre-test CRTSE Scale showed that teachers' mean efficacy level was 3.6 (Moderate), indicating a basic awareness of cultural diversity but limited pedagogical confidence in embedding it within classroom instruction. The lowest mean score appeared in the dimension of *Reflection and Curriculum Revision* ($M = 3.2$), suggesting that teachers were uncertain about modifying learning materials to represent students' cultural backgrounds.

Qualitative data reinforced these findings. Interviews and reflection notes revealed that most teachers understood the importance of cultural integration but lacked concrete strategies for practice. Teachers often equated cultural literacy with "commemorating traditional events" rather than embedding values of tolerance, empathy, and collaboration in daily learning. These insights informed the initial design framework of the CLM, emphasizing the need to link formal curriculum content with students' lived cultural experiences as a foundation for the next DBR stages.

4.2. Organization: Collaborative Design and Teacher Preparation

The second stage emphasized collaboration between researchers and teachers in co-developing

lesson plans, learning objectives, and student worksheets (LKPD) guided by cultural themes. The organization phase provided opportunities for all students to share experiences and learn collectively from challenges. During this phase, teachers introduced the topic and distributed learning tasks according to students' academic abilities. They also organized students into heterogeneous learning groups based on their levels of proficiency.

Quantitative data from the mid-cycle CRTSE reflection showed an early increase in teachers' confidence, particularly in the *Adapting Instruction* dimension, where the mean rose from 3.8 to 4.0 (+5.3%). Teachers began identifying entry points within the IPAS and Bahasa Indonesia curricula where cultural literacy could be naturally embedded.

During co-design workshops, teachers engaged actively in dialogue about pedagogical approaches. One participant reflected, "*Working together with colleagues helped me see that culture is not an extra activity, but something we can weave into the topic itself.*"

Field observations from the workshops documented that all 14 teachers successfully produced at least one complete teaching unit integrating cultural elements. Collaboration was evident as teachers discussed learning goals, selected local examples (e.g., *batik motifs*, *upacara wiwitan*, *regional folklore*), and formulated measurable outcomes related to empathy and critical thinking. However, teachers also identified logistical challenges such as forming balanced student groups and managing time for cross-cultural discussions which were later addressed through organizational refinements in the CLM prototype.

4.3. Facilitation: Implementation and Student Engagement

The facilitation stage represented the initial cycle of classroom implementation, during which teachers enacted the CLM in pilot lessons. Students engaged in collaborative discussions, shared knowledge, and completed group-based tasks. Teachers monitored learning and reinforced essential concepts and skills, while facilitating strategic, content-focused discussions within groups.

Quantitative analysis revealed a statistically significant improvement in the "Engaging Students" dimension, with mean scores rising from 4.0 to 4.5 (+12.5%), while "Adapting

Instruction" also increased to 4.2 (+10.5%). Teachers reported feeling more confident leading dialogic lessons and promoting empathy among students.

Observational data corroborated these improvements. Across 13 schools, 76% of students progressed from the Beginning to the Developing level of cultural literacy performance. Students began to demonstrate active listening, respond respectfully, and encourage their peers to contribute to discussions. For example, in SDN Suryodiningratan 1, one observer recorded:

"A student invited her peers by saying, 'Yes, now it's your turn to share about your family traditions,' and the group responded with enthusiasm. The discussion became more inclusive and cooperative."

Teachers' reflections indicated that culturally relevant topics such as flora-fauna diversity, family heritage, and local festivals, made lessons emotionally engaging. One teacher wrote, *"When students talk about their own traditions, even the quiet ones participate. They feel proud and respected."*

Nevertheless, time management and group dynamics emerged as constraints. Teachers noted that facilitating deep discussion in heterogeneous classrooms required flexible pacing and additional scaffolding. These insights later informed improvements in the Facilitation Guidelines within the model.

4.4. Construction: Knowledge Building and Collaborative Synthesis

The construction stage entailed deeper inquiry and the synthesis of cultural concepts through collaborative projects, reflective dialogue, and presentation tasks. Teachers employed inquiry and clarification techniques to support task completion and deepen students' understanding of the learning content.

This process enabled students to identify key ideas, engage in questioning, and connect new knowledge to their cultural backgrounds. When prior knowledge was limited, students generated comprehension questions that were explored collaboratively in small groups under teacher facilitation.

Quantitatively, this stage yielded the highest increase in self-efficacy, especially in the "Reflecting and Revising Content" dimension (from 3.2 to 3.9, +21.8%) and "Integrating Community Context" (from 3.4 to 4.0, +17.6%). The overall teacher efficacy mean improved from 3.6 to 4.2, representing a 16.1% overall gain.

Qualitative findings showed students demonstrating sophisticated-level competencies,

including analytical reasoning and negotiation of perspectives. For instance, during the Diversity of Flora and Fauna lesson at SDN Golo, one student remarked,

"If rare plants are protected, it not only protects nature, but also protects our farming culture."

This type of statement illustrated students' ability to connect ecological and cultural understanding.

Teachers' reflections confirmed that this stage "activated students' sense of ownership" and deepened their cultural empathy. However, 6 of the 13 teachers (46%) reported difficulty maintaining balanced participation in mixed-ability groups. As one teacher explained, *"Some students dominate the discussion while others stay silent; I need better strategies to help everyone contribute."* These findings led to the introduction of scaffolding tools, such as visual organizers and guiding questions, to support differentiated participation in future cycles.

4.5. Evaluation: Reflection, Feedback, and Model Refinement

The evaluation stage focused on critical reflection and collaborative validation of the model's effectiveness. Teachers provided targeted verbal and written feedback and offered additional support for students who had not yet completed assigned tasks. Feedback was continuous, timely, and constructive, demonstrating teachers' responsiveness to students' individual performance and cultural backgrounds.

Quantitative post-test results confirmed substantial improvement across all dimensions of teacher efficacy: the overall mean increased from 3.6 (pre-test) to 4.2 (post-test). All fourteen teachers moved from the *moderate* to *high* confidence category.

Teachers acknowledged the importance of ongoing reflection embedded throughout instruction rather than as a summative step. During FGDs, one participant remarked,

"Reflection is not something we do at the end – it should happen during teaching, while observing how students respond."

Three key qualitative insights emerged from this stage: (1) reflection fosters continuous professional growth; (2) peer discussion reinforces accountability and innovation; and (3) school-level collaboration is necessary for sustaining culture-based learning. In response, the CLM was revised to position *Evaluation* as a cyclical process involving both teacher and student reflection, not a terminal phase.

The final validation meeting with DIKPORA representatives also resulted in a commitment to

scale the model for district-wide teacher training, indicating institutional readiness for broader implementation.

Table 3: Operational Structure Of The CLM.

Stage	Teacher Actions	Student Activities	Outputs
Integration	Identify cultural context, activate prior knowledge	Share experiences	Cultural relevance established
Organization	Form groups, assign differentiated tasks	Collaborate	Structured interaction
Facilitation	Guide discussion, scaffold dialogue	Engage in dialogue	Conceptual understanding
Construction	Support inquiry, clarify meaning	Synthesize ideas	Cultural meaning-making
Evaluation	Provide feedback, facilitate reflection	Reflect and revise	Metacognitive awareness

Importantly, the five stages of the CLM are embedded within each DBR cycle, rather than representing a linear sequence. This alignment ensures that each instructional stage is continuously refined through iterative implementation. Overall, the findings demonstrate that the CLM not only improves teacher efficacy but also fosters meaningful student engagement through culturally grounded and dialogic learning processes.

5. DISCUSSION

The findings of this study are interpreted by linking them to the broader theoretical and contextual landscape of culturally responsive pedagogy. They highlight how teachers' growing confidence, students' evolving engagement, and the reflective practices emerging throughout the iterative Design-Based Research process collectively demonstrate the transformative potential of the Cultural Literacy Model (CLM) (Brown, 1992; Joseph, 2004; Kelly, 2014). By weaving together quantitative trends and qualitative insights, this section situates the results within established frameworks of culturally responsive teaching and multicultural education (Gay, 2010; Banks, 2004; Siwatu et al., 2015), while grounding them in the local philosophy of *Pendidikan Khas Kejogjaan* (Dwijonagoro et al., 2023). In doing so, the discussion not only deepens the understanding of how culture can be positioned at the core of learning but also underscores its significance for shaping empathetic, inclusive, and contextually grounded educational practice (Afifuddin et al., 2025; Fitrianto & Farisi, 2025).

The first research question explored teachers' self-efficacy in applying culturally responsive teaching practices, measured through the CRTSE scale (Siwatu et al., 2015) and analyzed across the DBR stages. The quantitative findings revealed a consistent improvement in teacher confidence from a moderate level ($M = 3.6$) before implementation to a high level ($M = 4.2$) after two cycles of the CLM. The most notable gains occurred in the dimensions of "Reflecting and Revising Content" (+21.8%) and "Integrating Community Context" (+17.6%),

signifying that teachers became more competent and willing to adapt instructional materials to the cultural backgrounds of their students (Comstock et al., 2023; Mahali & Seigny, 2021).

This growth aligns with Gay's (2010) framework of Culturally Responsive Teaching (CRT), which emphasizes that effective pedagogy must be built on teachers' ability to connect academic content with students' cultural experiences. Initially, teachers perceived culture as a decorative or peripheral aspect of learning—a finding consistent with previous studies noting that teachers in multicultural contexts often equate culture with folklore or national holidays (Douglas, 2020; Rima et al., 2024). However, through iterative design and reflection, teachers in this study began to reframe their understanding, recognizing that culture is both a medium and a resource for learning (Aulia et al., 2024; Arjaya et al., 2024).

The improvement in self-efficacy also mirrors Siwatu's (2015) theoretical assertion that teacher confidence develops through mastery experiences and collaborative reflection. Participation in co-design workshops and teaching experiments functioned as authentic mastery opportunities, allowing teachers to test, observe, and refine culturally responsive strategies (Cruz et al., 2019; Gere et al., 2009). This iterative engagement reshaped their pedagogical beliefs—transforming passive awareness into active confidence (Comstock et al., 2023).

Contextually, these findings resonate with the local educational vision of *Pendidikan Khas Kejogjaan* (Dwijonagoro et al., 2023), which promotes the values of *toleransi*, *empati*, and *kekancan salawase* (lifelong friendship). By grounding professional growth in cultural empathy, teachers in Yogyakarta began to perceive cultural literacy not as an additional task but as an intrinsic dimension of their professional identity (Surahman & Salmon, 2023). This shift represents a crucial step toward sustaining culturally contextualized education at the primary level (Sakti et al., 2024).

The second research question examined how the

implementation of the CLM influenced students' engagement, dialogue, and intercultural competence. Qualitative evidence from classroom observations and teacher reflections across thirteen schools demonstrated a marked transformation in students' participation patterns, from passive listening (Beginning) to active negotiation of meaning (Sophisticated). This progression was reflected in the 76 % increase of students moving from the beginning to developing proficiency levels during the Facilitation Stage (Braun & Clarke, 2021).

Students began to express cultural empathy through inclusive dialogue, exemplified in statements such as:

"My friend's tradition is different, but it teaches the same respect."

Such utterances indicate cognitive engagement coupled with emotional resonance, which, according to Banks (2004), represents the hallmark of transformative multicultural education—where learners move beyond awareness to action-oriented understanding (Mansilla & Wilson, 2020).

The CLM fostered dialogic interaction that aligns with Vygotskian sociocultural learning theory, in which knowledge construction occurs through social mediation (Nardo, 2021). By integrating local cultural themes such as *upacara wiwitan*, flora-fauna diversity, and family heritage, teachers provided culturally relevant entry points that allowed students to link academic content with personal experiences (Shufa & Adji, 2024; Aulia et al., 2024). This practice enhanced students' sense of belonging and pride in their cultural identities, while simultaneously nurturing the ability to respect differences (Lestari et al., 2024).

Furthermore, the results highlight the role of dialogue and empathy as cognitive-emotional bridges in cultural literacy learning. Echoing Portes et al. (2017) and supported by recent work on dialogic cultural literacy (Cook et al., 2022; Astratova & Rubene, 2024), the study found that instructional conversations grounded in cultural context help students internalize democratic values such as respect, cooperation, and social responsibility. In this sense, the CLM's iterative cycles of dialogue and reflection mirror the *Pendidikan Khas Keajaiban* philosophy, which emphasizes learning through interaction and harmony, bridging formal education with the lived cultural ethos of Yogyakarta society (Sawitri et al., 2021).

The data also suggest that students' development of intercultural competence is contingent on teachers' ability to facilitate structured, empathetic dialogue. Teachers who demonstrated high efficacy in "engaging students" also reported higher levels of

collaborative discourse and peer empathy among learners (Jin et al., 2023). Therefore, the CLM effectively served as both a pedagogical framework and a moral compass, guiding classrooms toward becoming microcosms of inclusive citizenship (Afifuddin et al., 2025; Nurman et al., 2022).

The third research question sought to identify the challenges and reflective insights that emerged from teachers during the DBR implementation process. The qualitative data revealed that teachers viewed the Construction Stage as the most demanding, with 46 % of participants citing difficulties related to time management, student heterogeneity, and limited scaffolding resources. This aligns with DBR literature emphasizing that real-world implementation often surfaces practical constraints that drive iterative refinement rather than linear progress (Brown, 1992; Joseph, 2004; Creswell & Creswell, 2018).

Despite these challenges, teachers' reflections revealed profound professional learning outcomes. Many described the experience as transformative, noting that iterative reflection helped them to "see culture as pedagogy rather than decoration." As one teacher expressed, "I used to avoid cultural topics because I thought they were too abstract; now I see them as opportunities to teach empathy." Such reflections signify a paradigm shift consistent with Gay's (2010) notion of teacher as cultural mediator and with Fitrianto and Farisi's (2025) argument that local wisdom can act as a contextual scaffold for empathy-based learning. Teachers transitioned from being transmitters of content to facilitators of dialogue—guiding students to connect personal, communal, and national values (Adegbola, 2022; Comstock et al., 2023).

Another key insight relates to collaborative professionalism. Through the DBR framework, teachers experienced the value of peer reflection and co-design as mechanisms for continuous improvement. This resonates with Siwatu et al.'s (2015) model of efficacy development through social persuasion and vicarious learning, as well as Banks' (2004) idea of "transformative teaching communities." The sustained partnership with the Yogyakarta Education Office (DIKPORA) further institutionalized the reflective culture, aligning school practices with the character-based vision of *Profil Pelajar Pancasila* (Halim et al., 2024; Fauziah et al., 2023).

The iterative nature of DBR also underscored the importance of feedback loops. Each cycle of design, implementation, and evaluation allowed teachers to test strategies, confront challenges, and collaboratively refine the CLM. As a result, reflection

evolved from an evaluative act into a pedagogical habit, a permanent element of instructional design (Braun & Clarke, 2021). This recursive reflection aligns with the *Kejogjaan* principle of *eling lan waspada* (awareness and mindfulness), symbolizing the intersection between local wisdom and global educational theory (Sakti et al., 2024; Lestari et al., 2024).

Ultimately, the DBR process did not merely yield a functional model but fostered a community of culturally responsive practitioners. Teachers reported higher self-efficacy, deeper empathy toward students, and stronger collaboration among peers (Comstock et al., 2023; Cruz et al., 2019). These collective transformations represent not only an educational innovation but also a renewal of the moral and cultural purpose of schooling in a multicultural society (Afifuddin et al., 2025; Nurman et al., 2022).

Taken together, the findings affirm that the Cultural Literacy Model functions as both a theoretical and practical embodiment of Culturally Responsive Teaching (Gay, 2010; Siwatu et al., 2015) and Multicultural Education (Banks, 2004), localized within the socio-cultural ethos of *Pendidikan Khas Kejogjaan* (Dwijonagoro et al., 2023). Theoretically, the study extends the CRT framework by integrating local wisdom as a contextual scaffold for developing empathy and intercultural understanding in primary education (Fitrianto & Farisi, 2025; Arjaya et al., 2024). Practically, the model demonstrates that design-based collaboration between universities and education offices can produce context-sensitive innovations that bridge global theories with local realities (Afifuddin et al., 2025).

The iterative, reflective, and dialogic nature of the CLM repositions cultural literacy not as an enrichment activity but as a core pedagogical orientation. It validates that when teachers and students co-construct learning through culture, education transcends cognitive boundaries and becomes an instrument for social cohesion and moral development (Kobakhidze, 2021; Edwards et al., 2020). This process ultimately embodies the spirit of Yogyakarta's educational philosophy, *memayu hayuning bawana*, to nurture harmony within the world through learning (Dwijonagoro et al., 2023).

Although developed in Yogyakarta, the CLM offers adaptable design principles that can be applied

across diverse multicultural contexts by aligning local cultural content with its instructional stages. These findings provide broader insights for multicultural education systems beyond Indonesia, particularly in settings where local culture plays a central role in shaping learning practices. Theoretically, this study extends existing CRT frameworks by positioning local wisdom as a pedagogical scaffold rather than merely contextual content. Methodologically, it contributes to DBR literature by demonstrating how iterative collaboration with teachers can generate context-sensitive and scalable instructional models.

6. CONCLUSION

This study developed and validated the Cultural Literacy Model (CLM) for primary schools in Yogyakarta through a five-stage Design-Based Research (DBR) approach: integration, organization, facilitation, construction, and evaluation. The iterative implementation demonstrated that embedding local wisdom into classroom practice significantly enhanced both teacher efficacy and student cultural literacy. Quantitative data showed a substantial increase in teachers' confidence in applying culturally responsive pedagogy, while qualitative evidence revealed deeper dialogic interaction, empathy, and collaboration among students. Theoretically, the CLM extends the frameworks of Culturally Responsive Teaching and Multicultural Education by contextualizing them within Indonesia's educational philosophy of *Pendidikan Khas Kejogjaan*, which values tolerance, empathy, and social harmony. Practically, it provides a replicable structure for integrating culture-based learning into existing curricula through reflective and collaborative pedagogy. Despite its effectiveness, the research highlights challenges in managing heterogeneous student groups and sustaining reflective practice. Future studies should explore the long-term impact of the CLM across regions and subjects, as well as its potential digital adaptation for broader accessibility. In essence, the Cultural Literacy Model positions culture not as an accessory to learning but as its core foundation, transforming classrooms into inclusive spaces where local wisdom nurtures global citizenship, empathy, and lifelong learning.

General of Research and Development, Ministry of Higher Education, Science, and Technology of the Republic of Indonesia through the BIMA Program (2025). The authors also acknowledge the APC support provided by the Enhancing Quality

Acknowledgment: The authors gratefully acknowledge the support and funding provided by the Directorate of Research and Community Service (DRPM). This research was funded by the Directorate

Education for International University Impact and Recognition (EQUITY) Program – THE Impact Ranking. The authors further extend their

appreciation to the university administration and all participants whose cooperation and engagement made this study possible.

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