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Feasibility Assessment of Teaching Materials for Writing Popular Scientific Articles Based on Culturally Responsive Teaching (CRT)

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A B S T R A C T

The teaching of Indonesian language writing skills often fails to align with students' sociocultural contexts, resulting in low motivation and poor learning outcomes. The application of the Culturally Responsive Teaching (CRT) approach in instructional materials can serve as a solution to bridge the gap between the formal curriculum and students' cultural experiences. This study aims to assess the feasibility of CRT-based instructional materials for writing popular science articles for eighth-grade junior high school students, taking into account both content feasibility and instructional feasibility. This study adopts the Research and Development (R&D) method using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), with the focus of this report on the Development stage (Feasibility Assessment). Data were gathered through validation tools comprising a checklist-based questionnaire and a Likert scale, which were completed by Content Experts and Instructional Experts. Following the feasibility assessment, the proposed instructional materials were classified as Highly Feasible for use in the learning process. The mean validation score assigned by the Content Experts was 97, which falls under the "Highly Appropriate" category, whereas the Instructional Experts' validation score was 85, also categorized as Highly Appropriate. The implications of this study are that CRT-based instructional materials that have been tested for appropriateness can serve as effective and relevant learning resources, thereby enhancing students' understanding of the material while fostering their appreciation for local culture in an academic context.
Keywords: Culturally Responsive Teaching; feasibility assessment; instructional materials; junior high school; writing popular articles

Penilaian Kelayakan Bahan Ajar untuk Penulisan Artikel Ilmiah Populer Berbasis Pengajaran Responsif Budaya (CRT)

Pengajaran keterampilan menulis bahasa Indonesia sering gagal selaras dengan konteks sosial budaya siswa, sehingga mengakibatkan motivasi rendah dan hasil belajar yang buruk. Penerapan pendekatan Pengajaran Responsif Budaya (Culturally Responsive Teaching/CRT) dalam materi pembelajaran dapat menjadi solusi untuk menjembatani kesenjangan antara kurikulum formal dan pengalaman budaya siswa. Studi ini bertujuan untuk menilai kelayakan materi pembelajaran berbasis CRT untuk menulis artikel sains populer bagi siswa kelas 8 SMP, dengan mempertimbangkan kelayakan konten dan kelayakan instruksional. Studi ini mengadopsi metode Penelitian dan Pengembangan (R&D) menggunakan model ADDIE (Analisis, Desain, Pengembangan, Implementasi, Evaluasi), dengan fokus laporan ini pada tahap Pengembangan (Penilaian Kelayakan). Data dikumpulkan melalui alat validasi yang terdiri dari kuesioner berbasis checklist dan skala Likert, yang diisi oleh Pakar Konten dan Pakar Instruksional. Setelah penilaian kelayakan, materi pembelajaran yang diusulkan diklasifikasikan sebagai Sangat Layak untuk digunakan dalam proses pembelajaran. Skor validasi rata-rata yang diberikan oleh Pakar Konten adalah 97, yang termasuk dalam kategori "Sangat Sesuai", sedangkan skor validasi Pakar Instruksional adalah 85, juga dikategorikan sebagai Sangat Sesuai. Implikasi dari penelitian ini adalah bahwa materi pembelajaran berbasis CRT yang telah diuji kesesuaiannya dapat berfungsi sebagai sumber belajar yang efektif dan relevan, sehingga meningkatkan pemahaman siswa terhadap materi sekaligus menumbuhkan apresiasi mereka terhadap budaya lokal dalam konteks akademik.
***Kata kunci**: materi pembelajaran; Pengajaran Responsif Budaya; penilaian kelayakan; penulisan artikel populer; sekolah menengah pertama*

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INTRODUCTION

Indonesian language instruction at the junior high school (SMP) level plays a vital role in the development of students' functional and academic literacy. One of the skills students are expected to master is the basic competency to write popular science articles. This skill is not only useful for training students to speak logically but also helps them write in a way that is easily understood by many people (Pelger & Nilsson, 2016). However, in reality, we often face a significant challenge: students' low motivation and lack of interest in learning. This problem frequently arises because the curriculum feels rigid, relies too heavily on textbooks, and lacks the application of cultural contexts relevant to students' daily lives (Willenda et al., 2024).

The disparity between the material taught and students' sociocultural backgrounds, which is often dismissed, greatly impacts the quality of assessments and evaluations (Barberan, 2023). Most evaluations have failed to fully examine students' abilities, so the assessment results do not present their true capabilities. To address these issues, a different approach to teaching is needed. One such approach is Culturally Responsive Teaching (CRT), developed by Ladson-Billings (1995) and Gay (2018). This approach seeks to engage students' diverse knowledge, experiences, and cultures to make the learning process more effective and improve educational outcomes. In writing, students can use stories from their own regions as a basis for creating more meaningful academic work (Hossain, 2024).

Although the effectiveness of the CRT approach in language education has been demonstrated by numerous studies (Hambandima, 2021) and in line with the growing trend of R&D research in Indonesia (Okpatrioka, 2025), recent analyses indicate that a gap still exists regarding the development of instructional materials for academic writing. Specifically, the integration of CRT as a foundation for the curriculum and product assessment in popular science article writing materials remains very limited. There are three main dimensions that constitute these gaps: (1) the Contextual Gap, namely the scarcity of popular science article teaching materials rooted in local culture; (2) the CRT Validation Gap, namely the lack of precise evaluation procedures for integrating CRT components into learning modules; and (3) the Product Assessment Gap, where the assessment focus has so far remained on students' final products without evaluating the suitability of the instructional materials themselves (Cyntya et al., 2025).

To bridge these gaps, this development study focuses on the feasibility testing phase. This step is crucial to ensure that the designed learning modules meet high standards of feasibility and validity before being implemented in the classroom (Arifin et al., 2024). Based on this rationale, the primary objective of this study is to test and present the degree of validity of CRT-based instructional materials for writing popular science articles for eighth-grade junior high school students. The evaluation process involves a comprehensive review by Content Experts and Instructional Experts (Walker, OliveraAguilar, et al., 2023).

This study is expected to contribute empirical evidence regarding the integration of the CRT approach into writing learning artifacts. Furthermore, this study aims to provide teaching materials that have been tested for suitability to help teachers foster student motivation and learning outcomes in a contextual manner. The recommendations formulated will also serve as a crucial reference for educational institutions in implementing instructional materials that are adapted to students' cultural backgrounds, in order to achieve more optimal and meaningful Indonesian language learning at the junior high school level (Indriyana et al., 2024; Nisa & Ulumuddin, 2025).

METHODS

This study employs a Research and Development (R&D) approach focused on developing and testing the feasibility of instructional materials for writing popular science articles based on culturally responsive teaching (CRT) for eighth-grade junior high school students (Sugiyono, 2019). The research framework is grounded in the ADDIE model, which consists of five principal stages:

Analysis, Design, Development, Implementation, and Evaluation. Nevertheless, this research report confines itself to the Development phase, particularly the feasibility assessment of the instructional material design, because the present research process is still focused on evaluating the feasibility of the developed product design.

This study applies the ADDIE model, emphasizing the Development and Formative Evaluation stages, as described below: (1) analysis: identifying student needs and existing learning conditions through observation and interviews with teachers; (2) design: developing instructional material designs based on the results of the needs analysis that are relevant to the students' local cultural context; (3) development: developing instructional materials based on the prepared design, which includes systematic steps for writing popular science articles based on CRT; and (4) formative evaluation (design validation)*:* design validation, is the process of checking if the instructional materials are appropriate by having experts in the subject area and in teaching review them. This helps make sure the content is right, and the way it's taught is effective.

The validators in this study consisted of two experts: a Subject Matter Expert and an Instructional Expert. The requirements and eligibility criteria for each validator are as follows.

a. The Content Expert holds a higher education degree in Indonesian Language and Literature Education, has more than 10 years of experience teaching as a literature lecturer, and has a deep understanding of the Culturally Responsive Teaching (CRT) approach. The substance expert's role includes evaluating the appropriateness of the content, the compatibility of the teaching materials with the Merdeka Curriculum, and the application of CRT principles contained therein.
b. The instructional expert has a track record of teaching Indonesian at the junior high school level and understands CRT-based learning strategies. The instructional expert is responsible for evaluating the pedagogical dimensions, practicality of use, and suitability of the instructional materials for the characteristics of junior high school students.

To provide evaluation and feedback on the designed instructional materials, the researchers involved experts in the field of education during this phase (Zulifah et al., 2021). Research data were collected from two key validators: Dr. Muhammad Ardi Kurniawan, M.A., serving as the Content Expert, and Pungki Safitri, S.Pd., serving as the Instructional Expert. Both validators provided quantitative data in the form of validation scores, as well as qualitative data in the form of feedback, critiques, and constructive suggestions useful for optimizing the quality of the instructional materials.

The research instrument used in the design validation stage was the Teaching Material Feasibility Validation Questionnaire, which employed a Likert scale and a checklist. This instrument was used to assess two main aspects: content validity and construct validity of the developed teaching materials. The instrument consisted of two main sections, namely:

a. Dimensions and indicators of content validity: (1) alignment of the instructional materials with the Merdeka Curriculum, which measures the extent to which the materials meet the Learning Outcomes (CP) and Learning Objectives (TP) established in the Merdeka Curriculum; and (2) the alignment of the materials with CRT principles, which measures the integration of elements of local culture into the instructional materials.
b. Dimensions and indicators of construct validity: (1) alignment of instructional materials with the characteristics of junior high school students, which measures the suitability of the language, writing style, and difficulty level of the instructional materials relative to students' abilities; and (2) practicality of the teaching materials, which measures the ease of applying the materials in the classroom learning process.

This study is scheduled to take place during the even semester of the 2024/2025 academic year at Raden Fattah Cimanggu Junior High School and Muhammadiyah Ponjong Junior High School. To gather relevant information regarding student needs and learning conditions at both schools, the researcher began the study with observations and interviews during the needs analysis phase. Observations were implemented to directly examine the learning process dynamics in the

classroom, whereas interviews with teachers were designed to explore the instructional issues they face and to identify their preferences for the instructional materials to be developed (Creswell, 2013; Gulab & Khokhar, 2024; Sugiyono, 2018).

The data collection procedures in this study involved a variety of techniques designed to ensure the data collection process was appropriate for each stage of the research. Initial data collection during the needs analysis phase was conducted through interviews and field observations, while the feasibility assessment phase utilized a validation questionnaire (Syahrul et al., 2025). The measurement tool used was a Product Feasibility Validation Questionnaire that combined a checklist model and a Likert scale (Sakinah et al., 2025). The development of this instrument was based on content indicators and aligned with the principles of Culturally Responsive Teaching (CRT) to ensure that the instructional materials were designed to be contextual and adaptable to the students' cultural backgrounds (Putri & Aisyah, 2025; Sakinah et al., 2025).

To ensure the validity and accuracy of the collected data, the validation process was entrusted to two independent experts. This step was taken to test Content Validity through a Subject Matter Expert while evaluating Construct Validity through an Instructional Expert. The involvement of these two experts allowed the researchers to obtain a comprehensive review of the suitability of the instructional materials under development (Saputri et al., 2023). Entering the final phase of the research, data analysis was conducted to follow up on various suggestions and improvements provided by the validators. A combination of qualitative and quantitative analysis techniques was applied in this process; the qualitative approach focused on reviewing feedback in the form of suggestions and input, while the quantitative approach was used to calculate the average score percentage. The outcome of this analysis is a measurable description of the instructional materials' suitability level (Ash-Shiddiqi et al., 2025; Sofwatillah et al., 2024). If the percentage falls within the range of 81% to 100%, the product is classified as "Highly Suitable" or "Very Good" for implementation in learning activities. Through this structured research process and multi-perspective evaluation, the study is expected to make a tangible contribution to the provision of high-quality instructional materials that are adaptable to students' needs and capable of optimizing the effectiveness of learning in schools (Arikunto, 2021; Tukan et al., 2021).

The product's suitability category is determined based on the average score obtained from each validator: Highly Acceptable (81%-100%), Qualified (61% -80%), and Not Eligible (> 60%). Formula for calculating the average score:

$$Average\ Score\ = \left(\frac{Total\ score\ obtained}{Maximum\ possible\ score}\ x\ 100\right)$$

RESULTS AND DISCUSSION

Results

Description of Development Needs (Analysis Phase)

The results of observations, interviews, and curriculum document analysis indicate an urgent need to develop teaching materials on writing popular science articles based on CRT. Based on these findings, it can be concluded that instructional materials need to be developed in innovative ways. This aims to make it easier for students to understand the concepts and steps involved in writing. Furthermore, it is important to utilize local cultural elements found in their environment as a foundation for the writing process (Gay, 2018; Munirah et al., 2025).

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Table 1. Needs Analysis Results

Aspect	Findings from the Needs Analysis	Data Sources
Learning Conditions	Teachers have not yet integrated popular science articles based on the CRT approach into their teaching. This makes the teaching-learning process feel monotonous because it still relies heavily on textbooks and student guides. The predominant use of the lecture method also contributes to boredom and reduces students' focus and concentration.	Teacher Interviews and Observations Class
Student Challenges	Students' skills in writing popular science articles remain low due to their limited ability to sort through valid information and distinguish between facts and opinions. Additionally, students' level of interest in the topics of popular science articles is relatively low.	Student Interviews
Cultural Gap	Learning activities to date have never included examples related to local culture. According to the students, integrating elements of local culture can broaden their horizons while making the learning environment more engaging.	Student Interviews

Product Specifications and Development (Design and Development Phases)

The product developed in this context is instructional material focused on writing popular science articles, based on the Culturally Responsive Teaching (CRT) approach. These materials are specifically designed for eighth-grade students in junior high school (SMP) and have been carefully aligned with the Learning Outcomes (CP) and Learning Objectives (TP) set out in the Merdeka Curriculum.

1. Integration of Culturally Responsive Teaching (CRT)
   These instructional materials were developed to incorporate elements of local culture into educational activities. The adopted strategy involves providing examples of popular science articles rooted in local wisdom. This contextual approach aims to encourage students to find inspiration in their surrounding environment, thereby enhancing the relevance and meaning of the learning process.
2. Writing Activities
   This teaching material provides a series of writing activities that encourage students to connect their ideas with their cultural backgrounds and personal experiences. These activities also enable students to integrate pertinent cultural elements into their writing, thereby helping them connect the learning process to their own experiences and environment. Beyond strengthening writing skills, the activities are designed to cultivate students' recognition of the essential role that culture plays in scientific writing. Through this approach, students are expected not only to communicate their ideas more creatively and critically, but also to understand how cultural values influence their viewpoints in their work.
3. Product Components
   The creation of this instructional material incorporates a collection of integrated components that work together and reinforce one another, including structured writing guidelines, contextualized text examples, reading comprehension activities, independent writing practice tasks, and tools for assessing student progress. This strategy is intended to support mastery of the content, strengthen students' writing abilities, and cultivate an appreciation of local knowledge. By developing these inclusive and culturally responsive teaching resources, learners are directed toward becoming

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competent, analytical writers who demonstrate cultural awareness and a commitment to social responsibility in the future.

Product Feasibility Assessment (Development Stage)

The Product Feasibility Assessment phase is a key component of this study, aimed at testing the content validity and construct validity of the teaching materials for writing popular science articles based on Culturally Responsive Teaching (CRT). The feasibility assessment process was conducted using a Likert Scale Validation Questionnaire administered to two validators: a Subject Matter Expert and an Instructional Expert

1. Subject Matter Expert Validation
   The content validation was conducted by Dr. Muhammad Ardi Kurniawan, M.A., as the Content Expert, to assess the accuracy of the scientific content, compliance with the Merdeka Curriculum, and the precision of the integration of CRT values. Based on the evaluation results, the Subject Matter Expert assigned an average score of 97 out of a possible maximum score, thereby classifying this product as "Highly Suitable/Very Good." Additionally, the validator provided several substantial suggestions for improvement, particularly regarding aligning the examples of popular science articles more closely with the context of the local wisdom being promoted.
2. Teaching Expert Validation Test
   Meanwhile, the assessment conducted by the Instructional Expert (Pungki Safitri, S.Pd.) highlighted pedagogical aspects, feasibility, graphical presentation, and the practicality of implementing the educational materials in 8th-grade junior high school Indonesian language classes. The evaluation outcomes produced an average validation score of 85 out of the maximum score, which was classified as "Highly Suitable/Very Good." The Instructional Expert's feedback focused on technical components and the visual layout, including revisions to the layout, strengthening relevant visual illustrations, and adjusting the writing style to enhance clarity and appropriateness for the developmental level of junior high school students.

Overall, the results of the Product Feasibility Test indicate that, based on the validation by both experts, the average product feasibility score reached 91. This figure demonstrates that the instructional materials have been tested and deemed "Highly Suitable" for use in Indonesian language instruction. The results of this feasibility assessment provide a strong foundation (empirical evidence) that this CRT-based instructional material is effective as a bridge between the academic curriculum and students' sociocultural context, and is capable of addressing the challenges identified during the needs analysis phase. The following Table 2 presents a comparison of the validation scores from the Content Expert and the Instructional Expert, as well as the overall average product suitability score.

Table 2. Product Feasibility Assessment Results

Validator	Average Score (%)	Feasibility Category
Content Expert	97	Highly Eligible
Teaching Expert	85	Highly Eligible
Overall Average	91	Highly Eligible

Discussion

This discussion of research findings on developing instructional materials for writing popular science articles grounded in Culturally Responsive Teaching (CRT) centers on three main pillars: an analysis of learning needs, strategies for incorporating culture into the materials, and an assessment of the product's feasibility. To maintain comprehensiveness, the study links the research findings to international literature from the past five years (2021–2026) addressing the pedagogical use of CRT, the promotion of critical literacy, methodological validation of instruments, and its alignment with the Sustainable Development Goals (SDGs), specifically SDG 4 (Quality Education), SDG 10 (Reduced Inequalities), and SDG 16 (Peace, Justice, and Strong Institutions).

1. The Transformation of Student Challenges into Learning Solutions

A requirements analysis in the eighth-grade class at Muhammadiyah Ponjong Junior High School in Gunungkidul Regency identified the main challenges students encountered in writing popular science articles: struggling to differentiate between facts and opinions, and a lack of proficiency in identifying valid information. To resolve these issues, the instructional materials were designed to incorporate a specific "Fact-Checking" rubric integrated with the local cultural context. By utilizing cultural elements familiar to students' daily lives (such as local traditions and sites), students become better equipped to distinguish objective data (facts) from the author's personal perspective (opinions). This approach reinforces the evidence that learning effectiveness increases when built upon students' prior knowledge.

These findings reinforce global research on fact-checking literacy. The implementation of a lateral reading program with more than two thousand middle school students in Canada significantly improved their ability to assess the credibility of information sources, with positive effects lasting up to six weeks after the intervention (Brodsky et al., 2023). The "Fact Check" rubric in this study serves as a contextual adaptation of this verification strategy, integrated with the local cultural context to foster greater engagement among junior high school students. Therefore, mastering the distinction between facts and opinions through this instructional material not only supports writing skills but also strengthens critical literacy and global citizenship awareness in line with SDG Target 4.7 regarding education for sustainable development and an understanding of cultural diversity.

2. Implementation of the Culturally Responsive Teaching (CRT) Approach

The CRT approach in this teaching material does not merely include cultural images but integrates them into the structure of scientific thinking: (a) the connection between culture and ideas. This material guides students to explore the cultures around them as subjects of simple research, and (b) motivation to learn. Observational data show that only 5–8 students were initially interested in the scientific article material. However, by integrating elements of local culture, this teaching material provides a context that is closer to students' lives, thereby increasing its relevance and fostering students' emotional engagement in the writing process.

This trend toward increased motivation aligns with a global systematic review (2020–2025) on the implementation of CRT, which confirms that sustained culture-based learning can foster student engagement and academic achievement by aligning the curriculum with their life experiences (Liu et al., 2024). Recent findings further underscore that strengthening cultural identity through the CRT approach has a positive impact on learning outcomes across various educational backgrounds (Alamsyah et al., 2025). Specifically in the realm of scientific writing, the integration of local wisdom values has been shown to deepen critical reflection, boost academic self-efficacy, and transform students' perspectives on scientific writing into a meaningful means of preserving culture (Suprihatin et al., 2020). Furthermore, the effectiveness of the ethoscience approach—which combines local culture and science literacy to foster communication skills and literacy among elementary school students—demonstrates that this culture-based contextualization strategy applies across subjects and grade levels, not limited to the Indonesian language subject alone (Khairiyah et al., 2025).

The successful integration of culture into instructional materials heavily depends on teachers' competence in consistently applying the CRT approach. A systematic review of educators' competencies in implementing culturally responsive pedagogy indicates that most teachers still require capacity building, particularly in operationalizing CRT principles within daily learning activities (Jia & Nasri, 2019). This is fully consistent with the findings of this study, where the results of the needs analysis confirmed that awareness of culture-based learning in partner schools remains relatively limited. Thus, the availability of validated instructional materials developed systematically through this research can serve as a practical solution to support teachers who are not yet accustomed to designing CRT modules independently. In line with this, Nuriadi (2023) emphasizes that the

integration of local wisdom into Indonesian language textbooks for junior high school level has the potential to strengthen the preservation and revitalization of within the framework of the Merdeka Curriculum, although challenges related to the equitable and consistent implementation across various regions of Indonesia still need to be addressed.

3. Analysis of Material and Instructional Feasibility

The assessment results indicate consistency in quality between theoretical and practical aspects. Content feasibility (97%). A high score from the content expert (Dr. Muhammad Ardi Kurniawan, M.A.) indicates that, substantively, the content meets the Learning Outcomes (CP) of the Merdeka Curriculum. The main strengths lie in the comprehensiveness of the content components and the precision of the practice questions. This aligns with research suggesting that the CRT approach can enhance the relevance of learning to students' cultural contexts, as well as increase their engagement and motivation in the learning process (Gay, 2018; Ladson-Billings, 1995). Teaching feasibility (85%). An assessment by a practitioner/teacher (Pungki Safitri, S.Pd.) confirms that this material is user-friendly and easy to implement in the classroom. It has already been categorized as "Very Good." Research by Munirah et al. (2025) and Paris & Alim (2017) indicates that the integration of local culture into instructional materials is a crucial aspect in enhancing the effectiveness of CRT-based learning.

The methodological validity of these two scores is further reinforced by findings from various international studies. In the development and validation of educational research instruments, best practices recommend involving a select number of validators chosen purposefully based on indepth expertise in their respective fields, rather than involving a large number of validators with less specific expertise (Jemsy, 2022). The content validity score of 97% from the Subject Matter Experts and the construct validity score of 85% from the Instructional Experts exceed the general standards for CRT-based instructional material development studies at the international level, which typically set the threshold for the "highly acceptable" category in the range of 81–100% (Diana & Mulyadi, 2024). The consistency of results across these two aspects of validity demonstrates that the method of triangulation among validators, as recommended in the classical R&D model, remains relevant to modern validation criteria that prioritize independent assessment to minimize subjective bias in the evaluation of educational product suitability.

Achieving these significant feasibility scores effectively addresses and overcomes various gaps identified in the previous analysis phase. The three main gaps that were successfully addressed are as follows.

a. Contextual Gap

The development of this relevant, locally-based instructional material directly bridges the gap between the school curriculum and the students' sociocultural backgrounds. In line with this, a study by Kim (2024) on the concept of "funds of knowledge" emphasizes that aligning instructional materials with cultural insights and experiences within family and community environments can enrich the learning process while strengthening students' engagement with the material being studied. A similar phenomenon of contextual disparity has also been identified in rural areas of Indonesia, where the integration of local wisdom with 21st-century skills remains very limited in Indonesian language teaching materials, despite the significant potential of this approach to enhance the relevance of learning (Shufa & Adji, 2024). Therefore, the teaching materials produced in this study are intended to address these limitations, particularly in the domain of writing popular science articles, which has so far been largely overlooked by development studies based on local wisdom.

b. CRT Validation Gap

The effectiveness of the CRT method was successfully established through a comprehensive validation process supervised by experts. The results of this evaluation confirm that the adaptation of the CRT approach in the Indonesian educational context aligns with established contemporary educational theories that prioritize cultural diversity in learning activities. In accordance with the

opinion of Hayati et al. (2024), the evaluation process by experts serves as a fundamental instrument in ensuring the effectiveness of integrating cultural components to develop a more comprehensive and productive learning experience. Furthermore, a systematic review of various instruments for measuring CRT practices at the PK–12 levels indicates that the lack of precisely validated quantitative measurement tools remains a major obstacle in the global CRT research landscape. Therefore, the transparent determination of content and construct validity scores in this study provides a meaningful methodological contribution to the development of this field (Kusumayani et al., 2025). This signifies that the identified issue of gaps in CRT validation is not merely a domestic problem but has become a key concern within the scope of international research.

c. Product Assessment Gaps

The evaluation focus on product feasibility, particularly regarding the quality and relevance of instructional materials, clearly demonstrates that these materials can be effectively implemented to address the issue of low student engagement resulting from the use of instructional materials that appear rigid and irrelevant. This aligns with the findings of Roseana et al. (2024), which confirm that the application of the CRT approach can significantly improve student engagement and learning outcomes. Through learning that is more sensitive and responsive to cultural contexts, students are expected to participate more actively and be more motivated, which in turn leads to an overall improvement in the quality of education. Furthermore, the shift in the orientation of evaluation, from a focus solely on final learning outcomes to an assessment of the suitability of the instructional materials themselves, aligns with trends in modern educational research and development (R&D); this trend increasingly emphasizes the critical importance of formative evaluation to ensure the quality of learning products before they are widely tested in the field (Wahyuningsih et al., 2025). Thus, all gaps identified during the needs analysis phase, including contextual aspects, CRT validation, and product assessment, have been addressed and empirically resolved through the process of designing, developing, and validating instructional materials in this study

Relevance of Research Findings to the Sustainable Development Goals (SDGs)

In addition to contributing to the discipline of Indonesian Language Education, the development of this Culturally Responsive Teaching (CRT)-based instructional material seeks to provide tangible support for the Sustainable Development Goals (SDGs), particularly SDG 4 on Quality Education. Specifically, Target 4.7 highlights the importance of education that promotes sustainable development and lifestyles, global citizenship, and respect for cultural diversity. In this study, the inclusion of local cultural elements and narratives from Gunungkidul and its surrounding areas in the popular science article writing materials provides a practical way to apply this target within the classroom context.

Research in South Africa on early childhood education shows that the application of CRT contributes to the achievement of the SDGs, particularly in building educational institutions that are inclusive, equitable, high-quality, and socially just through the recognition and integration of children's cultural backgrounds into the learning process, which aligns with SDG 4, SDG 10 (Reduced Inequalities), and SDG 16 (Peace, Justice, and Strong Institutions Resilient Institutions). In Indonesia, the integration of the SDGs into project-based learning under the Merdeka Curriculum has been shown to enhance pre-service science teachers' understanding and ability to solve problems related to sustainability issues. Based on this precedent, the feasibility assessment in this study serves as a starting point to ensure that the developed instructional materials meet feasibility standards before being directed toward broader sustainability goals, such as realizing culturally sensitive education, minimizing learning achievement gaps among students from diverse sociocultural backgrounds, and strengthening an educational institutional system that is responsive to diversity.

The links between this study and SDG 11 (Sustainable Cities and Communities) become especially clear in Target 11.4, which emphasizes reinforcing actions to safeguard and maintain the world's heritage and biodiversity. When eighth-grade middle school students in Gunungkidul

Regency produced popular science articles about regional traditions and heritage sites, they were not only honing their writing abilities but also actively supporting the preservation and broad public circulation of local heritage knowledge. This learning practice aligns with the spirit of cultural preservation through education, which positions students as both heirs and guardians of their community's cultural narratives.

Nevertheless, claims of contributions to the SDGs at this stage remain limited to the conceptual level and the feasibility of the design. Therefore, further research during the implementation and evaluation phases is essential to precisely measure the empirical impact of these teaching materials on SDG indicators, for example, by monitoring the equity of learning outcomes across schools with varying socioeconomic backgrounds.

Practical Implications and Methodological Reflections

From a practical perspective, the findings of the feasibility assessment in this study indicate that junior high school Indonesian language teachers can immediately adapt or modify this validated instructional material as a contextual reference without having to start from scratch. A comprehensive feasibility assessment approach, which distinguishes between the perspectives of content experts and instructional experts, also aligns with the provisional principle in culturally sensitive assessment, which underscores the importance of involving diverse expertise so that the resulting educational products can fully accommodate students' needs (Walker, Olivera-Aguilar, et al., 2023). Nevertheless, the methodological limitations of this study must be openly acknowledged, namely that the number of validators currently involves only two experts and that the scope of the pilot study has not yet been expanded to include other regional cultures in Indonesia. These challenges align with the dynamics of CRT-based instructional material development at the global level, which often faces similar limitations in the early stages; thus, evaluating long-term impacts and conducting field implementation phases are crucial priorities for future research (Abdalla & Moussa, 2024).

CONCLUSION

This study was designed to test the feasibility of Culturally Responsive Teaching (CRT)-based instructional materials for writing popular science articles for eighth-grade junior high school students. The development of these materials was motivated by the significant contextual gap and the lack of student motivation resulting from the use of materials that tend to be rigid. The feasibility test results showed that the developed product is well suited for implementation, achieving an average validation score of 91 in the Very Good category, as rated by subject matter experts and teaching experts. This outcome verifies that incorporating local cultural elements into the structured academic writing process was successful, effectively aligning the demands of the formal curriculum with the students' sociocultural context. Regardless, the limitations of this study remain confined to the design validation phase (feasibility assessment) and have not yet developed into a phase of testing effectiveness or comprehensive implementation in the field. The developed materials also offer valid and adaptable learning resources that can support teachers in increasing student engagement and developing contextual writing skills.

Author Contribution Statement

Purwati Zisca Diana: supervised the umbrella research project, conceptualized the study, designed the methodology, validated the findings, and reviewed and edited the manuscript. **Amilia Rivanda:** carried out the research as part of her student umbrella research project, including developing the teaching materials, collecting and analyzing the data, and writing the original draft. **Rina Ratih Sri Sudaryani:** contributed expertise on Indonesian cultural elements in the teaching materials and the manuscript. **Daroe Iswatiningsih:** contributed to the writing conventions and manuscript formatting. All authors have read and approved the final manuscript.

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Conflict of Interest Statement
The authors declare that there are no potential conflicts of interest that could influence the objectivity, integrity, or interpretation of this research.

Data Availability Statement
The data supporting the findings of this study, including expert validation results and questionnaire responses from teachers and students, are not deposited in a public repository because they contain respondents' information. The anonymized data are available from the corresponding author, Purwati Zisca Diana (purwati.diana@uad.ac.id), upon reasonable request.

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