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4964-Article Text-33582-1-2-20260927

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Students' Learning Outcomes in Science and Social Studies (IPAS) through the Picture and Picture Cooperative Learning Model

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Article Info

Article history:

Received April 23, 2026

Accepted June 05, 2026

Published July 06, 2026

Keywords:

Cooperative Learning;

IPAS;

Learning Outcomes;

Picture-in-Picture Model;

3T Regions.

ABSTRACT

This study aimed to improve the Science and Social Studies (Ilmu Pengetahuan Alam dan Sosial, IPAS) learning outcomes of Grade IV students at Elementary School Syota, Pulau Moa District, Southwest Maluku Regency, Indonesia—a school situated in a remote, outermost, and underdeveloped (Terdepan, Terluar, dan Tertinggal, 3T) archipelagic region—through the implementation of the Picture and Picture cooperative learning model. A Classroom Action Research (CAR) design was employed, comprising two cycles conducted from August to September of the 2024/2025 academic year and involving 12 Grade IV students (8 male, 4 female) as research subjects. Data were collected through written achievement tests, structured classroom observation, and documentation and were analyzed using quantitative descriptive statistics benchmarked against the school's Learning Objective Achievement Criteria (Kriteria Ketercapaian Tujuan Pembelajaran, KKTP). The findings indicated classical learning mastery increased consistently across the three assessment points, from 45.45% at the pre-test to 63.63% at the end of Cycle I and 100% at the end of Cycle II, accompanied by a rise in the class mean score from 72.72 to 85.00. Reflective refinements introduced between cycles — including strengthened scaffolding, improved visual instructional materials, and more consolidated formative feedback — were instrumental in the substantial gains observed in Cycle II. The findings offer a low-cost, technology-independent instructional alternative that teachers in resource-constrained island schools can readily adopt to strengthen conceptual understanding and active participation in IPAS instruction.

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1. INTRODUCTION

Elementary education constitutes the primary foundation for developing high-quality, globally competitive human resources (Ghufron et al., 2024). One of the Indonesian government's key initiatives to enhance the quality of elementary education is the implementation of the Merdeka Curriculum (*Kurikulum Merdeka*), which grants

educators greater flexibility to design learning experiences that are contextual, meaningful, and student-centered (Prahastina et al., 2024). Within this curricular framework, the Science and Social Studies subject (Ilmu Pengetahuan Alam dan Sosial, IPAS) emerge as an integrated discipline combining natural science (IPA) and social studies (IPS), aimed at equipping elementary school students with the ability to holistically comprehend natural and social phenomena (Fadila & Fitriyeni, 2024). This integration is grounded in the developmental characteristics of elementary school students, who tend to perceive their surrounding environment as a unified whole, making IPAS an ideal platform for cultivating critical thinking, creativity, and environmental awareness (Rahmawati et al., 2023).

Despite its strategic goals, the implementation of IPAS instruction in elementary schools continues to face significant challenges, particularly in regions classified as remote, outermost, and underdeveloped (3T) (Komariah et al., 2023). Alfatonah et al. (2023) found that Grade IV students frequently struggle to grasp abstract IPAS concepts, especially when instruction is delivered through monotonous lecture-based methods with minimal instructional media. This situation is further exacerbated by the resource gap between urban schools and those in 3T areas, where limited infrastructure, restricted access to technology, and scarce instructional materials constitute the primary barriers to meaningful learning (Dewi & Wardani, 2020). Southwest Maluku Regency, and specifically Pulau Moa District, exemplifies such an archipelagic region, characterized by restricted transportation access and limited educational support resources.

An initial observational study conducted at Elementary School Syota, Pulau Moa District, Southwest Maluku Regency, revealed that Grade IV student learning outcomes in IPAS remained critically low, failing to meet the school's Learning Objective Achievement Criteria (KKTP). Most students exhibited passive behavior during lessons, demonstrated low enthusiasm, and encountered considerable difficulty comprehending conceptual subject matter. These observations align with Agustina et al. (2025), who concluded that low IPAS learning outcomes in elementary schools are generally attributable to monotonous teaching methods, insufficient active student engagement, and underutilization of visual media capable of bridging students' understanding of abstract IPAS concepts. Limited variation in instructional models deprives students of meaningful learning experiences, which in turn contributes directly to poor academic outcomes.

The selection of an appropriate instructional model is a critical determinant of learning quality and student achievement, with teachers, as the frontline agents of elementary education, expected to implement models that maximize active student participation (Khaira, 2026; Zulfadli et al., 2020). One cooperative learning model that has demonstrated consistent effectiveness in IPAS instruction is the Picture and Picture model—a cooperative learning strategy that uses images as its primary medium, engaging students in analyzing, sequencing, and narrating information presented through logically and systematically arranged pictures (Putri & Setiyawati, 2023; Unawekla et al., 2026). Through the activity of ordering images, students are engaged

not only visually but also cognitively and socially, rendering learning more meaningful and enjoyable.

The theoretical effectiveness of the picture-and-picture model can be explained through dual coding theory, proposed by Paivio, which posits that information presented through two cognitive channels—verbal and visual—is more readily comprehended and retained than information delivered through a single channel alone (Mengkido et al., 2026; Wooten & Cuevas, 2024). The integration of verbal and visual elements creates dual memory pathways that reinforce knowledge retention. The model is further grounded in cooperative learning principles emphasizing social interaction, positive interdependence, and individual accountability within groups (Mahmu'ddin, 2025; Mengkido et al., 2026). As such, the model simultaneously operationalizes dual-process cognitive theory and social constructivism, both highly relevant to the developmental characteristics of elementary school students within the concrete operational stage.

Previous empirical studies have consistently demonstrated the effectiveness of the Picture and Picture model in improving elementary school learning outcomes. Marbun et al. (2025) reported a significant effect of the model on IPAS learning outcomes. Agustina et al. (2025) documented an improvement in Grade V IPAS learning outcomes from a pre-test mean of 37.35 to a post-test mean of 78.38, with mastery rates rising from 11.11% to 88.89%. Through a two-cycle classroom action research, Mengkido et al. (2026) found that classical mastery improved from 25% at baseline to 100% in Cycle II, with the most significant gains observed among lower-achieving students. Putri and Setiyawati (2023) further confirmed that the interactive Picture and Picture model significantly enhanced student learning motivation in elementary science instruction.

A particularly relevant advantage of the picture-in-picture model for schools in archipelagic and 3T regions such as Elementary School Syota is its simplicity, low cost, and independence from complex technological infrastructure (Mengkido et al., 2026). The model requires only pictures that can be manually prepared by teachers yet remains capable of delivering rich visual and collaborative learning experiences, making it strategically appropriate for resource-constrained schools where digital learning is not reliably accessible. Fajariah et al. (2024) confirmed that the model significantly improved IPAS outcomes, while Nursida et al. (2024) similarly demonstrated its effectiveness in improving elementary science learning outcomes.

Despite this established body of evidence, empirical studies specifically addressing elementary schools in archipelagic 3T contexts — particularly in Southwest Maluku Regency — remain scarce. Most prior research has been conducted in urban or semi-urban settings with markedly different socio-cultural characteristics and resource availability (Mengkido et al., 2026). Given that the effectiveness of any instructional model is substantially shaped by local context, including student characteristics, geographic conditions, and the availability of educational facilities, a clear gap exists for research that examines the Picture-and-Picture model within the specific context of Elementary School Syota, Pulau Moa District, Southwest Maluku Regency. This gap constitutes the central rationale and novelty of the present study.

Accordingly, this study was guided by the following research question: To what extent, and through what instructional mechanisms, does the implementation of the Picture and Picture cooperative learning model improve Grade IV students' IPAS learning outcomes at Elementary School Syota, a 3T archipelagic elementary school? This study aims to improve the IPAS learning outcomes of Grade IV students at Elementary School Syota, through the implementation of the Picture and Picture learning model. Theoretically, this research contributes to the development of visual-based cooperative learning in elementary IPAS instruction; practically, it offers teachers an effective, contextual, and resource-appropriate instructional strategy; and at the policy level, it is anticipated to inform the development of adaptive IPAS learning policies in archipelagic and 3T school contexts across Indonesia. The remainder of this article is organized as follows: Section 2 details the research method; Section 3 presents the results; Section 4 discusses the findings in relation to prior theory and empirical literature; and Section 5 concludes with implications and directions for future research.

2. METHOD

This study employed a Classroom Action Research (CAR) design implemented in cyclical phases consisting of four sequential stages: planning, acting, observing, and reflecting. The study focused on the application of the Picture and Picture learning model as an instructional intervention to improve student learning outcomes and motivation in IPAS. The Picture and Picture model is an instructional method that uses images arranged or sequenced in a logical order, designed to stimulate active student participation throughout the learning process.

The study was conducted at Elementary School Syota, Pulau Moa District, Southwest Maluku Regency, Indonesia, over one month, from August to September of the 2024/2025 academic year. This school was selected based on the researcher's position as an active teaching staff member at the institution, which facilitated data collection and action implementation. The research subjects comprised all 12 Grade IV students of Elementary School Syota for the 2024/2025 academic year (8 male, 4 female). This class was selected as the research population based on the documented problem of low IPAS learning outcomes and motivation, which necessitated immediate instructional intervention. Given the small, intact-class population, no additional sampling procedure was applied; all members of the class participated as research subjects.

The study was implemented across two cycles, with each cycle comprising two meetings and four stages: (1) planning, (2) action implementation, (3) observation, and (4) reflection. The procedural design is illustrated in Figure 1.

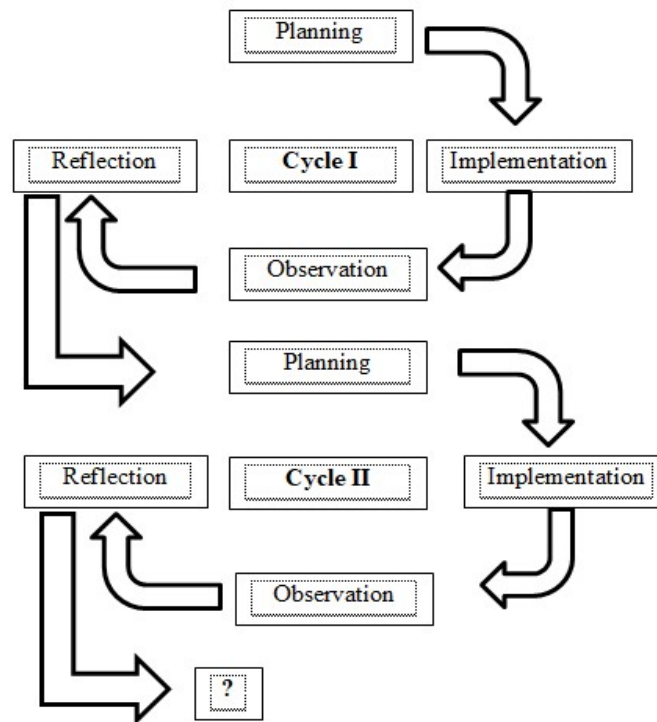


Figure 1. Research Procedure (CAR Cyclical Model)

Three data collection techniques were employed in this study:

1. Written tests. Tests were administered at the end of each cycle to measure student learning outcomes. The instruments consisted of multiple-choice and short-answer questions aligned with the learning material and instructional objectives on the topic of Indonesia's Cultural Diversity and were conducted during the final meeting of each cycle to assess the degree of learning achievement following implementation of the Picture and Picture model.
2. Observation. Classroom observations monitored implementation of the Picture and Picture model, including the teacher's instructional activities and student learning behaviors throughout the learning process. Observations were performed by an independent observer using a systematically designed observation checklist.
3. Documentation. Documentation was used to obtain supporting data, including pre-action student scores (pre-cycle), attendance records, photographs taken during the learning process, and other relevant documents, complementing information gathered through testing and observation.

Data was analyzed using quantitative descriptive analysis. Student final scores were computed using the following formula:

$$\text{Final Score} = (\text{Total Score Obtained} / \text{Total Maximum Score}) \times 100$$

Student learning outcomes were evaluated against the Learning Objective Achievement Criteria (KKTP) established by Elementary School Syota, as presented in Table 1. Classical mastery was defined as the percentage of students achieving a score of ≥ 70 , and the intervention was considered successful when classical mastery reached the pre-determined criterion of 100%.

Table 1. Learning Achievement Criteria

Minimum Mastery Criteria	Description
≥ 70	Achieved
< 70	Not Achieved

This study adhered to standard ethical principles for educational research involving minors. Permission to conduct the study was obtained from the school principal and the Grade IV homeroom teacher, and informed consent was obtained from students' parents/guardians prior to data collection. Student identities were anonymized using initials throughout data recording, analysis, and reporting, and confidentiality of individual results was maintained at all stages of the research process. Participation in supplementary learning activities carried no academic risk to students, as the Picture and Picture model was implemented as a regular component of classroom instruction.

3. RESULTS AND DISCUSSION

Results

Pre-Cycle: Initial Baseline Conditions

To establish baseline learning conditions, a pre-test was administered on August 29, 2025, at Elementary School Syota, Grade IV. The results are presented in Table 2.

Table 2. Pre-Test Results of Grade IV Students at SD Negeri Syota

Completion Category	Scoring Criteria	Number of Students	Percentage
Meets KKTP (Completed)	≥ 70	5	45.45%
Not Yet Meets KKTP (Incomplete)	< 70	7	63.63%
Total/Average Class	72,72	12	109,08%*

As shown in Table 2, only 5 students (45.45%) achieved a score of ≥ 70 and were classified as having met the KKTP, while 7 students (63.63%) scored below the mastery threshold. The class mean score was 72.72. These figures indicate that the prevailing instructional approach had not been sufficiently effective in facilitating optimal student comprehension of the IPAS material.

Cycle I Results

At the conclusion of Cycle I, an individual end-of-cycle test was administered to evaluate student comprehension of the instructional material and to measure the effectiveness of the Picture and Picture model. The results are presented in Table 3.

Table 3. Cycle I Test Results of Grade IV Students

Assessment Indicators	Pre-test	Cycle I	Improvements / Changes
Number of Students Completing	5 Students	7 Students	+2 Students
Classical Completion Percentage	45.45%	63.63%	+18,18%
Average Class Score	72.72	73.63	+0,91

Table 3 demonstrates that the number of students achieving mastery increased from 5 (45.45%) in the pre-test to 7 students (63.63%) in Cycle I, an improvement of 18.18 percentage points, while the class mean rose from 72.72 to 73.63. Although encouraging, this improvement had not yet reached the research's success indicator of 100% classical mastery. The researcher and classroom teacher therefore conducted a reflective review, identifying instructional weaknesses including suboptimal classroom management during group activities, uneven distribution of instructional pictures among students, and insufficient teacher reinforcement during the conclusion phase. These issues were addressed systematically in planning **Cycle II**.

Cycle II Results

At the conclusion of **Cycle II**, an individual end-of-cycle test was again administered to assess student knowledge acquisition and the effectiveness of the refined Picture and Picture implementation. The results are presented in Table 4.

Table 4. Cycle II Test Results of Grade IV Students

Student Score	Number of Students (f)	Percentage (%)	Status / Category
90	2	16.67%	Completed (Exceeded KKTP)
80	8	66.67%	Completed (Exceeded KKTP)
70	2	16.66%	Completed (Met KKTP)
Total	12	100.00%	Classical Mastery Achieved
Class Mean Score	85.00	—	—

Table 4 reveals that all 12 students (100%) achieved scores of ≥ 70 , with 2 students scoring 70, 8 students scoring 80, and 2 students scoring 90. The class rose substantially to 85.00. The attainment of 100% classical mastery represents an increase of 36.37 percentage points from Cycle I (63.63%), constituting a highly significant pedagogical outcome. Considering this result, the cyclical action research process was terminated following Cycle II, as the predetermined success criterion had been fully achieved.

Table 5. Summary of Learning Outcomes Progression Across Stages

Assessment Stage	Mean Score	Students Achieving Mastery	Classical Mastery (%)
Pre-Test	72.72	5 of 12	45.45%
Cycle I	73.63	7 of 12	63.63%
Cycle II	85.00	12 of 12	100%

Discussion

Baseline Conditions and the Limits of Conventional Instruction

The pre-test results established that initial IPAS learning outcomes among Grade IV students at Elementary School Syota were critically low, with only 45.45% of students meeting the KKTP threshold. This finding is consistent with Sugina and Kasmantoni (2025), who identified that low elementary school learning outcomes are generally caused by inadequate active student involvement and the inability of conventional instructional approaches to generate meaningful learning experiences, particularly for

conceptual and multicultural subject matters. The baseline condition observed in this study therefore corroborates the broader pattern documented in the 3T-region literature (Alfatonah et al., 2023; Dewi & Wardani, 2020), in which resource limitations compound the pedagogical constraints of lecture-based instruction.

Effects of Cycle I Implementation

Following implementation of the Picture and Picture model in Cycle I, student learning outcomes improved measurably, with mastery rates rising from 45.45% to 63.63% and the class mean increasing from 72.72 to 73.63. This improvement occurred because visual images enabled students to concretize the abstract concept of Indonesia's cultural diversity, rendering it more accessible and comprehensible. These findings are consistent with Gustiawan et al. (2023), who reported that the Picture and Picture cooperative model significantly influenced Grade IV student participation and learning outcomes, with visual media demonstrably increasing active engagement in the instructional process.

Nevertheless, five students (45.45%) remained unable to meet the KKTP following Cycle I. Reflective analysis conducted by the researcher and the classroom teacher identified several instructional shortcomings: suboptimal management of group learning activities, uneven access to instructional picture cards among students, and insufficient consolidation of student understanding during the conclusion phase. This reinforces the perspective of Suleman and Idayanti (2024), who demonstrated that the success of the Picture and Picture model in improving student outcomes is substantially determined by the quality of the teacher's facilitation across each instructional phase — their study documented teacher activity scores improving from 85.71% in Cycle I to 95.23% in Cycle II following systematic reflection and instructional refinement.

Effects of Cycle II Implementation and Reflective Refinement

The results of Cycle II were remarkably significant: all 12 students (100%) achieved scores of ≥ 70 , with a class mean of 85.00, an increase of 36.37 percentage points over Cycle I. This dramatic improvement is attributable to systematic refinements made based on Cycle I reflections, including strengthened scaffolding strategies, improved visual instructional materials, and enhanced formative feedback quality. These results are consistent with Siahaan and Sinday (2025), who reported an improvement in student mean scores from 67.81 (53% mastery) to 82.50 (84% mastery) through application of the Picture and Picture model in cross-cycle elementary science instruction. The cumulative pattern observed across the three assessment points — pre-test, Cycle I, and Cycle II — confirms that the CAR process functioned as an effective iterative mechanism, in which each cycle afforded an opportunity for reflection and refinement that directly improved subsequent instructional quality, mirroring the pattern reported by Handayani et al. (2024) in Grade V ecosystem instruction.

Theoretical Explanation: Visual Media and Dual Coding

The success of the Picture and Picture model in improving learning outcomes on the topic of Indonesia's Cultural Diversity is inseparable from the central role of visual media in bridging abstract concepts and students' concrete experience. Images depicting traditional attire, customary houses, and cultural practices of various Indonesian ethnic groups assisted students in constructing robust mental representations of cultural diversity, consistent with the dual-channel processing mechanism proposed by Dual Coding Theory (Wooten & Cuevas, 2024). Fitriani and Putra (2024) reinforced this finding by demonstrating that the Picture and Picture model combined with concrete visual media significantly enhanced conceptual understanding among Grade II elementary students compared to instruction without visual media. Within IPAS, which integrates natural and social science, visual media enabled students to engage with cultural diversity not merely as rote memorization but as knowledge anchored to real visual experience.

Cooperative Structure and Social Interaction

Beyond its visual dimension, the cooperative structure of the Picture and Picture model contributed significantly to learning outcome improvement. Group-based activities involving the sequencing and discussion of images fostered productive social interaction, in which students exchanged ideas, provided justifications, and collectively constructed understanding. This collaborative process activated students' zones of proximal development (ZPD), enabling higher-achieving peers to naturally support those having trouble. Wakhidah et al. (2024) affirmed that group interaction during image-sequencing activities in Picture and Picture cooperative learning for Grade IV IPAS students demonstrably contributed to improved conceptual comprehension and classical learning mastery.

Throughout the research process, a marked development in student activity and learning enthusiasm was also observed. In Cycle I, a few students remained passive and tentative during instructional activities; by Cycle II, students demonstrated greater confidence in presenting their image analysis results and articulating reasoning for selected image sequences. This heightened engagement corresponded directly to deeper conceptual understanding, aligning with Anzelina et al. (2023), who found that the Picture and Picture model effectively fostered active student involvement in elementary Pancasila and Citizenship Education, yielding sustained positive effects on learning outcomes.

Contextual Relevance for 3T Archipelagic Schools

The successful application of the Picture and Picture model at Elementary School Syota, Pulau Moa District, Southwest Maluku Regency, further underscores the model's relevance and adaptability for 3T archipelagic schools. Schools in these regions frequently face barriers to adopting technology-based instructional approaches due to limited infrastructure; the Picture and Picture model offers a practical alternative, requiring only manually prepared picture cards at minimal cost, while still delivering

high-quality visual and cooperative learning experiences. Sugina and Kasmantoni (2025) emphasized that a primary advantage of the model is its high adaptability across diverse school contexts, including those with significant resource limitations, without compromising the quality of student learning experiences. This contextual finding directly addresses the empirical gap identified in Section 1, as it extends evidence on the Picture and Picture model's effectiveness from predominantly urban and semi-urban settings to an archipelagic, resource-constrained environment.

Theoretical and Practical Implications

Theoretically, the consistent, cumulative pattern of improvement across the pre-cycle, Cycle I, and Cycle II stages provides further empirical support for the joint application of Dual Coding Theory and social constructivist principles of cooperative learning within the CAR framework, reinforcing the proposition that instructional models integrating dual-channel cognitive processing with structured peer interaction produce compounding effects across iterative cycles. Practically, the findings suggest that teachers in 3T and other resource-constrained settings can adopt the Picture and Picture model as a low-cost, readily implementable strategy for improving IPAS learning outcomes, provided that adequate attention is given to classroom management, equitable distribution of instructional materials, and structured formative feedback during the concluding phase of each lesson. At the policy level, the findings support the case for incorporating visual-based cooperative learning models into teacher training and instructional guidance for archipelagic and 3T school contexts across Indonesia.

Limitations of the Study

This study is subject to several limitations that should be considered when interpreting its findings. First, the research was conducted with a single, small intact class of 12 students at one school, which limits the statistical generalizability of the results to other schools or student populations; the findings should therefore be interpreted as context-specific evidence rather than a generalizable causal claim. Second, the CAR design, while appropriate for iterative instructional improvement, does not include a control group, making it difficult to fully isolate the effect of the Picture and Picture model from other concurrent influences such as increased teacher attention or a general practice effect across repeated testing. Third, the study assessed learning outcomes only immediately following each cycle and therefore does not provide evidence on the long-term retention of the knowledge gained. Future studies employing experimental or quasi-experimental designs with larger and more diverse samples, together with delayed post-tests, are needed to substantiate and extend these findings.

4. CONCLUSION

This study concludes that the Picture and Picture learning model constitutes an effective pedagogical intervention for improving the IPAS learning outcomes of Grade IV students at Elementary School Syota, Pulau Moa District, Southwest Maluku Regency, particularly in the context of the Diversity of Ethnic Cultures in Indonesia.

The progressive improvement in classical mastery rates — from 45.45% at pre-test to 63.63% in Cycle I, and culminating at 100% in Cycle II with a class mean score of 85.00 — provides strong empirical evidence of the model's effectiveness. This outcome was achieved through the synergistic integration of three key elements: (1) the power of visual image media in concretizing abstract cultural concepts, (2) cooperative learning principles that stimulate productive social interaction, and (3) the systematic reflective process and instructional refinement conducted between cycles. Accordingly, the Picture and Picture model has demonstrated effectiveness not only in well-resourced school environments but equally in schools operating under resource constraints in archipelagic 3T regions, establishing it as an inclusive and strategically appropriate instructional choice for IPAS teachers across Indonesia.

Future research is recommended to explore application of the Picture and Picture model in larger and more diverse school populations, to employ experimental or quasi-experimental designs to strengthen causal inferences, and to investigate the model's effectiveness across other IPAS topics and grade levels. Research is also encouraged to examine the long-term retention effects of visual-based cooperative learning on student knowledge in 3T school contexts, and to explore its integration with complementary low-cost instructional media in similarly under-resourced settings.

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