



AT THE CRUX OF THE MATTER: ENHANCEMENT OF RESEARCH WRITING SKILLS OF HIGH SCHOOL STUDENTS

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Abstract

Research competency is a vital 21st-century skill that enhances students' cognitive growth and scientific thinking. This study determined the level of Grade 11 students' competence in writing research introductions and the factors affecting their performance. Using a sequential explanatory mixed-method design, quantitative data from 71 Practical Research 1 groups across ABM, STEM, HUMSS, HE, and ICT strands in Saint Louis College were analyzed, followed by interviews with 10 students. Results showed an Approaching Proficient level, with TVL students scoring lower than Academic Track students. Cognitive, linguistic, and external factors influenced performance, leading to the development of a research writing workbook.

Keywords: *Practical Research, Research Introduction, Research Writing Skills, Research Writing Workbook, Senior High School*

INTRODUCTION

Research competency is a crucial 21st-century skill that equips students with critical thinking, creativity, communication, and problem-solving abilities necessary for academic and professional success. It fosters cognitive growth and enables learners to transform knowledge into meaningful action. As emphasized by Marushkevych et al. (2022), developing research competence remains an urgent priority for future specialists navigating complex, interdisciplinary environments.

Despite the recognized importance of research writing, many students continue to face persistent challenges in developing their research skills. In South Africa, for instance, students often struggle with designing studies and formulating coherent research questions, partly due to limited methodological training and insufficient guidance in academic writing (Moloi & Tait, 2020). In Spain, research indicates that learners face difficulties in generating hypotheses and conducting systematic data analysis, with gaps in both statistical



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literacy and critical thinking skills hindering their overall research performance (Peneda & Caidoy, 2023). Similarly, in China, students frequently encounter challenges in experimental design and interpreting research findings, which are exacerbated by restricted access to academic resources, such as scholarly articles, research databases, and laboratory equipment, limiting the depth and rigor of their investigations (Chen & Wang, 2020). Across these diverse contexts, common barriers ranging from inadequate methodological preparation to limited resource availability impede students' ability to conduct high-quality research, highlighting the need for more targeted instruction, structured support, and enhanced access to research tools to improve research writing competence globally.

Language proficiency is another major barrier. Non-native English speakers, such as students in the United Kingdom, struggle with academic writing conventions, vocabulary, and clarity of argument (Patel & Zhang, 2022). Similar issues are reported in the Philippines, where limited vocabulary and weak language control affect overall writing quality and confidence (Dela Cruz & Abarquez, 2021).

In response, the Department of Education integrated Practical Research 1 and 2 as applied subjects into the K–12 curriculum to strengthen research skills in senior high school. Moreover, to improve the academic writing of students, a competency was incorporated in the subject, Reading and Writing Skills (core subject). This requires senior high school students to identify properties of a well-written text: a) organization; b) coherence and cohesion; c) language use; d) mechanics (EN11/12RWS-IIIgh-4); and unity. These properties of well-written text are essential for students to compose a clear, effective, and academically sound written work.

Organization ensures logical arrangement of ideas, guiding readers clearly from background to thesis (Lunsford & Connors, 2020). Coherence and cohesion promote smooth flow and clear connections between ideas, making arguments persuasive and comprehensible (Swales & Feak, 2022). Language use requires appropriate academic tone and vocabulary, while mechanics focus on grammar, punctuation, and technical accuracy (Noori, 2020). Unity, meanwhile, ensures that all parts of the introduction contribute to a single central idea, preventing digressions and confusion (Hutchinson, 2020). Together, these elements determine the clarity, credibility, and effectiveness of academic writing.

The study is grounded in Cognitive Writing Theory by Flower and Hayes (2015), which views writing as a complex, recursive problem-solving process influenced by limited working memory. It also draws from Transactive Theory by Bawarshi and Reiff (2016) and Sociocultural Writing Theory of Prior (2006), emphasizing that writing development is shaped by social interaction, audience awareness, scaffolding, and cultural context.

Related studies reveal specific issues in each property of well-written text. In terms of organization, students struggle with structuring essential research components such as problem statements, hypotheses, and methodological design, resulting in poorly sequenced introductions (Villarin, 2023; Fernández et al., 2022; Tiu, 2020). Problems in coherence and cohesion also arise from weak transitions, ambiguous pronoun references, and inconsistent verb tenses that disrupt logical flow (Reyes & Santos, 2020; Dela Cruz & Espiritu, 2021). In terms of language use, limited vocabulary and difficulty applying formal academic register hinder students' ability to articulate complex arguments clearly (Patel & Zhang, 2022; Callora & Puñas, 2023). Moreover, recurring errors in mechanics, including subject-verb disagreement and punctuation misuse, reduce clarity and weaken the credibility of research introductions (Reyes & Santos, 2020). Lastly, regarding unity, many learners present ideas that lack clear connection to a central research focus, often due to disengagement or unclear research rationale (Carreon, 2020; Ramos & Nacion, 2021). These issues collectively demonstrate the need for focused intervention in research introduction writing.

Similar issues were observed at Saint Louis College in City of San Fernando, La Union. Grade 11 students are taking their Practical Research 1 course during the second semester of the School Year 2024-2025. Students are required to write qualitative type of research in groups. However, challenges in each group are anticipated as Grade 11 students are mixture of Junior High School completers of Saint Louis College and transferees who came from different schools. These transferee students may have low self-esteem due to lack of exposure to research, which later on can affect to their writing of research output.

Further, even though former students are products of the same institution, they still differ as SLC Junior High School run two divisions – Science High School and Regular High School. Former students from Regular High School had an experience in writing

research but it is only limited to the background of the study, as a requirement in their English subject. On the other hand, former students from Science High School, who had taken a research elective subject, had involvement in writing a full-blown research paper, specifically an investigatory project. So, these students do not share the same experience and exposure to research writing, which can be a factor that can aggravate their research introduction writing process. With that, it is necessary to be at the “crux of the matter”, which means getting to the most important, central, or essential point of a problem, issue, or argument that can be used to simplify the complex issue.

Given these concerns, the study focuses on Given these concerns, the study focuses on assessing Grade 11 students’ competence in writing research introductions in terms of organization, unity, coherence and cohesion, language use, and mechanics; and identifying factors affecting their performance to inform targeted interventions for skill enhancement.

RESEARCH METHOD

This study employed a mixed-methods approach, specifically an explanatory sequential design, where quantitative data were collected and analyzed first, followed by qualitative data to explain and deepen the statistical results (George, 2021). This design allowed the researcher to measure Grade 11 students’ research writing competency and identify the factors influencing their performance.

The respondents and participants were Grade 11 students from the Accountancy, Business, and Management (ABM), Science, Technology, Engineering, and Mathematics (STEM), Humanities and Social Sciences (HUMSS), Home Economics (HE), and Information and Communication Technology (ICT) strands of Saint Louis College, City of San Fernando, La Union, enrolled in Practical Research 1 during the Second Semester of School Year 2024–2025. For the quantitative phase, total enumeration sampling was used, including all 71 research groups – 10 from ABM, 45 from STEM, 10 from HUMSS, three from HE, and three from ICT strand. Each group’s research introduction output served as the primary data source.

For the qualitative phase, stratified sampling was applied. Two research leaders in each strand were selected based on inclusion criteria: they must be Grade 11 students conducting qualitative research, serve as group leaders, and belong to groups that obtained

the highest or lowest “Approaching Proficient” mean score in their strand. This resulted in 10 participants. The selection ensured varied perspectives regarding research writing experiences.

The study utilized document analysis to evaluate research introductions. Outputs were independently assessed by the researcher and two Practical Research 1 teachers using a researcher-made rubric validated by the Saint Louis College Research Office. The rubric measured five domains of a well-written text: organization, cohesion and coherence, language use, mechanics, and unity. Each output received three scores, and the mean score represented the group’s performance.

A five-point Likert scale categorized competency levels: Advanced (4.51–5.00), Proficient (3.51–4.50), Approaching Proficient (2.51–3.50), Developing (1.51–2.50), and Beginning (1.00–1.50). Average weighted mean ranges followed the Saint Louis College High School Manual for Practical Research II (2021), while Descriptive Equivalent Ratings (DER) drew from the High School Department’s Learner’s Progress Report Card (School Form 9) descriptors, ranking quality from highest to lowest. To determine differences across strands, Multivariate Analysis of Variance (MANOVA) was used to analyze multiple dependent variables simultaneously. It is a statistical method used to test the differences in multiple dependent variables across different groups, where one or more independent variables are considered (Cognition, 2024).

After quantitative analysis, qualitative data were collected through interviews using an Interview Development Guide based on statistical results. Interviews were conducted face-to-face and through Google Zoom after securing parental consent. The qualitative phase explored cognitive, linguistic, social, and contextual factors affecting students’ research introduction writing.

Ethical standards were strictly observed. The study received Research Ethics Clearance from the Saint Louis College Research Office. Permission was obtained from the school principal and English Department Head. Participants were informed of the study’s purpose, confidentiality measures, and voluntary participation. All data were kept confidential and handled in accordance with the Saint Louis College Code of Research Ethics (2024).

The integration of quantitative and qualitative findings led to the development of a Workbook in Research Writing Introduction. A matrix based on performance results guided the distribution of exercises across the five writing domains. The workbook underwent internal validation by the research panel and external validation by by educators with the following qualifications: 1) a research teacher and 2) has a master’s degree. The workbook was also anchored with a crafted matrix to ensure that the given number of items in each domain was appropriately distributed according to the quantitative results.

Overall, the explanatory sequential mixed-methods design enabled the study to assess students’ research introduction competency systematically and identify key factors influencing their performance, providing a strong foundation for targeted instructional intervention.

FINDING AND DISCUSSION

Finding

This section presents the quantitative results of the document analysis conducted by Practical Research 1 teachers on the research introductions of Grade 11 students from the STEM, ABM, HUMSS, ICT, and HE strands. Students’ performances in organization, mechanics, coherence and cohesion, language use, and unity were analyzed using mean scores to determine their overall research writing competency.

Table 1 Means, Standard Deviations, and ANOVA Results of Writing Competence by Strand

Domain	ABM (n = 10)	HE (n = 3)	HUMSS (n = 10)	ICT (n = 3)	STEM (n = 45)	F(4, 66), p	Partial η^2
Organization	3.20 (.50)	2.78 (.38)	3.27 (.44)	2.67 (.33)	3.26 (.45)	1.93, p = .117	.104 (small)
Mechanics	3.53 (.45)	2.56 (.38)	3.03 (.43)	2.44 (.19)	3.24 (.30)	9.21, p < .001	.358 (large)
Coherence & Cohesion	3.30 (.46)	2.44 (.19)	3.17 (.42)	2.67 (.00)	3.27 (.37)	4.90, p = .002	.229 (medium)
Language Use	3.57 (.35)	2.89 (.19)	3.43 (.42)	3.00 (.33)	3.59 (.29)	5.54, p = .001	.251 (medium)
Unity	3.47 (.36)	2.44 (.19)	3.17 (.32)	2.78 (.19)	3.36 (.30)	9.66, p < .001	.369 (large)

Note. Cells show *M* (*SD*). Scores range from 1 (very low) to 5 (very high).

Table 1 shows that ICT and HE students consistently obtained lower mean scores across most domains, particularly in mechanics, coherence and cohesion, language use, and

unity. In contrast, STEM students achieved the highest means in language use and unity, while ABM students demonstrated strong performance in mechanics.

Table 2 Post Hoc Summary of Significant Pairwise Differences (Tukey HSD)

Domain	Significant Pairwise Differences (p < .05)
Organization	None
Mechanics	HE < ABM; HE < STEM; ICT < ABM; ICT < STEM; HUMSS < ABM
Coherence & Cohesion	HE < ABM; HE < HUMSS; HE < STEM
Language Use	HE < ABM; HE < STEM; ICT < STEM
Unity	HE < STEM; ICT < STEM

A one-way multivariate analysis of variance (MANOVA) revealed a significant multivariate effect of strand on the combined dependent variables, Wilks' $\Lambda = .403$, $F(20, 206.58) = 3.26$, $p < .001$, partial $\eta^2 = .203$. This suggests that strand membership significantly influenced students' research writing competence. The assumption of homogeneity of covariance matrices was met, Box's $M = 24.27$, $p = .940$, and Levene's tests were nonsignificant for all dependent variables (all $ps > .20$). Follow-up ANOVAs showed that strand had significant effects on mechanics, $F(4, 66) = 9.21$, $p < .001$, partial $\eta^2 = .358$ (large effect); coherence and cohesion, $F(4, 66) = 4.90$, $p = .002$, partial $\eta^2 = .229$ (medium effect); language use, $F(4, 66) = 5.54$, $p = .001$, partial $\eta^2 = .251$ (medium effect); and unity, $F(4, 66) = 9.66$, $p < .001$, partial $\eta^2 = .369$ (large effect). No significant difference was found for organization, $F(4, 66) = 1.93$, $p = .117$, partial $\eta^2 = .104$ (small effect).

Because the homogeneity of variances assumption was met, post hoc results are reported using Tukey HSD. Significant pairwise differences are summarized in Table 4. Overall, the post hoc tests emphasize that HE and ICT strands consistently underperformed across mechanics, coherence and cohesion, language use, and unity compared to ABM and STEM. HUMSS students, meanwhile, performed better than HE in coherence and cohesion, but were significantly lower than ABM in mechanics. These findings suggest that ABM and STEM strands are comparatively stronger in academic writing competence, whereas HE and ICT may require targeted interventions to improve research introduction writing skills.

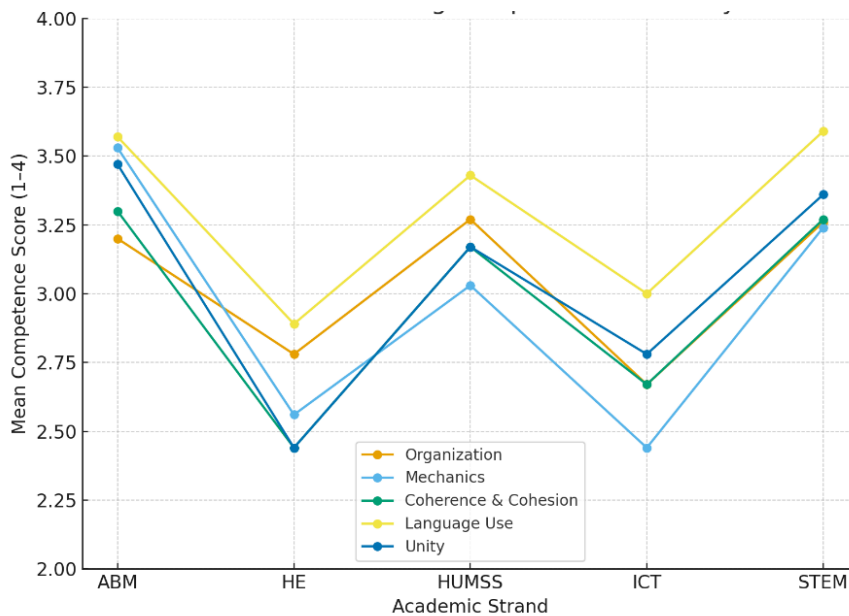


Figure 1 Profile Plot of Mean Writing Competence Scores by Strand

Figure 2 illustrates the profile plot of mean scores for each domain of writing competence by strand. The plot highlights the consistently lower scores of ICT and HE students compared to their peers, particularly in mechanics, coherence and cohesion, language use, and unity.

The results indicate that strand significantly influences competence in mechanics, coherence and cohesion, language use, and unity, but not organization. Effect size interpretation shows that strand membership explained large proportions of variance in mechanics and unity ($\eta^2 > .35$), and medium proportions in coherence and cohesion and language use ($\eta^2 \approx .23-.25$). Organization showed only a small effect size. ICT and HE students consistently demonstrated weaker performance, suggesting possible curricular or instructional gaps, while ABM and STEM strands outperformed others, especially in mechanics and language use.

This revealed that strand significantly influenced writing competence in mechanics, coherence and cohesion, language use, and unity, but not in organization. Overall, students achieved a general mean of 3.062, interpreted as Approaching Proficient. This indicates that while students demonstrate developing competence in writing research introductions, there remains considerable room for improvement across domains.

In organization, all strands were rated Approaching Proficient. Although students were able to structure their ideas adequately, interviews revealed persistent struggles in deciding how to begin introductions, arrange paragraphs logically, and manage multiple ideas simultaneously. As Student A from HUMSS stated, “I think the challenge was how to layout or organize the content or paragraphs.” These findings suggest that while structural awareness exists, students need further scaffolding to strengthen logical sequencing and paragraph development.

Mechanics showed the most significant differences among strands. ABM achieved a Proficient level, while STEM and HUMSS were Approaching Proficient. HE remained at the lower boundary of Approaching Proficient, and ICT fell into the Developing level. Errors in grammar, punctuation, spelling, and formatting were particularly evident among HE and ICT students. This was confirmed by the answer of Student C from ICT: “Even though we use Grammarly, there are still lapses because we are not focused.” Statistical analysis showed a large effect size, indicating that strand membership strongly influenced mechanical accuracy.

For coherence and cohesion, ABM, STEM, HUMSS, and ICT were rated Approaching Proficient, while HE was rated Developing. Student I from ABM reported, “I found it hard to arrange my ideas in the right order and I had thoughts in minds but I struggled to decide what to explain first and some parts of the outline I made is that I jump from one idea to another without proper transition or link which made it look unorganized.” Paragraphs often shifted abruptly from one idea to another, resulting in fragmented flow. These findings highlight the need for explicit instruction in transition signals, paragraph linking, and logical progression of ideas.

In language use, ABM and STEM reached the Proficient level, demonstrating stronger vocabulary control and formal academic tone. HUMSS, ICT, and HE were rated Approaching Proficient. Students struggled particularly with balancing technical terminology and clarity, especially when dealing with emotionally sensitive or highly technical topics, as Student C from ICT shared, “One struggle is to find the most applicable formal words. Our topic is technical, so it is difficult to explain it in simple words.” Thus, limited vocabulary and difficulty selecting precise academic words contributed to uneven expression.

Lastly, unity revealed another area of concern. ABM, STEM, HUMSS, and ICT were rated Approaching Proficient, while HE fell into the Developing category. Off-topic sentences and weak alignment of supporting ideas with the main research focus were observed. This weakened the clarity and strength of introductions, as confirmed by Student E from HE: “Some of the sentences in our introduction seem to be off topic and they do not support the main idea anymore.”

These results resonate with recent studies emphasizing the role of scaffolding and iterative engagement in improving writing competence. Yang et al. (2021) found that students who actively revised and modified AI-assisted suggestions improved lexical sophistication and cohesion, while Umarova et al. (2025) stressed the value of interactive writing processes in generating stronger ideas. Such findings corroborate this study’s evidence that higher competence is associated with engaged, recursive practices—an observation reflected in the Proficient ratings of ABM and STEM in mechanics and language use. Linking these results to Cognitive Writing Theory further clarifies their implications. Cognitive Writing Theory frames writing as a recursive process of planning, translating, reviewing, and monitoring, where metacognition is central. Wan et al. (2025) emphasized that successful writing mirrors human cognitive processes, particularly iterative planning and revision. The stronger performance of ABM and STEM students, often achieving Proficient ratings, may therefore be explained by curricular exposure to structured problem-solving and analytical tasks that naturally promote recursive and metacognitive writing practices. In contrast, the Developing ratings of HE and ICT students in areas like mechanics and unity suggest fewer opportunities for guided metacognitive engagement.

Discussions

The discussion connected these findings to Cognitive Writing Theory, Transactive Writing Theory, and Sociocultural Writing Theory. Students’ difficulties in organization and word choice reflect limited metacognitive awareness and recursive writing practices. Differences in strand performance may also be attributed to varying exposure to analytical and structured problem-solving tasks.

The level of competency obtained by the Grade 11 students can be explained through the responses from the conducted interview in which factors in writing research introduction were drawn. These factors in research writing were divided into two – cognitive and

linguistic, and external factors. Cognitive and linguistic factors such as writing anxiety, lack of confidence, limited vocabulary, and difficulty in organizing ideas were identified through interviews. Students often experienced cognitive overload when balancing content, structure, and language simultaneously. Linguistic weaknesses further affected clarity and precision in writing (Roxas, 2020).

External factors also influenced performance. Limited access to related literature, particularly for uncommon research topics, hindered students from building strong theoretical foundations. Group dynamics posed another challenge, as unequal participation created frustration and reduced productivity. These findings align with the findings of Listyani and Budjalemba (2020) emphasizing the importance of scaffolding, access to resources, and collaborative accountability.

Based on these results, a Workbook in Writing Research Introduction was developed as a targeted intervention. The workbook includes three structured sections per domain: Look Back (review), Lesson (core instruction with QR-supported tutorial videos), and Look Ahead (application and reflection). Supplementary activities are accessible through QR codes.

The distribution of workbook items was data-driven. Mechanics and Coherence & Cohesion received the highest emphasis (13 items each), followed by Organization and Unity (12–13 items each), and Language Use (10 items). This allocation reflects the magnitude of performance gaps observed in the quantitative findings. Activities vary in complexity across Academic and TVL tracks to ensure differentiated instruction.

Limitations of the study include its focus solely on research introductions and its confinement to one institution. With that, it is recommended that future research adopt a more comprehensive approach by examining all major chapters of a research paper and incorporating perspectives from both teachers and students to better identify instructional gaps and practical needs. Longitudinal studies are also encouraged to track the development of research writing skills over time and evaluate the effectiveness of teaching interventions. To address competency gaps, Saint Louis College High School is advised to implement continuous research engagement, allowing students to gradually strengthen their skills. Overall, while Grade 11 students are generally at the Approaching Proficient level, strand- and domain-specific differences (particularly in mechanics, coherence and cohesion, and

unity) highlight the need for targeted, data-driven interventions, such as the proposed workbook, to support progressive improvement in research writing competence.

CONCLUSION

In conclusion, the study shows that while Grade 11 students are generally at the Approaching Proficient level in writing research introductions, differences across strands and domains highlight specific areas needing improvement, particularly in mechanics, coherence and cohesion, and unity. These variations are influenced by cognitive, linguistic, and external factors such as metacognitive skills, vocabulary limitations, access to literature, and group dynamics. Anchored in theories and related literature, findings emphasize the importance of scaffolded and recursive writing practices. The proposed workbook serves as a targeted, data-driven intervention to address these gaps and support students in progressing toward higher levels of research writing competence.

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