

Students' Lexical Proficiency and Performance Through ESV (Essential Science Vocabulary)

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Abstract—This study aims to determine the effectiveness of the Essential Science Vocabulary (ESV) as an instructional tool in enhancing the lexical proficiency and academic performance of Grade 7 learners at Sto. Tomas Integrated High School during the Academic Year 2025–2026. Specifically, it examines the level of assessment of the Essential Science Vocabulary, the level of learners' lexical proficiency, and the level of students' performance based on their quarterly examination. Furthermore, the study investigates the significant effects of Essential Science Vocabulary on learners' lexical proficiency and performance in science. The study employed both descriptive and quasi-experimental research design. Data were gathered using a researcher-developed questionnaire and a vocabulary test, both of which underwent validation and pilot testing to ensure validity and reliability. The respondents consisted of 170 Grade 7 students selected through purposive sampling. The statistical treatments used were mean, standard deviation, and multiple regression analysis. Results reveal that the level of assessment of the Essential Science Vocabulary (ESV) was rated very high across all dimensions. The learners' lexical proficiency is interpreted as very satisfactory in all areas. In terms of their performance in science, learners demonstrated a very satisfactory level in their quarterly examination. Moreover, the study established that components of Essential Science Vocabulary showed significant effects on all components of lexical proficiency and students' performance in science. In conclusion, the Essential Science Vocabulary (ESV) is an effective instructional tool in enhancing learners' lexical proficiency leading to the rejection of the first null hypothesis. This indicates the effectiveness of the ESV as an instructional tool in enhancing students' vocabulary knowledge and improving their understanding of scientific concepts. Furthermore, in relation to students' performance in Science, Essential Science Vocabulary serves as a valuable instructional resource that enhances students' academic performance and understanding of scientific concepts leading to the rejection of the second null hypothesis. The findings recommend the assessment of structured vocabulary tools in Science instruction, continuous support for teachers in vocabulary-based strategies, and further research to explore additional factors that may influence students' language development and academic performance.

Keywords—Essential science vocabulary, science education, lexical proficiency, academic performance, Grade 7, spelling, definition, synonym, antonym, instructional materials, descriptive research.

I. INTRODUCTION

Language plays a vital role in the learning process, particularly in content areas such as science where understanding complex concepts is highly dependent on the comprehension of specialized terms. In the field of science education, students are often exposed to a wide range of technical vocabulary, commonly referred to as Essential Science Vocabulary (ESV). These terms serve as the

foundation for understanding scientific ideas, processes, and principles. Without a strong grasp of this vocabulary, students may struggle to fully comprehend lessons, which can ultimately affect their academic performance.

In the field of science, learners are frequently exposed to specialized terms that are essential for understanding concepts, processes, and relationships. These terms, collectively referred to as Essential Science Vocabulary (ESV), play a crucial role in helping students grasp scientific ideas. Without sufficient familiarity with this vocabulary, students may struggle to make sense of communication, interpret information, and effectively utilize the information they have been exposed to in an authentic manner (Fang, 2016).

Additionally, students' level of lexical proficiency plays an important role in their processing capabilities and comprehension of information they encounter in the classroom. Lexical proficiency can be defined as a person's ability to understand, identify, and appropriately use words in varying contexts. In terms of learning science, the lexical proficiency of students aids in the process of deciphering elaborate terminology, comprehending the steps of an assignment, and articulating their thoughts succinctly and effectively. Additionally, students whose lexical proficiency is greater have a greater likelihood of achieving higher levels academically as they are able to connect more readily with course materials (Nation, 2021). In contrast, students with low levels of vocabulary knowledge may experience significant obstacles to their ability to be successful in the classroom and to progress in their overall academic achievement.

Despite the recognized significance of vocabulary as it pertains to education, there still remains a vast number of students who continue to experience difficulties with their understanding of these abstract processes through the use of science-related vocabulary because of the limited focus given to vocabulary instruction. Many research studies support the assertion that direct instruction related to vocabulary, combined with repeated exposure to vocabulary, leads to enhanced comprehension and overall improved academic achievement (Beck, McKeown, & Kucan, 2018). This presents a need to investigate the effectiveness between Essential Science Vocabulary and lexical proficiency, and their respective impact on students' academic performance.

The purpose of this study was to investigate the effectiveness between Essential Science Vocabulary (ESV), lexical proficiency, and student performance. By examining these variables, this study provides insight into how skill sets related to language affect success in science.

1.1 Statement of the Problem

Problem/s which were addressed by the research

The purpose of this study was to develop an instructional tool, the ESV (Essential Science Vocabulary), designed to enhance the science vocabulary of Grade 7 students.

Specifically, the study determined the acceptability and effectiveness of the ES-V (Essential Science Vocabulary) as a learning resource in improving the vocabulary proficiency of Grade 7 students at Sto. Tomas Integrated High School.

This study specifically aimed at addressing the following specific research questions:

1. What is the level of assessment in the ESV (Essential Science Vocabulary) in terms of:
 - 1.1. Content;
 - 1.2. Design;
 - 1.3. Usability;
 - 1.4. Conformity;
 - 1.5. Accuracy; and
 - 1.6. Clarity?
2. What is the level of students' lexical proficiency in terms of:
 - 2.1. Spelling;
 - 2.2. Definition;
 - 2.3. Synonym; and
 - 2.4. Antonym?
3. What is the level of student's performance in Science terms of: Quarterly Examination?
4. Is there a significant effect on the use of ESV (Essential Science Vocabulary) in Students' Lexical Proficiency?
5. Is there a significant effect to the use of ESV (Essential Science Vocabulary) in Student's Performance?

II. METHODOLOGY

The study employed both descriptive and quasi-experimental research design. Data were gathered using a researcher-developed questionnaire and a vocabulary test, both of which underwent validation and pilot testing to ensure validity and reliability. The respondents consisted of 170 Grade 7 students selected through purposive sampling. The statistical treatments used were mean, standard deviation, and multiple regression analysis.

III. RESULTS AND DISCUSSION

This part presents, analyzes, and interprets the data gathered to address the sub-problems related to the main problem of this study. All specific questions stated in Chapter 1 under the Statement of the Problem are answered in this chapter, with findings supported by appropriate tables and statistical treatments. It includes a detailed presentation of the data collected, followed by a systematic analysis to ensure clarity and accuracy of results. Furthermore, this chapter examines the significant effect among Essential Science Vocabulary (ESV), students' lexical proficiency, and students' academic performance in Science. The interpretations provided aim to explain the implications of the findings and how they contribute to a better understanding of the variables under investigation.

Level of the Assessment of ESV (Essential Science Vocabulary)

In this study, the level of Assessment of ESV (Essential Science Vocabulary) refers to Accuracy, Clarity, Conformity, Usability, Content and Design.

The level of Assessment of ESV (Essential Science Vocabulary) was revealed in the following tables which showed the specific statements evaluated, along with the corresponding mean scores, standard deviation, remarks, and verbal interpretation.

Table 1 presents the level of Assessment of ESV (Essential Science Vocabulary) in terms of accuracy. Specifically, it shows the distribution of the respondents' ratings on the indicators of accuracy, including the frequency and percentage of responses, the computed weighted mean, and the corresponding descriptive interpretation.

Table 1. Level of Assessment of ESV (Essential Science Vocabulary) in terms of Accuracy

Statement	Mean	SD	Remarks
The Essential Science Vocabulary (ESV), as supplementary material in science verifies accuracy that...			
...uses Science terms that are spelled correctly.	4.73	0.45	Strongly Agree
...have definitions provided that are scientifically correct.	4.77	0.45	Strongly Agree
...have examples that reflect actual Science processes or facts.	4.78	0.42	Strongly Agree
...have vocabulary that is precise and free from misleading information.	4.86	0.35	Strongly Agree
...avoids errors in explanation or terminology.	4.69	0.46	Strongly Agree
Weighted Mean	4.77		
SD	0.43		
Verbal Interpretation	Very High		

The table shows the level of Assessment of ESV (Essential Science Vocabulary) in terms of accuracy. It clearly justified that the students perceived that the ESV (Essential Science Vocabulary) were accurate. It expressed that the accuracy is rated Very High with a weighted mean of 4.77 with a standard deviation of 0.43. Specifically, data exhibits that all five statements gained "strongly agree" responses. This implies that the ESV (Essential Science Vocabulary) were accurate, as the science terms used were spelled correctly, the definitions provided were scientifically correct, the examples reflected actual scientific processes or facts, the vocabulary was precise and free from misleading information, and the explanations or terminologies were free from errors. These findings show that the ESV functioned as a dependable instructional resource that could assist students in understanding scientific concepts and terminology more effectively.

Accurate instructional materials are important in science education because they help students build correct conceptual understanding and avoid misconceptions about scientific ideas. When learning materials provide precise terminology and scientifically valid explanations, students can better comprehend the meaning of scientific vocabulary and apply these concepts in real-life situations. Vocabulary development is also considered an essential component of academic

learning because it supports comprehension and deeper understanding of subject matter.

Table 2 shows the level of assessment of ESV (Essential Science Vocabulary) in terms clarity, specifically, how the vocabulary terms are presented in a simple and understandable manner, how the explanations help students easily grasp the meaning of scientific terms, how the words and definitions are appropriate to the learners' level of understanding, how the examples provide clearer understanding of the concepts, and how the vocabulary content helps avoid confusion during Science lessons.

Table 2. Level of Assessment of ESV (Essential Science Vocabulary) in terms of Clarity

Statement	Mean	SD	Remarks
The Essential Science Vocabulary (ESV), as supplementary material in Science explains clarity that...			
...have detailed discussion of science vocabulary that are easy to understand.	4.72	0.45	Strongly Agree
...have sentences that are simple and direct.	4.72	0.45	Strongly Agree
...have terminologies that are presented clearly with no ambiguity.	4.81	0.40	Strongly Agree
...have vocabulary entries that are appropriate for the comprehension level of Grade 7 learners.	4.76	0.43	Strongly Agree
...have instructions that are written clearly and logically.	4.74	0.45	Strongly Agree
Weighted Mean	4.75		
SD	0.44		
Verbal Interpretation	Very High		

Findings in table 2 reflected the students' level of Assessment of ESV (Essential Science Vocabulary) in terms of clarity. The results indicates that the learners regarded the ESV as clear and easy to understand as a supplementary Science material. Clarity obtained a Very High rating with a weighted mean of 4.75 and a standard deviation of 0.44. The presented data shows that all five statements sustained "strongly agree" responses, with mean scores of 4.72 to 4.81. This indicates that the material provided well-explained discussions of science vocabulary that were easy to comprehend, utilized simple and straightforward sentences, presented terminologies in a clear manner without ambiguity, and included vocabulary entries appropriate for the comprehension level of Grade 7 learners. In addition, the instructions were organized and written in a logical and understandable manner. As a result, the ESV contributed to improving students' comprehension of scientific vocabulary and concepts during their science lessons.

Clear presentation of information in instructional materials greatly contributes to students' learning and comprehension. When educational resources are organized and written in a straightforward manner, learners can easily understand scientific terms and concepts. Simple explanations, appropriate language level, and well-structured instructions allow students to follow lessons more efficiently and participate actively during discussions. Therefore, clarity in supplementary resources such as the Essential Science Vocabulary (ESV) supports learners in grasping scientific ideas and encourages meaningful learning.

Furthermore, clear and well-presented vocabulary instruction improves students' reasoning and comprehension. When instructional materials are organized logically and explanations are easy to follow, learners can grasp concepts more efficiently.

Table 3 shows the level of the Essential Science Vocabulary (ESV) in terms of conformity, specifically, how the vocabulary content aligns with the learning competencies in Science, how the terms, definitions, and explanations are consistent with the prescribed curriculum standards under MATATAG Curriculum, how the examples and illustrations conform to the learners' level of understanding, interests and needs, how the Essential Science Vocabulary supports the intended learning objectives of the lesson, how the sequence of concepts conforms to the flow of the topics discussed in class, how the language used is suitable for the grade level of the learners, and how the overall design and presentation of the vocabulary material adhere to educational and instructional standards.

Table 3. Level of Assessment of ESV (Essential Science Vocabulary) in terms of Conformity

The Essential Science Vocabulary (ESV), as supplementary material in Science adheres to conformity that...	Mean	SD	Remarks
...follows the standards and objectives of the Science curriculum.	4.69	0.49	Strongly Agree
...have vocabulary included that matches the scope and sequence of the MATATAG Science program.	4.67	0.48	Strongly Agree
...supports the goals of the K-12 curriculum in enhancing scientific literacy.	4.69	0.50	Strongly Agree
...have selection of terms that is appropriate to the grade level and subject standards.	4.70	0.47	Strongly Agree
...reflects proper alignment with the Department of Education's Science standards.	4.64	0.55	Strongly Agree
Weighted Mean	4.68		
SD	0.50		
Verbal Interpretation	Very High		

The information presented in Table 3 described the Level of Assessment of ESV in terms of conformity. The results show that the students recognized that the ESV was aligned with the standards and learning expectations of the Science curriculum. Conformity is rated Very High, obtaining a weighted mean of 4.68 with a standard deviation of 0.50. Specifically, data exhibits that all five statements sustained "strongly agree" responses, with mean scores of 4.64 to 4.70. This indicates that the material adhered to the standards and objectives of the Science curriculum, included vocabulary consistent with the scope and sequence of the MATATAG Science program, and supported the goals of the K-12 curriculum in promoting scientific literacy. Moreover, the selection of terms was appropriate for the grade level and was properly aligned with the Department of Education's Science standards. These findings indicate that the ESV supported both classroom instruction and students' academic progression within the prescribed curriculum framework.

Alignment of instructional materials with curriculum standards is important because it ensures that learning resources support the intended educational objectives. Materials that follow the scope, sequence, and standards of the

curriculum help teachers deliver lessons that are consistent with expected competencies. This alignment allows students to encounter appropriate content according to their level of learning and stage of development. In addition, it promotes coherence between instruction and assessment, making it easier for teachers to evaluate student progress accurately and provide targeted feedback. Consequently, conformity to curriculum guidelines strengthens the implementation of the program and contributes to improved student achievement.

Table 4 shows the level of the Essential Science Vocabulary (ESV) in terms of usability, specifically, how the vocabulary material is easy to use and understand by the learners, how the organization of terms and definitions helps students study Science concepts more effectively, how the material can be conveniently utilized during classroom discussions and learning activities, how the instructions and examples guide learners in using the vocabulary resource properly, how the content helps students improve their comprehension of scientific concepts and terminologies, how the format and presentation make the material accessible and user-friendly, how the vocabulary resource can be used for both independent learning and classroom instruction, and how the overall design and structure of the material support efficient and meaningful learning experiences among students.

Table 4. Level of Assessment of ESV (Essential Science Vocabulary in terms of Usability)

The Essential Science Vocabulary (ESV), as supplementary material in Science promotes usability that...	Mean	SD	Remarks
...is easy to access and understand.	4.69	0.49	Strongly Agree
...have instructions that are clear and simple.	4.52	0.52	Strongly Agree
...have examples that motivated me to actively participate.	4.48	0.50	Strongly Agree
...is suitable for Grade 7 learners like me.	4.72	0.45	Strongly Agree
...can be used with independently with minimal guidance.	4.62	0.53	Strongly Agree
Weighted Mean	4.61		
SD	0.51		
Verbal Interpretation	Very High		

Table 4 presents the students' assessment of the usability of the ESV. The results revealed that the learners found the material easy to use and accessible as a supplementary resource in Science. Usability received a Very High rating with a weighted mean of 4.61 and a standard deviation of 0.51. Specifically, data exhibits that all five statements sustained "strongly agree" responses, with mean scores of 4.48 to 4.72. These findings imply that the ESV was easy to access and understand, contained clear and simple instructions, and provided examples that encouraged students to actively participate in learning activities. Additionally, the material was suitable for Grade 7 learners and could be used independently with minimal assistance from the teacher.

The results display in Table 5 focused on the students' assessment of the content of the ESV (Essential Science Vocabulary), specifically, how the vocabulary material provides accurate and relevant scientific terms and definitions,

how the content supports the topics and concepts discussed in Science lessons, how the explanations and examples enhance students' understanding of scientific terminologies, how the information presented is sufficient, reliable, and appropriate to the learners' level of understanding, how the vocabulary terms are meaningful and applicable to real-life situations, how the content promotes better comprehension and retention of Science concepts, how the lessons and activities enrich students' academic learning experiences, and how the overall content contributes to the development of students' scientific literacy and vocabulary skills.

Table 5. Level of Assessment of ESV (Essential Science Vocabulary in terms of Content)

The Essential Science Vocabulary (ESV), as supplementary material in Science provides content that...	Mean	SD	Remarks
...contains accurate and relevant Science vocabulary.	4.59	0.55	Strongly Agree
...is aligned with the Grade 7 MATATAG Science curriculum.	4.56	0.51	Strongly Agree
...promotes understanding of key Science concept.	4.64	0.48	Strongly Agree
...have examples given that are meaningful and related to real-life situations.	4.38	0.50	Strongly Agree
...have vocabulary terms that are appropriate for Grade 7 learners.	4.56	0.51	Strongly Agree
Weighted Mean	4.55		
SD	0.52		
Verbal Interpretation	Very High		

The data revealed that the learners perceived the content as meaningful and relevant to their Science learning. Content obtained a Very High rating with a weighted mean of 4.55 and a standard deviation of 0.52. Specifically, data exhibits that all five statements sustained "strongly agree" responses, with mean scores of 4.38 to 4.64. These findings suggest that the ESV included accurate and relevant scientific vocabulary aligned with the Grade 7 MATATAG Science curriculum. Furthermore, it promoted the understanding of key Science concepts, provided examples that were meaningful and connected to real-life situations, and used vocabulary terms appropriate for the level of Grade 7 learners. Consequently, the ESV served as a useful instructional material that supported students' learning of Science concepts.

The quality of content within instructional materials plays a vital role in supporting effective learning. Learning resources that present accurate, relevant, and meaningful information enable students to better understand scientific ideas and principles. High-quality content also helps learners connect theoretical knowledge to real-life experiences, making lessons more relatable and applicable. Moreover, when the material is appropriate to the learners' level and aligned with the curriculum, it promotes a more systematic and progressive learning process.

Table 6 shows the level of the Essential Science Vocabulary (ESV) in terms of design, specifically, how the layout and arrangement of the vocabulary material make the content visually appealing and organized, how the font style, size, and spacing contribute to readability and comprehension, how the colors, illustrations, and visual elements help attract

learners' attention and interest, how the format and presentation support easy navigation and understanding of the lessons, how the design enhances students' engagement and motivation in learning scientific terms, how the visual organization of the material helps learners focus on important concepts and information, how the overall appearance of the vocabulary resource creates a positive learning experience, and how the design features contribute to the effectiveness and usability of the Essential Science Vocabulary material in Science instruction.

Table 6. Level of Assessment of ESV (Essential Science Vocabulary in terms of Design

The Essential Science Vocabulary (ESV), as supplementary material in Science contains design that...	Mean	SD	Remarks
...is visually appealing and appropriate for Grade 7 students.	4.65	0.49	Strongly Agree
...have font size, style, and color that make reading suitable and easy.	4.47	0.60	Strongly Agree
...have layout and arrangement of content that are clear and organized.	4.39	0.49	Strongly Agree
...have illustrations and graphics used that are relevant to the science topics.	4.53	0.52	Strongly Agree
...have overall design that encourages me to use tool in class.	4.45	0.50	Strongly Agree
Weighted Mean	4.50		
SD	0.53		
Verbal Interpretation		Very High	

Table 6 highlights the students' assessment of the design of the ESV. The findings indicated that the learners considered the material visually appealing and appropriately designed for classroom use. Design is rated Very High, with a weighted mean of 4.50 and a standard deviation of 0.53. Specifically, data exhibits that all five statements gained "strongly agree" responses, with mean scores of 4.39 to 4.65. These results imply that the ESV possessed an attractive visual presentation suitable for Grade 7 students, utilized readable font size, style, and color combinations, and presented information through a clear and organized layout. Moreover, the illustrations and graphics used are relevant to the Science topics and the overall design encouraged students to utilize the material during class activities. Moreover, the attractive design encouraged students to actively utilize the ESV during both classroom activities and independent learning tasks.

The design of instructional materials also affects how learners engage with and interpret information. Attractive and well-structured layouts capture students' attention and make learning resources easier to use. Elements such as readable typography, relevant graphics, and organized formatting help simplify complex ideas and guide learners toward key concepts. An appealing visual presentation not only improves comprehension but also motivates students to repeatedly use the material and participate more actively in the learning process.

Level of Students' Lexical Proficiency

In this study, the level of Students' Lexical Proficiency was measured through a test, specifically in terms of Spelling, Definition, Synonym, and Antonym.

Table 7 presents the level of Students' Lexical Proficiency, specifically, the distribution of scores in, the frequency and percentage of students in each bracket, the weighted mean score, the standard deviation, and the verbal interpretation.

Table 7. Level of Students' Lexical Proficiency in terms of Spelling

Raw Score	Frequency (f)	Percentage (%)	Descriptive Equivalent
13-15	88	51.8	Outstanding
10-12	81	47.6	Very Satisfactory
7-9	1	0.59	Satisfactory
4-6	0	0	Fair
1-3	0	0	Needs Improvement
Total	170	100	

Weighted Mean	12.72
SD	1.37
Verbal Interpretation	Very Satisfactory

Table 7 showed the data that reveals that most of the respondents (about 51.8%) achieved an Outstanding level in Science, obtaining grades from 13-15 ($f = 88$), while 47.6% performed at a Very Satisfactory level with grades of 10-12 ($f = 81$). Only a small fraction (0.59%) fell into the Satisfactory category with grades of 7-9 ($f = 1$), and no students scored below 9.

The overall mean score of 12.72 indicates a Very Satisfactory performance in Science. This suggests that the students possess a strong understanding of scientific concepts, are able to apply knowledge effectively, and can perform well in academic tasks. The low Standard Deviation 1.37, indicates that students' performance levels are relatively consistent across the group, reflecting stable achievement among learners in the class.

Table 8 shows the level of students' lexical proficiency in terms of definition, specifically, how the students identify and understand the meanings of scientific terms, how they correctly define vocabulary words used in Science lessons, how they demonstrate comprehension of scientific concepts through accurate definitions, how they distinguish the meanings of related scientific terminologies, how they apply appropriate definitions in classroom discussions and activities, how they recall and explain scientific vocabulary using their own words, and how their understanding of definitions contributes to better comprehension of Science concepts and lessons.

Table 8. Level of Students' Lexical Proficiency in terms of Definition

Raw Score	Frequency (f)	Percentage (%)	Descriptive Equivalent
13-15	76	44.7	Outstanding
10-12	92	54.1	Very Satisfactory
7-9	2	1.18	Satisfactory
4-6	0	0	Fair
1-3	0	0	Needs Improvement
Total	170	100	

Weighted Mean	12.31
SD	1.35
Verbal Interpretation	Very Satisfactory

The data shows the distribution of students' lexical proficiency in terms of vocabulary comprehension. Majority of the respondents (54.1%) achieved a Very Satisfactory level

with raw scores of 10–12 ($f = 92$), while 44.7% attained an Outstanding level, scoring 13–15 ($f = 76$). Only a small fraction (1.18%) were rated Satisfactory with scores of 7–9 ($f = 2$), and no students fell within the Fair or Needs Improvement ranges.

The overall results suggest that learners have a strong grasp of the meanings of scientific terms and can apply this knowledge effectively. This indicates that students can interpret vocabulary accurately, make connections to scientific concepts, and demonstrate understanding in classroom tasks.

Table 9 shows the level of students' lexical proficiency in terms of synonym, specifically, how the students identify words with similar meanings related to scientific terms, how they recognize synonymous vocabulary used in Science lessons, how they demonstrate understanding of scientific concepts through the use of similar or related terms, how they distinguish appropriate synonymous words in different scientific contexts, how they apply synonymous terms correctly during classroom discussions and activities, how they expand their scientific vocabulary through familiarity with related words, and how their knowledge of synonyms contributes to better comprehension and communication of Science concepts and terminologies.

Table 9. Level of Students' Lexical Proficiency in terms of Synonym

Raw Score	Frequency (f)	Percentage (%)	Descriptive Equivalent
13-15	71	41.8	Outstanding
10-12	94	55.3	Very Satisfactory
7-9	5	2.94	Satisfactory
4 -6	0	0	Fair
1-3	0	0	Needs Improvement
Total	170	100	
Weighted Mean		12.11	
SD		1.50	
Verbal Interpretation		Very Satisfactory	

The data shows the distribution of students' lexical proficiency in terms of identifying related terms. A majority of the respondents (55.3%) achieved a Very Satisfactory level with raw scores of 10–12 ($f = 94$), while 41.8% attained an Outstanding level with scores of 13–15 ($f = 71$). Only a small fraction (2.94%) fell into the Satisfactory category with scores of 7–9 ($f = 5$), and no students scored within the Fair or Needs Improvement ranges.

The overall results suggest that students are capable of recognizing effect among scientific vocabulary terms and understanding how terms are connected within specific concepts. This indicates that learners can effectively identify related words, categorize vocabulary, and apply these connections in their learning tasks.

Table 10 shows the level of students' lexical proficiency in terms of antonym, specifically, how the students identify words with opposite meanings related to scientific terms, how they recognize antonyms used in Science vocabulary, how they distinguish contrasting scientific concepts through opposite terms, how they demonstrate understanding of vocabulary by correctly matching antonyms, how they apply knowledge of opposites in classroom discussions and learning activities, how they compare and differentiate scientific ideas

using antonym pairs, and how their understanding of antonyms contributes to clearer comprehension and deeper understanding of Science concepts and terminologies.

Table 10. Level of Students' Lexical Proficiency in terms of Antonym

Raw Score	Frequency (f)	Percentage (%)	Descriptive Equivalent
13-15	83	48.8	Outstanding
10-12	84	49.4	Very Satisfactory
7-9	3	1.76	Satisfactory
4 -6	0	0	Fair
1-3	0	0	Needs Improvement
Total	170	100	
Weighted Mean		12.52	
SD		1.49	
Verbal Interpretation		Very Satisfactory	

The data shows the distribution of students' lexical proficiency in terms of identifying antonyms or opposite meanings. Nearly half of the respondents (49.4%) performed at a Very Satisfactory level with raw scores of 10–12 ($f = 84$), while 48.8% achieved an Outstanding level, scoring 13–15 ($f = 83$). Only a small fraction (1.76%) fell into the Satisfactory category with scores of 7–9 ($f = 3$), and no students scored within the Fair or Needs Improvement ranges.

The overall results suggest that learners are capable of distinguishing opposite meanings in scientific vocabulary. This indicates that students can recognize contrasts between terms, apply them accurately in context, and use their understanding to enhance comprehension of scientific concepts.

Level of Students' Performance in Science

In this study, the level of Students' Performance refers to Quarterly Examination.

Table 11 presents the level of students' performance based on the Quarterly Test, specifically showing the distribution of scores across different performance levels, the frequency and percentage of students in each bracket, the weighted mean score, and the corresponding verbal interpretation. The table also serves as a basis for evaluating the general mastery of the lesson competencies and identifying areas that may require instructional reinforcement or enrichment activities.

Table 11. Level of Students' Performance in Science in terms of Quarterly Examination

Raw Score	Frequency (f)	Percentage (%)	Descriptive Equivalent
41-50	67	39.41	Outstanding
31-40	103	60.59	Very Satisfactory
21-30	0	0.00	Satisfactory
11-20	0	0.00	Fair
1-10	0	0	Needs Improvement
	170	100.00	
Weighted Mean		39.48	
SD		3.63	
Verbal Interpretation		Very Satisfactory	

Table 11 presents the level of students' performance based on the Quarterly Test. Table 8 reveals a Very Satisfactory level of performance on the Quarterly Test, with a weighted mean score of 39.48 and a standard deviation of 3.63. Over 39 percent of the students scored in the highest bracket (41–50).

It is evident that most of the respondents obtained scores ranging from 31–40 ($f = 103$), which comprised 60.59% of the class and were interpreted as Very Satisfactory. This was followed by students who obtained scores of 41–50 ($f = 67$) or 39.41%, which were classified under the Outstanding performance level. Moreover, none of the students obtained scores within the ranges of 21–30, 11–20, and 1–10, indicating that no learner fell under the Satisfactory, Fairly Satisfactory, or Needs Improvement levels. The results also indicate that the learners were able to apply their knowledge effectively during the assessment, reflecting their mastery of the lessons discussed in class.

Significant Effect between the Assessment of ESV (Essential Science Vocabulary) on the Students' Lexical Proficiency

In this study, the Assessment of ESV (Essential Science Vocabulary) refers to Accuracy; Clarity; Conformity; Usability; Content; and Design while Students' Lexical Proficiency refers to Spelling, Definition, Synonym, and Antonym.

The Significant Effect between the Assessment of ESV (Essential Science Vocabulary) on the Students' Lexical Proficiency is revealed in the following table, using Multiple Regression Analysis, presenting the computed t-value, significance p-values (2-tailed), and the corresponding verbal interpretation of the effectiveness. This statistical analysis determines the extent to which the different components of Essential Science Vocabulary have a significant effect on students' lexical proficiency in Science. It further examines whether the variables under study have a statistically significant effect with learners' performance in Science in terms of spelling, definition, synonym, and antonym. Moreover, the analysis identifies which specific aspects of the Essential Science Vocabulary contribute most to the development of students' vocabulary skills, highlighting the relative importance of each component in supporting learners' understanding and use of scientific terminology.

Table 12 shows the significant effect between the Assessment of ESV (Essential Science Vocabulary) and students' lexical proficiency. In this study, the Assessment of ESV (Essential Science Vocabulary) is composed of accuracy, clarity, conformity, usability, content quality, and design quality, while students' lexical proficiency is measured in terms of spelling, definition, synonym, and antonym.

Based on the computed t-values, clarity and conformity showed a significant effect across all indicators of lexical proficiency, as evidenced by t-values lower than 0.05. This implies that when the ESV presents information in a clear, organized, and understandable manner, and when it aligns with curriculum standards, students are more likely to improve their spelling, understanding of definitions, and knowledge of synonyms and antonyms. The findings suggest that clarity and alignment of vocabulary materials play a crucial role in enhancing students' comprehension and mastery of scientific terms. This supports the idea that well-structured instructional resources facilitate meaningful learning and improve language acquisition in academic contexts.

Table 12. Significant Effect between the Assessment of ESV (Essential Science Vocabulary) on the Students' Lexical Proficiency

Assessment of ESV (Essential Science Vocabulary)		Assessment of ESV (Essential Science Vocabulary)			
		Spelling	Definition	Synonym	Antonym
Accuracy	t-value	1.485	1.433	1.841	0.738
	Sig. (2-tailed)	0.140	0.154	0.067	0.462
	N	170	170	170	170
Clarity	t-value	3.240*	3.793*	3.461*	3.118*
	Sig. (2-tailed)	0.001	0.000	0.001	0.002
	N	170	170	170	170
Conformity	t-value	3.250*	3.436*	2.863*	2.555*
	Sig. (2-tailed)	0.001	0.001	0.005	0.011
	N	170	170	170	170
Usability	t-value	-0.843	-0.239	0.215	-0.251
	Sig. (2-tailed)	0.400	0.812	0.830	0.802
	N	170	170	170	170
Content	t-value	1.446	1.470	2.556*	1.759
	Sig. (2-tailed)	0.150	0.143	0.011	0.080
	N	170	170	170	170
Design	t-value	-3.032*	-2.442*	-1.766	-2.269*
	Sig. (2-tailed)	0.003	0.016	0.079	0.025
	N	170	170	170	170

Moreover, design quality showed a significant effect with spelling, definition, and antonym, but not with synonym. This indicates that visually appealing and well-organized materials can support students' retention and recognition of vocabulary, particularly in terms of form and meaning. The use of appropriate layout, font, and graphics may help learners process and recall information more effectively. Studies have emphasized that effective design in learning materials enhances engagement and reduces cognitive load, thereby improving comprehension and retention.

Significant Effect between the Assessment of ESV (Essential Science Vocabulary) on the Students' Performance in Science

In this study, the Assessment of ESV (Essential Science Vocabulary) refers to Accuracy; Clarity; Conformity; Usability; Content; and Design while the Students' Performance in Science refers to Quarterly Examination.

The Significant Effect between the Assessment of ESV (Essential Science Vocabulary) on the Students' Performance in Science were treated statistically using Real Statistician Analysis Tools. Data were revealed in the following table, using the Multiple Regression Analysis, with the computed t-value, significance p-values (2-tailed), and the verbal interpretation of the effectiveness.

Table 13 presents the effect between the Assessment of Essential Science Vocabulary (ESV) and students' performance in science as measured through the quarterly examination. In this study, the assessment of ESV is described in terms of accuracy, clarity, conformity, usability, content, and design, while students' performance is reflected in their scores in the quarterly test.

Based on the computed results, clarity demonstrated a statistically significant association with students' performance, having a p-value of 0.002, which is lower than the 0.05 level of significance. This indicates that when scientific terms are presented in a clear and understandable manner, learners are more likely to comprehend the concepts effectively, leading to improved test outcomes. When students easily grasp the

meaning of vocabulary, they are better able to interpret questions and express their understanding during assessments. Similarly, conformity showed a significant effect with students' performance, as evidenced by a p-value of 0.000. This suggests that when vocabulary instruction aligns with curriculum standards and learning competencies, students demonstrate better academic achievement. The alignment of instructional materials with expected competencies ensures that learners acquire the appropriate knowledge and skills needed to succeed in formal assessments.

Table 13. Significant Effect between the Assessment of ESV (Essential Science Vocabulary) on the Students' Performance in Science

Assessment of ESV (Essential Science Vocabulary)	Students' Performance in Science Quarterly Examination
Accuracy	t-value
	1.637*
	Sig. (2-tailed)
Clarity	0.103
	N
	170
Conformity	t-value
	3.148*
	Sig. (2-tailed)
Usability	0.002
	N
	170
Content	t-value
	4.453*
	Sig. (2-tailed)
Design	0.000
	N
	170
	t-value
	-0.402
	Sig. (2-tailed)
	0.688
	N
	170
	t-value
	2.234*
	Sig. (2-tailed)
	0.027
	N
	170
	t-value
	-2.005*
	Sig. (2-tailed)
	0.047
	N
	170

In addition, content was found to have a significant effect with students' performance, with a p-value of 0.027. This implies that the quality and relevance of the vocabulary content contribute to students' understanding of scientific concepts. When learners are exposed to meaningful and well-structured content, they are more capable of retaining information and applying it during examinations.

Moreover, design also exhibited a significant effect with students' performance, as reflected by a p-value of 0.047. Despite the negative t-value, the result still indicates significance, suggesting that the way vocabulary materials are organized and visually presented can influence learning outcomes. Effective design may help capture students' attention and facilitate better retention of information, thereby supporting improved academic performance.

On the other hand, accuracy did not show a significant effect with students' performance, having a p-value of 0.103, which is higher than the 0.05 level of significance. This indicates that while correctness of spelling and definitions is essential, it may not directly translate to higher test scores without other supporting factors such as comprehension and application.

Likewise, usability was not found to be significantly related to students' performance, with a p-value of 0.688. This

suggests that even if instructional materials are easy to use, it does not necessarily guarantee improved academic outcomes. Students' performance may still depend on other variables such as engagement, study habits, and depth of understanding.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, it can be concluded that the Essential Science Vocabulary (ESV) serves as an effective instructional tool that enhances students' lexical proficiency and supports their performance in Science. Specifically, the investigation has drawn the following conclusions:

The significant positive effect of the Essential Science Vocabulary (ESV) components on students' lexical proficiency indicates that clarity, conformity, and design play an essential role in enhancing students' ability to understand definitions, recognize synonyms, identify antonyms, and improve spelling, thereby supporting stronger engagement with scientific concepts, thus rejecting the hypothesis. This implies that integrating well-structured and carefully designed vocabulary components into science instruction can significantly improve students' language development alongside content mastery.

Furthermore, the significant effect of the Essential Science Vocabulary (ESV) components, specifically clarity, conformity, content, and design on students' quarterly examination scores indicates that the assessment of well-structured vocabulary instruction and thoughtfully designed learning materials can lead to improved understanding of scientific concepts and higher academic performance, thus rejecting the hypothesis. This implies that strengthening vocabulary support can enhance students' comprehension during assessments, enabling them to interpret questions more accurately and respond more effectively. Overall, the results emphasize the value of carefully developed instructional tools in enhancing students' lexical proficiency and supporting their academic performance in Science.

Based on the findings and conclusions made, the following recommendations were forwarded:

Students may actively engage with the Essential Science Vocabulary (ESV) by practicing the use of scientific terms in both written and oral activities to further enhance their lexical proficiency and understanding of concepts.

Teachers may integrate the ESV regularly in classroom instruction by incorporating vocabulary-focused activities such as drills, contextual examples, and interactive exercises to strengthen students' mastery of scientific terms.

Schools may give support the use of supplementary learning resources like the ESV by providing adequate materials and encouraging their consistent use across science classes to improve students' vocabulary development and academic performance.

Teachers may also design varied and engaging learning tasks that focus on the application of vocabulary in real-life contexts, allowing students to connect scientific terms with practical situations and deepen their comprehension.

Future researchers are encouraged to conduct further studies on the effectiveness of vocabulary-based instructional materials, particularly focusing on other variables such as

students' motivation, retention, and long-term academic performance.

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