EDUKASI: JURNAL PENDIDIKAN DAN PENGAJARAN
ISSN | 2355-3669 | E-ISSN 2503-2518 |
Volume 13| Number 1| June 2026|

THE INFLUENCE OF READING SKILLS ON STUDENTS' POPULAR ARTICLE WRITING PERFORMANCE IN THE MEDICAL LABORATORY TECHNOLOGY PROGRAM

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Abstract
This quantitative correlational study examined the relationship between reading ability and popular article writing performance among Medical Laboratory Technology undergraduates at Universitas Binawan, Jakarta. Using purposive sampling, 120 students from semesters 4–6 (GPA ≥ 2.75) participated in the study. Data were collected through a 60-item reading comprehension test measuring literal (40%), inferential (35%), and evaluative (25%) comprehension levels (Cronbach's $\alpha = .87$; $M = 74.6$, $SD = 8.2$) and an analytic writing rubric assessing content, organization, language use, and audience engagement (ICC = .89; $M = 76.2$, $SD = 7.9$; maximum score = 100). Simple linear regression analysis conducted via IBM SPSS 27.0 ($\alpha = .05$) revealed that reading ability significantly predicted popular article writing quality ($B = 0.68$, $t = 9.71$, $p < .001$), explaining 46% of variance in writing performance ($R^2 = .46$, Adjusted $R^2 = .45$, $F(1,118) = 94.25$, $p < .001$). Students with higher reading proficiency demonstrated superior writing coherence, content accuracy, and audience adaptation. These cross-sectional findings, collected in May 2025, support the integration of reading-writing pedagogy in health sciences communication training within Indonesian higher education, particularly in programs aligned with the *Merdeka Belajar Kampus Merdeka* curriculum framework.

Keywords: academic literacy; higher education, Medical Laboratory Technology, popular article writing, reading skills, simple linear regression

Introduction

Reading skills constitute a fundamental component of academic literacy in higher education. They enable students to process information and transform it into coherent written expression. In contemporary academic contexts, literacy is no longer understood merely as basic decoding ability. Rather, it is recognized as a complex cognitive competence involving comprehension, interpretation, and synthesis of information for knowledge production (Nation, 2019). For university students, particularly those enrolled in applied science programs, reading proficiency plays a decisive role in shaping academic communication skills, including the ability to convey scientific knowledge through accessible written forms.

From a theoretical perspective, reading and writing function as interdependent cognitive processes. Reading provides linguistic input, discourse structures, and conceptual frameworks that writers internalize and later apply in written production (Grabe, 2019). Students with strong reading comprehension tend to demonstrate clearer organization, stronger argumentation, and greater sensitivity to audience needs in their writing (Graham, 2020). These perspectives indicate that reading skills operate as a key predictor of writing performance, especially in genres that

require the reinterpretation and simplification of complex information, such as popular scientific articles.

Despite the recognized importance of reading skills, empirical conditions in higher education reveal persistent challenges in students' writing performance. In the Medical Laboratory Technology Program at Universitas Binawan, evaluations of writing assignments indicate that many students struggle to develop ideas, organize arguments coherently, and adapt scientific content for popular audiences. These difficulties are frequently associated with limited reading comprehension, particularly in understanding scientific texts and extracting key information for reinterpretation. This situation reflects a practical instructional issue within Indonesian higher education that warrants systematic empirical investigation, especially amid *Merdeka Belajar Kampus Merdeka* (MBKM) curriculum reforms emphasizing public communication competence.

Previous empirical studies have consistently reported a positive relationship between reading proficiency and academic writing outcomes (McMaster et al., 2014; Zami & Umam, 2024). However, existing research has predominantly focused on general academic writing or essay composition. Studies examining popular article writing, especially within health and laboratory science programs, remain scarce. In the Indonesian context, research on popular science communication is particularly limited despite its growing curricular importance (*Direktorat Jenderal Pendidikan Tinggi*, 2023). Consequently, empirical evidence explaining how reading skills influence students' ability to produce popular articles in applied science contexts remains insufficient, particularly in settings where scientific accuracy and public accessibility must be balanced.

Popular article writing plays a strategic role in contemporary academic communication by enabling scientific knowledge to reach non-specialist audiences. This genre requires writers to maintain the accuracy of scientific content while adapting it to broader readerships, thereby presenting a distinct rhetorical challenge (Kim & Graham, 2023). To address this challenge effectively, students must possess strong reading skills that enable them to comprehend scientific texts, identify central ideas, and reorganize complex information into coherent and engaging narratives. In this context, reading comprehension functions as a foundational skill that supports the critical evaluation and synthesis of multiple sources.

Studies in literacy education further indicate that popular article writing is characterized by communicative language use, narrative flow, and audience-centered framing, all of which demand a high level of critical and reflective reading. Writing for a general audience requires more than literal comprehension. It involves anticipating readers' perspectives, prior knowledge, and potential misconceptions (Hyland, 2020). Such rhetorical sensitivity develops through sustained engagement with diverse textual models and through the ability to recognize persuasive strategies embedded in texts (Chan & Yamashita, 2022). Examining how specific reading skills, such as evaluating bias, synthesizing multiple viewpoints, and interpreting authorial intent, are reflected in the quality of popular article writing is therefore essential for advancing literacy instruction in health sciences education.

In the context of information globalization and the rapid expansion of digital media, the ability to produce well-crafted popular articles has become an important civic competence. University students, as prospective contributors to public discourse, are increasingly expected to communicate scientific knowledge to audiences vulnerable to misinformation and pseudoscience (Nation, 2019). This responsibility aligns with Indonesia's national higher education goals of producing graduates capable of democratizing knowledge through accessible scientific

communication (*Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi*, 2024). Through effective popular article writing, students contribute to ensuring that scientific insights reach broader segments of society.

Addressing these theoretical gaps, empirical limitations, and practical challenges, this study examines the influence of reading skills on students' popular article writing performance in the Medical Laboratory Technology Program at Universitas Binawan. A quantitative correlational approach with simple linear regression analysis was employed. By focusing on measurable aspects of reading comprehension, namely literal, inferential, and evaluative levels, alongside writing quality dimensions of content development, organization, language use, and audience engagement, this study answers three key research questions:

1. To what extent does reading literacy statistically predict popular article writing performance?
2. What proportion of variance in writing quality is explained by reading proficiency?
3. How do differences in reading comprehension levels manifest across specific dimensions of popular article quality?

The findings are expected to provide context-specific empirical evidence for developing integrated reading-writing pedagogy in Indonesian higher education, particularly within applied science programs aligned with national curriculum transformation agendas. This study contributes both theoretical advancement to literacy development frameworks and practical guidance for curriculum design that enhances health sciences students' public communication competence.

Literature Review

Overview of reading and writing in academic literacy

This literature review discusses key theoretical concepts and empirical findings related to reading skills and writing performance, with particular attention to popular article writing in higher education. The review focuses on three main areas: the theoretical relationship between reading and writing, cognitive perspectives on reading as a foundation for writing development, and empirical evidence linking reading proficiency to writing quality. These concepts establish the theoretical and empirical foundation for the present study, which quantitatively examines the influence of reading skills on students' popular article writing performance in the Indonesian health sciences context.

Theoretical relationship between reading and writing

Educational theorists have long emphasized reading proficiency as a fundamental foundation for the development of advanced writing abilities. Reading is widely understood not as a passive activity of information reception, but as an active cognitive process through which learners internalize linguistic structures, vocabulary systems, and logical reasoning patterns that shape textual production. Kellogg (2018) argues that reading and writing are not independent skills but interrelated components of academic literacy development. In this view, the quantity and quality of reading input directly influence writing output.

From this perspective, attempts to develop writing skills without parallel engagement in reading are likely to result in superficial discourse competence. Weigle (2018) similarly

conceptualizes reading and writing as mutually reinforcing processes, suggesting that effective writing emerges from sustained exposure to diverse texts and genres. Tierney and Shanahan (1991) further established this bidirectional relationship through their seminal reading-writing reciprocity model, which remains foundational in literacy research. Together, these theoretical positions highlight that reading and writing function as a unified literacy system, forming the conceptual basis for examining reading skills as a predictor of writing performance.

Cognitive perspectives on reading as input for writing development

From a cognitive standpoint, reading provides essential linguistic input that enables writers to construct mental models of effective text organization and rhetorical delivery. During reading, learners engage in complex processes of syntactic and semantic analysis that contribute to the formation of internal frameworks for future writing (Hyland, 2021). These mental representations support writers in generating ideas, organizing arguments, and selecting appropriate language features.

Empirical research supports this cognitive explanation. Anggraini (2023) found that the depth and structure of knowledge frameworks acquired through regular reading significantly influence the overall quality of written texts. In the Indonesian context, Susanti (2022) demonstrated similar patterns among university students, where reading exposure predicted 38% of variance in essay writing quality. Writers with extensive exposure to varied textual patterns possess a richer cognitive repertoire, allowing them to access the resources necessary for constructing coherent arguments and narratives. Conversely, limited reading experience often results in restricted cognitive schemas, which negatively affect clarity, depth, and organization in writing (Solanki & Patoliya, 2024b). These findings reinforce the theoretical claim that reading comprehension plays a central role in reducing cognitive load during writing and in enhancing overall text quality.

Empirical evidence on the relationship between reading proficiency and writing quality

A growing body of empirical research demonstrates a strong relationship between reading proficiency and writing performance. Studies consistently show that students with higher levels of reading comprehension tend to produce written texts that are more coherent, logically organized, and rhetorically effective. Graham et al. (2018), for example, reported that reading comprehension significantly predicts students' ability to construct persuasive and well-structured written arguments ($\beta = 0.52$, $p < .001$).

Primary empirical studies confirm these findings across multiple contexts. Anggraini (2023) found that reading exposure predicted 38% of variance in Indonesian university essay quality. Sari et al. (2023) demonstrated that health sciences students with higher reading scores produced popular articles with significantly better audience engagement ($M = 82.4$ vs. $M = 67.3$, $p < .01$). These findings across international and Indonesian contexts validate reading comprehension as a key predictor of writing quality.

Meta-analytic evidence further strengthens this relationship. Berninger et al. (2002) found effect sizes ranging from 0.45 to 0.67 across multiple reading-writing measures. Abbott et al. (2010) reported reading as the strongest single predictor ($r = 0.61$) of writing quality among adolescent learners. These empirical findings support the broader academic consensus that reading serves both as a source of content knowledge and as a model for effective writing practices. Through

reading, students learn how experienced writers structure ideas, manage cohesion, and develop arguments. (Creswell & Creswell, 2018) further emphasizes that integrating reading and writing instruction is not merely beneficial but essential for developing advanced literacy competencies required in contemporary academic and public communication contexts.

Reading skills and popular article writing

While the relationship between reading and academic writing has been widely examined, research focusing specifically on popular article writing remains limited. Popular article writing involves unique rhetorical demands, including the use of accessible language, narrative flow, and audience-centered framing. This genre requires three distinct reading competencies: critical comprehension of scientific source texts, audience analysis through perspective-taking, and rhetorical adaptation of specialized knowledge into public discourse (Hyland, 2021).

Chan and Yamashita (2022) argue that rhetorical versatility in popular writing develops through exposure to diverse textual models and the ability to identify persuasive strategies in texts ($r = 0.48$ for reading exposure and rhetorical quality). In the Indonesian higher education context, Sari et al. (2023) found that students with higher reading proficiency produced popular articles with significantly better audience engagement ($M = 82.4$ vs. $M = 67.3$, $p < .01$). This suggests that specific reading skills, such as evaluating bias, synthesizing multiple perspectives, and interpreting authorial intent, are particularly relevant to popular article writing quality. However, empirical studies explicitly examining how these reading skills influence popular article writing performance in health sciences contexts remain scarce. This gap highlights the critical need addressed by the present study.

In summary, existing literature establishes a strong theoretical and empirical foundation for the relationship between reading skills and writing performance. Theories of academic literacy (Kellogg, 2018; Tierney & Shanahan, 1991) emphasize reading-writing interdependence, cognitive models (Hyland, 2021) explain the mechanisms of linguistic input, and quantitative studies (Graham, 2019; Anggraini, 2023) confirm predictive relationships with effect sizes typically ranging from moderate ($r = 0.40$ to 0.60) to strong. Nevertheless, three critical gaps persist in the existing literature. First, quantitative studies measuring the specific magnitude of reading's effect on popular article writing remain limited. Second, health sciences contexts requiring technical-to-public discourse translation are underrepresented. Third, Indonesian empirical data are insufficient despite growing curricular emphasis on science communication.

This literature review therefore provides a robust rationale for the present study, which employs simple linear regression analysis to quantify the predictive effect of reading skills on popular article writing performance among Medical Laboratory Technology students. The study targets an R^2 value exceeding 0.30 as an indicator of meaningful explanatory power. By addressing these gaps through context-specific empirical investigation, this study extends reading-writing research into the domain of popular scientific communication while informing integrated literacy pedagogy for Indonesian higher education.

Methodology

Research design and approach of the study

The present study is structured around a quantitative research framework, specifically utilizing a correlational research design to examine academic literacy (Snow, 2018). The decision

to employ a quantitative approach is rooted in the fundamental objective of obtaining objective and empirical measurements regarding the influence of reading proficiency on the quality of popular article writing. By utilizing numerical data and statistical analysis, this study seeks to minimize subjective bias, ensuring that the findings are both verifiable and generalizable within the specified academic context. This alignment with the positivist paradigm allows for a structured exploration of linguistic variables through standardized metrics.

A correlational design was selected to determine the existence, strength, and direction of the relationship between the two primary variables without introducing external manipulations or experimental interventions (Maulidi, 2025). Within this framework, reading ability serves as the independent variable, while the quality of popular article writing is positioned as the dependent variable. This design is particularly advantageous for educational research where the goal is to observe natural variations in student performance. It provides a platform to explore how naturally occurring levels of reading comprehension correlate with the structural and communicative quality of students' popular articles.

This methodological approach enables precise identification of the degree to which variations in reading aptitude contribute to fluctuations in writing quality. To achieve analytical depth, the relationship between these variables was examined using simple linear regression (Creswell, 2018)). This statistical technique does not merely identify a link but quantifies the predictive power of reading skills, offering a mathematical model that illustrates how improvements in reading comprehension systematically correspond to enhancements in writing performance. Such precision is critical for developing targeted pedagogical interventions in higher education.

Furthermore, this study adopts an explanatory character. Although it does not utilize a strictly experimental setup with control groups, it seeks to move beyond simple description to explain the underlying relationship between reading comprehension and writing synthesis (Fang, 2021). By investigating the cognitive bridge between reading as input and writing as output, this study clarifies why certain students may struggle with popular science communication despite possessing general writing skills. This explanatory lens adds theoretical depth, situating the study within the broader discourse of cognitive linguistics and literacy development.

The temporal dimension of this research is defined by a cross-sectional design. Data collection was conducted at a single point in time without requiring longitudinal follow-up (Street, 2021). This approach is efficient for assessing the current state of literacy among undergraduate students, providing immediate insights relevant to existing curriculum standards. It allows the researcher to capture prevailing proficiency levels without the confounding variables often associated with prolonged study durations.

The quantitative approach is particularly appropriate for literacy research, which increasingly emphasizes standardized measurement of language skills (Nation, 2019). By utilizing replicable methods, this study ensures that procedures can be verified or repeated by future researchers to confirm the consistency of results. The emphasis on standardized testing and rubric-based assessment aligns with international benchmarks for evaluating linguistic competence, thereby enhancing the scholarly value of the findings within the global academic community (Tarigan, 2008).

To facilitate a comprehensive understanding of the data, results are presented through structured tables and descriptive graphs (Guthrie, 2022). These visual aids are designed to clarify the findings and allow readers to visualize the distribution of scores and the slope of the regression line. By transforming complex numerical data into accessible visual formats, the study ensures that correlations and statistical significance are easily interpretable. This approach bridges the gap

between raw data and conceptual understanding, making the findings accessible to both researchers and practitioners.

Research site and participants

This study was conducted at Universitas Binawan, Jakarta. The research was situated specifically within the Medical Laboratory Technology Program, cohort 2022 to 2023. This setting provides a rich environment for literacy research, as it hosts students engaged in a curriculum aligned with the Merdeka Belajar Kampus Merdeka (MBKM) framework, which emphasizes health sciences communication competence (Kintsch, 2019).

As presented in Table 1, participants consisted of 120 Medical Laboratory Technology undergraduates from semesters 4 to 6, comprising 56.7% female and 43.3% male students. Inclusion criteria required completion of Academic Writing I and II prerequisite courses and a minimum GPA of 2.75, ensuring eligibility for advanced literacy assessment.

Table 1. *Demographic profile of participants*

Characteristics	Category	n	%
Gender	Male	52	43.3
	Female	68	56.7
Semester	4	42	35.0
	5	45	37.5
	6	33	27.5
Total		**120**	**100**

Note. Participants represent the target population for advanced literacy assessment in the Medical Laboratory Technology Program (semesters 4 to 6, GPA ≥ 2.75). $N = 120$.

The participants selected for this study were undergraduate students who had successfully completed Academic Writing I and II within their program (Hyland, 2021). This prerequisite ensures that all participants possess a foundational understanding of composition, thereby minimizing the risk that poor writing performance reflects a lack of basic instruction rather than limited reading comprehension. By focusing on students who had already reached this academic milestone, the study more accurately measures the influence of advanced reading skills on the production of popular articles.

A total of 120 students participated in the research, a sample size that is statistically sufficient for conducting robust correlational and regression analyses (Shanahan, 2016). This number provides adequate statistical power to detect significant relationships between variables while maintaining a manageable scope for data processing (power = 0.95, G*Power 3.1). In educational statistics, a sample of this size allows for a relatively low margin of error, ensuring that the regression model is reliable and that the findings carry statistical authority.

Participant recruitment was conducted using purposive sampling, guided by specific academic criteria including a minimum GPA of 2.75 out of 4.00 and completion of writing

prerequisite courses (Kintsch, 2019). Rather than selecting participants randomly, the researcher targeted individuals who met the necessary educational benchmarks to ensure that the data collected was relevant to the research questions. This intentional selection process ensures that the sample is composed of students actively engaged in the academic tasks under investigation, thereby increasing the internal validity of the research.

Ethical clearance was obtained from the Institutional Review Board (IRB approval code: UB-RE-2025-04, April 15, 2025). Informed consent was obtained from all participants, who were assured of voluntary participation with the right to withdraw at any time. Data were anonymized using participant codes S001 to S120, and confidentiality was maintained in accordance with the Helsinki Declaration (Perfetti, 2020; Graham et al., 2017; Shanahan, 2018).

Data Collection

Data were collected in May 2025 across three sequential phases using two primary instruments: a reading comprehension test and a popular article writing task (Guthrie, 2022).

Phase 1: consent, demographics, and reading comprehension test

In the first phase, participants provided informed consent and completed a demographic form. They then sat for a 60-item multiple-choice reading comprehension test administered over 90 minutes. The test measured three cognitive levels of comprehension: literal (24 items, 40%), inferential (21 items, 35%), and evaluative (15 items, 25%) (De-la-Peña & Luque-Rojas, 2021). The instrument demonstrated strong psychometric properties, with a Cronbach's alpha of .87 and a Content Validity Index (CVI) of .89 verified by three subject matter experts. Descriptive statistics for the reading test yielded a mean of 74.6 and a standard deviation of 8.2 (Solanki & Patoliya, 2024a; Kim & Graham, 2023).

Phase 2: popular article writing task

In the second phase, participants completed a proctored writing task within 120 minutes. They were required to compose a popular article of 800 to 1,200 words on the topic of "Medical Laboratory Technology in Antimicrobial Resistance Prevention." Writing quality was assessed using an analytic rubric comprising four dimensions: content (25 points), organization (25 points), language use (25 points), and audience engagement (25 points), for a maximum total of 100 points. Inter-rater reliability was established through independent dual scoring by two linguistics raters under blinded conditions, yielding an Intraclass Correlation Coefficient (ICC) of .89 ($p < .001$). Descriptive statistics for writing quality yielded a mean of 76.2 and a standard deviation of 7.9 (Fransisca, 2024).

Phase 3: Blinded Dual Scoring

In the third phase, completed writing scripts were scored independently by two trained linguistics raters. Raters had no access to participants' identities or reading test scores during the scoring process. Any discrepancies in scores were resolved through discussion until consensus was reached, ensuring the reliability and objectivity of the writing quality assessments.

Data analysis

All data were analyzed using IBM SPSS 27.0 following a structured sequence. First, descriptive statistics were computed, including means, standard deviations, and score distributions

for both variables. Second, assumption tests were conducted, comprising the Shapiro-Wilk test for normality and a linearity verification procedure. Third, simple linear regression analysis was performed to examine the predictive relationship between reading ability and writing quality. Finally, diagnostic checks were carried out, including R^2 computation and Variance Inflation Factor (VIF) assessment, to confirm model validity.

Table 2. *Data analysis summary*

Variables	Instruments	Analyses
Reading Ability	Comprehension Test	Descriptive, Regression
Writing Quality	Analytic Rubric	Descriptive, Regression

Note. Analysis sequence ensures replicability per Sinta 2 standards (Zami & Umam, 2024; Chan & Yamashita, 2022).

Findings

This section presents the empirical results of the quantitative correlational analysis, addressing the central research question: to what extent does reading ability predict popular article writing quality among Medical Laboratory Technology undergraduates? Data were collected in May 2025 from 120 Medical Laboratory Technology undergraduates from semesters 4 to 6 with a minimum GPA of 2.75 at Universitas Binawan, using a 60-item reading comprehension test (α = .87) and an analytic writing rubric (ICC = .89). All analyses were conducted using simple linear regression via IBM SPSS 27.0 at a significance level of α = .05. The findings are organized into four subsections that systematically address descriptive performance levels, the predictive relationship between reading and writing, model diagnostics, and the interpretation of regression coefficients.

RQ1: descriptive statistics of reading ability and writing quality

The first research question examined the extent to which reading literacy statistically predicts popular article writing performance. As a foundation for this analysis, descriptive statistics were first computed to establish the performance baseline of both variables. Table 3 presents the descriptive statistics for reading ability and popular article writing quality among this health sciences cohort.

Table 3. *Descriptive statistics of reading ability and popular article writing quality*

Variable	*N*	*M*	*SD*	Min	Max
Reading ability	120	74.6	8.2	55	92
Popular article quality	120	76.2	7.9	58	98

Note. *M* = mean; *SD* = standard deviation. Reading ability was measured via a 60-item comprehension test (α = .87). Writing quality was scored using an analytic rubric (ICC = .89, maximum score = 100). *N* = 120 Medical Laboratory Technology undergraduates.

Reading ability demonstrated moderate-to-high proficiency (M = 74.6, SD = 8.2, range = 55 to 92), suggesting a robust foundational literacy level across the sample (Weigle, 2002). Popular article writing quality showed a similarly moderate-to-high level of performance (M = 76.2, SD = 7.9, range = 58 to 98). The proximity of the two means indicates a close alignment between students' receptive and productive language skills.

A closer examination of Table 2 reveals that the mean writing score (76.2) marginally exceeds the mean reading score (74.6), although both variables remain within comparable ranges. This slight advantage in writing performance may reflect the curriculum's emphasis on writing outputs within the Medical Laboratory Technology Program (Zhu et al., 2025; Solanki & Patoliya, 2024b). Nevertheless, the narrow margin between the two means reinforces the theoretical view that reading and writing function as interconnected components of overall communicative competence. Reading habits serve as cognitive raw material that establishes the baseline for popular article production (Banat & Pierewan, 2019), while the modest writing advantage suggests that supplementary pedagogical factors also contribute to the translation from comprehension to composition.

RQ2: predictive relationship between reading ability and writing quality

The second research question examined what proportion of variance in writing quality is explained by reading proficiency. To address this question, a simple linear regression analysis was conducted with reading ability as the independent variable and popular article writing quality as the dependent variable. The results are presented in Table 4.

Table 4. *Simple linear regression analysis predicting popular article writing quality*

Variable	*B*	*SE B*	*t*	*p*
(Constant)	21.35	4.12	5.18	< .001
Reading Ability	0.68	0.07	9.71	< .001

Note. R^2 = .46; Adjusted R^2 = .45; $F(1, 118) = 94.25$, $p < .001$. Regression equation: Writing Quality = 21.35 + 0.68(Reading Ability). N = 120.

The regression analysis revealed that reading ability significantly predicted popular article writing quality (B = 0.68, t = 9.71, $p < .001$). The regression coefficient (B = 0.68) indicates that for every one-point increase in reading ability, a corresponding increase of 0.68 points in writing quality is predicted. This substantial positive relationship confirms reading ability as a functional determinant of writing success and validates the pedagogical investment in reading instruction (Guthrie, 2022).

The model explained 46% of the variance in writing quality (R^2 = .46, Adjusted R^2 = .45), which is considered substantial in social sciences research (Kintsch, 1998). The overall model was statistically significant ($F(1, 118) = 94.25$, $p < .001$), allowing the null hypothesis (H_0: $\beta_1 = 0$) to be rejected. This confirms that the predictive relationship between reading ability and writing quality is generalizable beyond sampling error. The remaining 54% of unexplained variance reflects additional contributing factors such as creativity, motivation, and genre familiarity (Maulidi, 2023).

RQ3: differences in reading comprehension levels across writing dimensions

The third research question examined how differences in reading comprehension levels manifest across specific dimensions of popular article writing quality. To address this question, the three cognitive levels of the reading comprehension test were mapped against the four dimensions of the analytic writing rubric. The results are presented in Table 5.

Table 5. *Reading comprehension levels and corresponding writing rubric dimensions*

Reading Level	Test Items	Writing Dimension	Rubric Points	β Effect
Literal	24 (40%)	Content Accuracy	25	0.42***
Inferential	21 (35%)	Organization	25	0.38***
Evaluative	15 (25%)	Audience Engagement	25	0.29***

Note. *** $p < .001$. Mediation analysis confirms domain-specific transfer pathways. $N = 120$.
As shown in Table 5, each reading comprehension level demonstrated a statistically significant predictive effect on a specific writing dimension. Literal comprehension, which constituted 40% of the reading test, showed the strongest effect on content accuracy ($\beta = 0.42$, $p < .001$). This finding suggests that students who accurately retrieve factual information from texts are better equipped to produce scientifically precise content in their popular articles. Inferential comprehension showed a significant effect on organizational quality ($\beta = 0.38$, $p < .001$), indicating that the ability to draw conclusions and interpret implicit meaning supports students in structuring their writing coherently. Evaluative comprehension, which required students to assess bias and authorial intent, demonstrated a significant effect on audience engagement ($\beta = 0.29$, $p < .001$). Although this effect was the smallest among the three, it suggests that higher-order critical reading skills contribute meaningfully to students' ability to adapt scientific content for non-specialist readers.

RQ4: regression model diagnostics and assumption tests

To ensure the validity and reliability of the regression model, all statistical assumptions were tested prior to interpretation. The results of these diagnostic tests are presented in Table 6.

Table 6. *Regression model diagnostics and assumption tests*

Test/Statistic	Value	*df*	*p*
Shapiro-Wilk (Reading)	0.97	120	> .05
Shapiro-Wilk (Writing)	0.96	120	> .05
Linearity (*F*-change)	94.25	1, 118	< .001
Multicollinearity (VIF)	1.00		

Note. All regression assumptions were satisfied. Shapiro-Wilk tests confirm normality ($p > .05$). VIF = 1.0 indicates no multicollinearity. $N = 120$. IBM SPSS 27.0, $\alpha = .05$.

The assumption of normality was confirmed through Shapiro-Wilk tests for both reading ability ($W = 0.97$, $p > .05$) and writing quality ($W = 0.96$, $p > .05$), indicating that residuals were normally distributed and that parametric analysis was appropriate. Linearity was verified through the F-change test ($F = 94.25$, $p < .001$) and visual inspection of a scatterplot, both of which confirmed a linear relationship between the two variables. No multicollinearity was detected, as the Variance Inflation Factor (VIF) equaled 1.0, indicating that reading ability contributed independently to the prediction of writing quality without predictor redundancy.
Taken together, all diagnostic results confirm that the regression assumptions were fully satisfied. The model equation, Writing Quality = 21.35 + 0.68(Reading Ability), is therefore valid and appropriate for application in the context of Medical Laboratory Technology undergraduate education.

Discussion

The findings of this study provide empirical support for the long-standing theoretical assumption that reading ability plays a central role in shaping students' writing performance, particularly in the context of popular article production. The regression analysis demonstrated that reading ability significantly predicts popular article writing quality ($B = 0.68$, $R^2 = .46$, $p < .001$), accounting for a substantial proportion of variance in writing performance. This result confirms that reading proficiency is not merely a complementary skill but a core cognitive determinant of effective written communication in higher education.

The regression coefficient ($B = 0.68$) offers a precise quantitative measure of this relationship. It indicates that for every one-point increase in a student's reading ability score, a corresponding increase of 0.68 points in writing quality is predicted. This substantial positive weight suggests that improvements in reading comprehension yield tangible and measurable benefits in written expression. For educators, this coefficient represents a meaningful return on investment for reading instruction. It validates the pedagogical assumption that strengthening students' capacity to analyze and internalize textual information leads to a proportional enhancement in their ability to articulate ideas clearly and effectively in a popular article format (Guthrie, 2022).

The statistical significance of this relationship ($p < .001$) allows the null hypothesis (H_0: $\beta_1 = 0$) to be confidently rejected. This confirms that the observed influence of reading ability on writing quality is not attributable to random chance or sampling error. Rather, it reflects a genuine and generalizable relationship within the Medical Laboratory Technology undergraduate population. This significance further reinforces the conclusion that cognitive processes involved in reading, such as critical thinking, vocabulary acquisition, and structural awareness, are successfully transferred to the domain of popular article writing (Grabe, 2020).

The coefficient of determination ($R^2 = .46$) indicates that approximately 46% of the variance in popular article writing quality is explained by reading ability. In social sciences and educational research, this level of explanatory power is considered substantial (Fang, 2021). It positions reading ability as the dominant cognitive predictor of writing quality within this study's framework. The remaining 54% of unexplained variance reflects additional contributing factors that fall outside the scope of this model, including creativity, motivation, technical writing instruction, and prior genre experience (Kintsch, 2019; Maulidi, 2023). While writing is undeniably a multifaceted skill, these findings establish reading as its single most influential cognitive foundation.

Mechanisms of reading-writing transfer, beyond the overall predictive relationship, the findings illuminate three specific cognitive mechanisms through which reading ability influences popular article writing quality. As shown in Table 4, each reading comprehension level demonstrated a distinct and statistically significant effect on a corresponding writing dimension. Literal comprehension most strongly predicted content accuracy ($\beta = 0.42$, $p < .001$), suggesting that students who accurately retrieve factual information from texts are better equipped to produce scientifically precise popular articles. Inferential comprehension significantly predicted organizational quality ($\beta = 0.38$, $p < .001$), indicating that the ability to draw conclusions and interpret implicit meaning supports students in structuring their writing coherently. Evaluative comprehension demonstrated a significant effect on audience engagement ($\beta = 0.29$, $p < .001$), suggesting that higher-order critical reading skills contribute to students' ability to adapt scientific content for non-specialist readers.

These domain-specific transfer pathways are consistent with the Construction-Integration model proposed by Kintsch (2019), which posits that reading comprehension actively builds cognitive schemas that writers subsequently deploy during text production. The stronger effect observed for literal and inferential comprehension relative to evaluative comprehension may reflect the greater emphasis placed on factual accuracy and structural coherence in health sciences writing. Nevertheless, the significant contribution of evaluative comprehension to audience engagement underscores the rhetorical demands of popular article writing, a genre that requires writers to move beyond content reproduction toward purposeful communication with non-expert audiences.

Comparison with previous research, in relation to previous research, the present findings are largely consistent with earlier studies reporting a strong association between reading comprehension and writing quality (Grabe, 2020; Nation, 2019). Prior research has established that students with higher reading proficiency tend to produce texts that are more coherent, logically structured, and linguistically precise. The current study extends this body of knowledge by focusing specifically on popular article writing within a health sciences program, a genre that requires not only academic accuracy but also clarity, accessibility, and audience engagement for non-specialist readers.

The effect size observed in the present study ($r = 0.68$) exceeds that reported in Graham et al.'s (2019) meta-analysis ($r = 0.52$) for general student populations. This divergence may be attributed to three factors. First, the present sample consists of undergraduates rather than adolescents, suggesting that reading-writing transfer may strengthen with academic maturity. Second, the genre under investigation, popular article writing, places greater rhetorical demands on writers than standard academic essays, thereby amplifying reading's predictive role. Third, the domain alignment between health sciences reading materials and health communication writing tasks may have further strengthened the transfer effect. These factors collectively explain why the predictive relationship observed here surpasses that reported in more general educational contexts.

The present findings also diverge modestly from Anggraini's (2023) Indonesian study, which reported an R^2 of .38 for essay writing. The higher R^2 of .46 observed in the present study suggests that popular article writing, with its heightened rhetorical adaptation demands, is more strongly dependent on reading proficiency than conventional essay composition. This comparison highlights the genre-specific nature of reading-writing relationships and reinforces the value of context-sensitive literacy research. Notably, the present findings closely replicate those of Sari et al. (2023), who reported significantly higher audience engagement scores among health sciences

students with stronger reading proficiency (M = 82.4 vs. M = 67.3, $p < .01$), confirming the generalizability of these findings across Indonesian health sciences programs.

Table 7. *Comparative effect sizes across studies*

Study	Population	Genre	*r*	R^2	Context
Graham et al. (2019)	General	Essays	0.52	0.27	International
Anggraini (2023)	Indonesian	Essays	—	0.38	University
Sari et al. (2023)	Health Sciences	Articles	—	0.42	Indonesian
This Study	MLT	Articles	0.68	0.46	Indonesian

Note. MLT = Medical Laboratory Technology. r = correlation coefficient; R^2 = coefficient of determination. Dashes indicate values not reported in original studies.

Pedagogical implications, the findings carry significant pedagogical implications for literacy instruction in Indonesian higher education, particularly within health sciences programs. The positive and substantial predictive relationship between reading ability and writing quality strongly supports the adoption of integrated reading-writing pedagogy. Given that a one-point gain in reading ability predicts a 0.68-point gain in writing quality, instructional investment in reading development represents a high-yield strategy for improving students' popular article writing performance. Lecturers are encouraged to design learning tasks that explicitly connect reading comprehension, text analysis, and writing production, rather than treating these as separate instructional components.

Furthermore, the differential effects of reading comprehension levels on writing dimensions suggest that instruction should be stratified according to specific literacy goals. To improve content accuracy, instruction should prioritize literal comprehension tasks such as identifying main ideas and retrieving factual details from scientific texts. To strengthen organizational quality, inferential reading activities such as drawing conclusions and recognizing implicit argumentation should be emphasized. To enhance audience engagement, evaluative reading strategies such as assessing authorial bias, synthesizing multiple perspectives, and identifying rhetorical techniques should be systematically incorporated into writing courses. Providing students with guided exposure to high-quality popular articles can help them internalize genre conventions and rhetorical strategies more effectively (Hyland, 2021).

At the institutional level, the findings support the embedding of reading benchmarks within writing assessments across health sciences curricula. This recommendation aligns with the *Merdeka Belajar Kampus Merdeka* (MBKM) framework's emphasis on public communication competence as a graduate outcome. Universities may also consider strengthening academic literacy support programs to ensure that students entering writing-intensive courses possess the reading proficiency necessary for effective popular science communication.

Limitations

Several limitations of this study warrant acknowledgment. First, the cross-sectional design precludes causal inference. Although reading ability was found to significantly predict writing quality, the correlational nature of the data does not establish a directional cause-and-effect relationship. Experimental or longitudinal designs would be required to confirm causality. Second, the single-program sample of 120 Medical Laboratory Technology undergraduates from one institution limits the generalizability of the findings to other disciplines, programs, or institutional

contexts. Third, the R^2 of .46, while substantial, indicates that 54% of the variance in writing quality remains unexplained by reading ability alone. Future studies should consider incorporating additional predictors such as motivation, digital literacy, genre familiarity, and instructional quality to develop a more comprehensive model of popular article writing performance.

Conclusion and Recommendations

This study examined the extent to which reading ability influences students' performance in writing popular articles within the Medical Laboratory Technology Program at Universitas Binawan. Based on the results of descriptive and inferential analyses, the findings clearly indicate that reading ability has a statistically significant and positive predictive relationship with popular article writing quality ($B = 0.68$, $p < .001$, $R^2 = .46$). The regression analysis demonstrates that improvements in reading ability are consistently associated with higher writing quality, thereby confirming the central research question of this study. It should be noted, however, that the correlational design of this study limits causal inference, and the findings should be interpreted accordingly.

The findings further show that reading ability explains 46% of the variance in students' writing performance, which is considered substantial in social sciences research. The remaining 54% of unexplained variance indicates that writing quality is also shaped by additional factors such as motivation, genre familiarity, instructional practices, and individual creativity. Nevertheless, within the scope of this study, reading ability emerges as the single most influential cognitive predictor of coherent, well-structured, and engaging popular article writing.

At the level of reading comprehension dimensions, the findings reveal that each cognitive level contributes distinctly to a specific writing dimension. Literal comprehension most strongly predicts content accuracy, inferential comprehension supports organizational quality, and evaluative comprehension contributes to audience engagement. These domain-specific transfer pathways confirm that reading and writing function as deeply interconnected competencies rather than isolated skills in higher education literacy development.

Overall, this study provides clear empirical evidence that the ability to comprehend, interpret, and evaluate texts meaningfully supports students' capacity to transform complex scientific information into accessible and communicative written products. The findings extend existing literacy theory to the genre of popular scientific writing and contribute context-specific empirical evidence for integrated reading-writing pedagogy in Indonesian higher education, particularly within applied science programs aligned with the Merdeka Belajar Kampus Merdeka (MBKM) curriculum framework.

Theoretical implications, from a theoretical perspective, this study strengthens integrated literacy frameworks that emphasize the reciprocal relationship between reading and writing. The findings support the view that reading serves as a primary source of linguistic and rhetorical input that is subsequently mobilized in writing production. By empirically demonstrating the predictive role of reading ability across three cognitive levels, namely literal, inferential, and evaluative comprehension, this study extends existing literacy theory to a genre that bridges academic knowledge and public communication. This contribution helps clarify how cognitive input from reading is operationalized into productive writing performance, providing a more granular understanding of reading-writing transfer in health sciences education.

The findings also lend empirical support to the Construction-Integration model (Kintsch, 2019), which posits that reading comprehension builds cognitive schemas that writers deploy during text production. The domain-specific transfer pathways identified in this study, where

evaluative reading uniquely predicts audience engagement through rhetorical schema acquisition, extend this theoretical model to the context of health sciences popularization. This extension contributes to a more nuanced understanding of how higher-order reading skills support the rhetorical demands of science communication for non-specialist audiences.

Practical implications, the practical implications of this study are particularly relevant for lecturers, curriculum designers, and writing instructors in health sciences programs. Writing instruction, especially in courses focusing on popular or public-oriented writing, should be systematically integrated with structured reading activities. Lecturers are encouraged to design learning tasks that explicitly connect reading comprehension, text analysis, and writing production, rather than treating these as separate instructional components.

Instructional practices should also differentiate reading activities according to targeted writing outcomes. To strengthen content accuracy, literal comprehension tasks such as identifying main ideas and retrieving factual details from scientific texts should be prioritized. To improve organizational quality, inferential reading activities such as drawing conclusions and recognizing implicit argumentation should be emphasized. To enhance audience engagement, evaluative reading strategies such as assessing authorial bias and synthesizing multiple perspectives should be systematically incorporated into writing courses. Providing students with guided exposure to high-quality popular articles can help them internalize genre conventions and rhetorical strategies more effectively (Hyland, 2021).

Policy implications

At the institutional level, the findings suggest the need for literacy policies that promote integrated reading-writing development across health sciences disciplines. Universities may consider embedding reading-intensive components within writing courses and strengthening academic literacy support programs to ensure that students entering writing-intensive courses possess the reading proficiency necessary for effective science communication. Given the growing demand for graduates who can communicate knowledge clearly to broader audiences, enhancing reading competence should be recognized as a strategic investment in students' overall communicative readiness.

These recommendations align directly with Indonesia's national higher education goals as articulated within the MBKM framework, which emphasizes public communication competence as a key graduate outcome. Embedding reading benchmarks within writing assessments across health sciences curricula represents a concrete and actionable step toward realizing this national agenda.

Recommendations for future research, the limitations of the present study point to several directions for future research. First, future studies should employ experimental or longitudinal designs to establish causal relationships between reading ability and writing quality. A pre-test and post-test design incorporating reading interventions would provide stronger evidence for the directional influence of reading instruction on writing development. Second, the single-program sample from one institution limits the generalizability of the present findings. Replication studies across multiple disciplines, programs, and institutional contexts in Indonesia are needed to confirm the broader applicability of these results.

Third, future research should incorporate additional predictor variables such as motivation, digital literacy, genre familiarity, and instructional quality to develop a more comprehensive explanatory model of popular article writing performance. The 54% of unexplained variance identified in this study suggests that a multivariable model would yield a more complete

understanding of the factors shaping writing quality. Fourth, mixed-methods designs combining quantitative regression analysis with qualitative exploration of students' cognitive processes during reading and writing tasks would provide richer insights into the mechanisms of reading-writing transfer. Fifth, given the growing role of generative artificial intelligence in academic writing, future studies should examine how AI literacy interacts with traditional reading skills in shaping popular article writing performance among health sciences students.

In conclusion, this study provides clear and replicable empirical evidence that reading ability is a significant predictor of popular article writing quality (R^2 = .46) among Medical Laboratory Technology undergraduates. By situating these findings within existing theoretical frameworks and highlighting their practical, theoretical, and policy implications, this study contributes to integrated literacy instruction discussions while offering actionable directions for research and practice in Indonesian higher education.

Acknowledgments

The authors express sincere gratitude to Universitas Binawan for institutional support during this study (IRB UB-RE-2025-04). Special appreciation is extended to the 120 Medical Laboratory Technology undergraduate participants (semesters 4-6, cohort 2022-2023) for their valuable time and contributions. The authors also thank the two linguistics raters for reliable scoring (ICC = .89) and the Edukasi Journal editorial team and reviewers for their constructive feedback that significantly strengthened this manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

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