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Implementation of the Scaffolding Approach in Teaching Popular Scientific Article Writing to Eighth-Grade Students at MTsN 2 Bungo

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Abstract: Writing is a complex language skill because it requires mastery of structure, idea development, and accurate linguistic rules. In the context of the Independent Curriculum, the ability to write popular scientific articles is crucial for strengthening the literacy of junior high school (SMP/MTs) students. However, classroom learning practices still show low structural regularity and idea development due to minimal gradual guidance. This study aims to describe the implementation of the scaffolding approach in teaching popular scientific articles to eighth-grade students at MTsN 2 Bungo and identify supporting and inhibiting factors. This study used a qualitative research type with an instrumental case study design. Data were obtained through learning observations, document analysis of 32 student articles, and interviews with teachers and students. Then, they were analyzed descriptively through stages of reduction, categorization, and thematic interpretation with triangulation of sources and techniques. The results showed that scaffolding was implemented gradually through providing intensive assistance in the initial stage, simplifying tasks, providing examples and feedback, and reducing assistance (fading). Most students were able to structure texts in a more organized manner, develop ideas logically, and show improvements in linguistic aspects and writing independence. It was concluded that the scaffolding approach effectively improves the quality of the writing process and products while encouraging students' learning independence, and is relevant to the learning principles in the Independent Curriculum.

Keywords: scaffolding, popular scientific articles, Independent Curriculum, independent learning, junior high school/Islamic junior high school.

INTRODUCTION

Writing is the most complex language skill compared to other language competencies. This complexity is reflected in the demands for mastery of grammar, vocabulary, the ability to organize ideas, and critical thinking skills [1]. Writing activities enable abstract ideas to be expressed in a clear written form that can be understood by the public [2]. Therefore, writing can be regarded as a systematic thinking process to express ideas and organize them coherently so that they are easily understood by readers.

In line with this, the Kurikulum Merdeka integrates Indonesian language learning with literacy and writing skills development [3]. Writing popular scientific articles is one of the learning materials in the Indonesian language curriculum that needs to be mastered by junior secondary school students (SMP/MTs) to strengthen literacy competence [4]. However, the practice of writing instruction in schools still faces various challenges. Preliminary observations at MTsN 2 Bungo indicate that students experience difficulties in writing, particularly in organizing ideas systematically, selecting appropriate diction, and producing texts that meet the standards of popular scientific articles. Teacher-centered learning patterns result in limited step-by-step guidance, leading to relatively low writing quality. This condition is consistent with findings stating that the lack of gradual guidance negatively affects students' ability to develop ideas and text structure [5].

To address these problems, a learning approach that provides gradual support according to students' learning needs is required. One relevant approach is scaffolding, defined as temporary assistance provided by teachers to help students complete learning tasks until they achieve independence [6]. This approach

includes the stages of recruitment, reduction in degrees of freedom, direction maintenance, marking critical features, control of frustration, and demonstration, which aim to facilitate students in understanding tasks, maintaining focus, and gradually developing writing skills.

Several studies have shown that the scaffolding approach is effective in improving students' writing skills. Previous research reported that scaffolding enhances writing quality, structural organization, and students' ability to develop ideas [7], [8]. However, these studies generally focus on text types other than popular scientific articles or are conducted at different educational levels. Other studies [9], [10] have not specifically examined the implementation of scaffolding in teaching popular scientific article writing at the SMP/MTs level within the Kurikulum Merdeka context. Thus, a research gap remains regarding how gradual scaffolding assistance is implemented to foster students' learning independence in writing popular scientific articles.

Based on this gap, this study aims to describe the implementation of the scaffolding approach in teaching popular scientific article writing to eighth-grade students at MTsN 2 Bungo and to identify supporting and inhibiting factors in the gradual assistance process. This research employs a qualitative method using an instrumental case study approach. Data were collected through classroom observations, document analysis of students' popular scientific articles, and interviews with teachers and students. The findings are expected to provide empirical insights into the implementation of scaffolding aligned with the principles of the Kurikulum Merdeka and to contribute to the development of effective writing instruction strategies at the SMP/MTs level.

RESEARCHMETHOD
This study employed a qualitative research design using an instrumental case study approach. Qualitative inquiry was selected because the study aimed to obtain an in-depth understanding of how the scaffolding approach was implemented in teaching popular scientific article writing, rather than to test causal relationships quantitatively. An instrumental case study was applied because scaffolding served as the primary phenomenon under investigation, while the eighth-grade classroom context at MTsN 2 Bungo functioned as the setting through which the implementation of this approach could be examined in an authentic instructional situation.

Research Site and Participants
The study was conducted at MTs Negeri 2 Bungo during the odd semester of the 2025/2026 academic year. The participants consisted of one Indonesian language teacher and 32 eighth-grade students who were directly involved in learning activities on writing popular scientific articles. Participants were selected purposively based on accessibility, students' readiness to participate, and the suitability of the instructional context with the research focus.

Data Collection Techniques and Instruments
Data were collected through classroom observation, document analysis, and interviews. Observation was used to capture the instructional process and the implementation of each scaffolding stage. Document analysis was conducted on students' popular scientific articles to examine the relationship between gradual instructional support and the quality of students' writing. Semi-structured interviews were carried out with the teacher and selected students to explore their experiences and perceptions, as well as the supporting and inhibiting factors encountered during scaffolding implementation. The research instruments included an observation sheet based on the scaffolding syntax, an interview guide, and a document analysis protocol.

Data Analysis and Trustworthiness
Data were analyzed descriptively using qualitative procedures consistent with instrumental case study analysis, including data organization, data reduction, thematic coding based on scaffolding stages, and direct interpretation of research findings. Trustworthiness was ensured through source and technique triangulation [11] by comparing evidence obtained from observations, document analysis, and interviews to support consistency and credibility of the findings.

RESULTS AND DISCUSSION

Student Task Analysis

Document analysis was conducted on students' popular scientific articles after the implementation of the scaffolding approach. The analysis indicates variation in students' writing quality across idea development, structural organization, and language accuracy.

Table 1. Student Task Analysis

Assessment Aspect	Evidence From Student Text (Excerpt)	Dominant Related Scaffolding Syntax
Structure and Organization	Student: Fazriyah Hariani (Grade VIII-α) \nTitle: How Can Extreme Weather Be Predicted? \n"Extreme weather such as storms and floods can endanger communities if it is not predicted quickly. Scientists use advanced tools such as satellites and radar to observe atmospheric conditions. The data obtained from these tools are analyzed to identify weather patterns and predict the possibility of severe weather. This prediction greatly helps farmers anticipate crop damage and helps communities be better prepared for disasters. By knowing weather predictions, we can take earlier action for our shared safety."	Reduction in Degrees of Freedom; Direction Maintenance
Idea Development and Argumentation	"Scientists use advanced tools such as satellites and radar to observe atmospheric conditions. The data obtained from these tools are analyzed to identify weather patterns and predict the possibility of severe weather." \n(Argument supported by external information) \n"This prediction greatly helps farmers anticipate crop damage and helps communities be better prepared for disasters."	Marking Critical Features; Demonstration
Popular-Scientific Language Conventions	Uses accessible popular-scientific diction such as "extreme weather," "storms," "floods," "atmosphere," "satellite," and "radar," which fits the context and is easy for a general audience to understand. Sentences are written in a direct, informative, and persuasive manner to raise public awareness about the importance of weather forecasting.	Marking Critical Features; Control of Frustration
Independence and Originality	The article reflects independence and originality through the writer's perspective in emphasizing the importance of predicting extreme weather for public safety. Ideas are expressed in the student's own words with examples relevant to daily life, and there is no clear indication of full-text plagiarism.	Fading across scaffolding stages

Table 2. Students' Writing Outcomes

Assessment Aspect	Good (n)	Adequate (n)	Poor (n)
Structure and Organization	25	7	0
Idea Development and Argumentation	22	10	0
Popular-Scientific Language Conventions	18	14	0
Independence and Originality	22	10	0

Table 1. Student Task Analysis summarizes representative evidence from a student text and links each assessed aspect to the dominant scaffolding syntax applied. In terms of structure and organization, the sample text demonstrates a recognizable title, an introductory lead that states the problem, and supporting paragraphs explaining how extreme weather can be predicted. This suggests that the teacher's support in narrowing task complexity and maintaining direction helped students sustain a coherent structure (Reduction in Degrees of Freedom; Direction Maintenance).

For idea development and argumentation, the student provides an explanatory sequence (use of satellites and radar, analysis of atmospheric conditions, recognition of weather patterns) and connects the explanation to practical implications (helping farmers anticipate crop damage and helping communities prepare for disasters). This indicates that the scaffolding emphasis on highlighting critical writing features and providing modeling supported students in producing claims with basic supporting reasoning (Marking Critical Features; Demonstration).

With regard to popular-scientific language conventions, the text uses accessible technical terms such as "extreme weather," "storms," "floods," "atmosphere," "satellite," and "radar." Sentences are largely informative and persuasive, aiming to raise public awareness of the importance of forecasting. This aligns with scaffolding moves that draw attention to key language features while reducing anxiety during writing (Marking Critical Features; Control of Frustration).

Finally, independence and originality are reflected in the student's viewpoint emphasizing public safety and the use of everyday-relevant examples with the student's own wording. This outcome is consistent with the fading process, where instructional support is gradually withdrawn as students take greater ownership of the writing process (Fading across scaffolding stages).

Distribution of Students' Writing Performance
As shown in Table 2. Students' Writing Outcomes, most students achieved a good level in structure and organization (25 students), followed by idea development and argumentation (22 students), and independence/originality (22 students). Achievement in popular-scientific language conventions showed a wider spread, with 18 students categorized as good and 14 as adequate. No students fell into the poor category across all aspects.

Overall, Tables 1 and 2 indicate that most students were able to produce more organized popular scientific articles after the implementation of scaffolding. These findings suggest that gradual support helped students understand the stages of writing and manage the complexity of writing tasks. However, the observed variation confirms that students' independence develops progressively and is not uniform across individuals.

Implications of Scaffolding for Writing Quality and Independence
These results reinforce prior findings that scaffolding effectively improves structural organization and idea development in writing instruction [12], [13]. Nevertheless, limitations in the use of supporting evidence and precision of diction in some students' texts indicate that continued guidance is needed, particularly for content enrichment and language editing.

Beyond the written products, classroom observations also revealed a consistent pattern of teacher assistance throughout instruction. The teacher provided intensive direction, examples, and feedback at the initial stages, then gradually reduced intervention at later stages to promote students' independence in writing. The scaffolding implementation progressed from strong guidance to systematic withdrawal of support, enabling students to increasingly assume responsibility for their writing process. This supports the view that scaffolding not only improves writing quality but also develops learners' autonomy while fostering critical and reflective thinking so that emerging ideas become more focused [14].

Field notes further documented the gradual fading of teacher support. In early meetings, the teacher modeled writing components directly. Subsequently, assistance was reduced by providing step-by-step worksheets (LKPD) accompanied by an argumentation template. By the fourth meeting, students revised the title, lead, argumentation paragraphs, and concluding paragraph independently. In the fifth meeting, the teacher largely withdrew support and assigned students to conduct peer assessment using a rubric. The minimal teacher intervention and students' ability to provide rubric-based feedback indicate that learners reached a higher level of learning autonomy, suggesting that the implemented scaffolding strategy operated effectively.

Theoretical Interpretation
From a theoretical perspective, these findings emphasize that scaffolding effectiveness depends on the teacher's accuracy in providing and withdrawing support. If support is not reduced gradually, there is a risk of students becoming dependent on the teacher, as highlighted by previous work [15]. Therefore, the

success of scaffolding implementation in this study was influenced by the teacher's consistency in applying each phase of gradual assistance.

In summary, the results and discussion demonstrate that scaffolding facilitated students' popular scientific article writing through a structured, step-by-step support process. This study extends prior research by offering a more detailed description of scaffolding processes at the SMP/MTs level within the Kurikulum Merdeka context. Thus, the study contributes to the development of writing instruction strategies that emphasize process, learner autonomy, and active student engagement.

In addition, the findings confirm that implementing scaffolding in popular scientific writing instruction supports students in gradually understanding task demands—from idea planning to independent drafting. This reinforces the argument that process-oriented writing instruction is more effective than approaches focusing solely on final products [12], [15], [5]. Document analysis indicates improvements in structural organization and idea development, consistent with studies reporting that scaffolding helps learners organize ideas and reduce cognitive load in writing [13], [16]. However, variation in writing quality—particularly in depth of content and use of supporting data—suggests that scaffolding outcomes are also shaped by students' initial readiness and the intensity of teacher guidance.

Within the Kurikulum Merdeka framework, the results support the idea that scaffolding aligns with learning principles that emphasize independence and meaningful learning experiences. This approach enables students to learn according to their developmental stage while strengthening writing literacy at the SMP/MTs level [3], [9]. Therefore, this study offers empirical contributions to the development of contextual writing instruction strategies relevant to current curriculum policy.

CONCLUSION

This study demonstrates that the scaffolding approach is effective in improving both the process and the quality of learning in writing popular scientific articles through structured, gradual assistance. The approach helps students understand the stages of writing, organize ideas more systematically, and develop writing independence as teacher support is progressively reduced.

The findings address a research gap regarding the implementation of scaffolding in teaching popular scientific article writing at the SMP/MTs level within the Kurikulum Merdeka context. The novelty of this study lies in mapping an adaptive pattern of gradual assistance aligned with the principles of independent learning. Theoretically, the study reinforces the concept of scaffolding as temporary support that is dynamic and responsive to students' learning needs. Practically, it provides implications for the development of process-oriented writing instruction strategies that emphasize learner autonomy.

Based on the findings, it is recommended that teachers consistently apply scaffolding by carefully managing the stages of providing and withdrawing support in accordance with students' developmental progress. Schools are also encouraged to support teacher training in designing structured and reflective process-based writing instruction. Future researchers are advised to examine the effectiveness of this approach at different educational levels or across other text genres to broaden the generalizability of findings and enrich the body of knowledge on scaffolding-based writing instruction within the Kurikulum Merdeka framework.

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