

# Utilization of Vocabulary Aid (VocAid) in Improving the Vocabulary Skills in Science of Grade 10 Students

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## Abstract

This study about the Vocabulary Aid (VocAid) focused on the acceptability and effectiveness of the material. The goal of the study was to determine how well-accepted science teachers were in the validation of the Vocabulary Aid (VocAid) in science for students in Grade 10. The second objective was to assess how well students were using vocabulary aid (VocAid). The study also looked for a significant difference between the Grade 10 students' pretest and posttest results.

Quasi-experiment specifically one-group type and descriptive research design were utilized in the study. The results were interpreted using statistical tools such as Mean, Standard Deviations, and Paired t-test. The subject of the study was a group of fifty (50) former Grade 10 students of San Roque National High School in Victoria, Laguna from S.Y: 2019-2020. Selected fifteen (15) science teachers evaluated the Vocabulary Aid (VocAid) for acceptability in terms of appearance, content, usability, conformity, accuracy, and clarity.

The level of acceptability of the Vocabulary Aid (VocAid) in terms of Appearance, Content, Usability, Conformity, Accuracy, and Clarity was Highly Acceptable. Statistical analysis also shows an increase in posttest over pretest which shows that the learners' performance was enhanced. The difference in pretest and posttest is significant as manifested by the probability value less than 0.05 level.

Vocabulary Aid (VocAid), a tool to enhance learners' vocabulary skills, was the goal of this research. The results suggest that the Vocabulary Aid is a useful teaching tool for improving students' Science performance. It can be inferred that the instrument can be used in conjunction with subject instruction and discussion. The findings demonstrated that students who use Vocabulary Aid (VocAid), which allows them to quickly generate vocabulary definitions, comprehend science concepts more fully. Hence, the null hypothesis stating that there is no significant difference in posttest and pretest is rejected.

In light of the findings and conclusion, it is highly suggested that vocabulary aids (VocAid) be developed for other subject areas to help students improve their vocabulary. In order to make the VocAid more engaging and practical to use, the researcher also advises turning it into a digital app.

Keywords: vocabulary; vocabulary skills; vocabulary aid; dictionary; learning tool

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## 1. Introduction

Science is one of the core subjects in the Philippine education system together with Math, English and Filipino. The Philippine Science Curriculum aims to develop scientifically, technologically, and environmentally literate and productive Filipino learners. In the implementation of K-12 Curriculum thru Republic Act No. 10533 known as -Enhanced Basic Education of 2012, Science is taught in a spiral progression from Grade 1 to Grade 12. The spiral progression approach exposes the learners into varying concepts and disciplines, which are given from simple to complex levels.

Government and non-government organizations in the education sector have been developing and carrying out projects and programs continuously to enhance science education. Despite their best efforts, the Philippines' educational system came under fire in 2019 as a result of local and international assessments of student achievement that showed how poorly Filipino learners performed Malipot (2019). According to Villegas (2021), Filipino students consistently scored the lowest in mathematics, science, and reading across all three international surveys namely, Southeast Asia Primary Learning Metrics (SEA-PLM), Trends in International Mathematics and Science Study (TIMSS), and Program for International Student Assessment (PISA) of the Organization for Economic Co-operation and Development (OECD).

In light of the persistently dismal performance of the Philippines in national and international surveys, the education system has a lot of work to do to support the delivery of quality science education. Learning the subject involves more than just understanding scientific principles; it also calls for other abilities, such as a basic command of the English language so that students can articulate their thoughts clearly and effectively and explain events. Based on the researcher's teaching experience, one of the challenges to learners understanding science is their degree of communication abilities. It is crucial to keep researching the curriculum and creating new projects and activities in order to increase students' aptitude for and enthusiasm in science. Therefore, in accordance to DepEd Order No. 39, s. 2016 regarding the adoption of -Basic Education Research Agenda to conduct education research to address this pressing and emerging education issue, this research-based study on Vocabulary Aid (VocAid) is devised.

## Background of the Study

We are always surrounded by products of science that are guided by an infinite number of scientific notions, therefore science is pervasive. Due to its importance to people's lives and the skills it employs, science education is regarded as the most important subject in schools for this reason. It is challenging to impart technology literacy, critical thinking, and problem-solving skills through science education, particularly when there are communication issues. The learners' communication abilities, which may be limited by their lack of proficiency in skills like reading, writing, vocabulary, and comprehension, might be a barrier.

According to studies, Filipino learners struggle to retain concepts, have weak analytical and reasoning abilities, and have poor communication skills (UP NISMED, 2004). On the National Achievement Test (NAT), Filipino pupils continue to perform poorly in the science category. A region received an average score of 28.42 on the 2018 National Achievement Test (NAT), falling short of the required average score of 75 (Department of Education (DepEd) Region 2, 2018). It was noted that students performed poorly on their Science Achievement Tests in a classroom context, as seen by their low mean percentage scores. Additionally, the researcher's own experience in the classroom demonstrated students' incapacity to support their arguments with evidence. Teachers frequently conduct discussions in English but must translate into Filipino because pupils find it challenging to understand. There are times when students can articulate their concepts in Tagalog but struggle to do so in English. These circumstances prompt an investigation on the importance of vocabulary to science education.

For three reasons, according to Alexander (2018), vocabulary is essential to reading achievement.

Knowing the definition of a term helps with comprehension. Because vocabulary is the basis of communication, its significance should not be understated. All aspects of communication—listening, speaking, reading, and writing—benefit from a strong vocabulary. They gain intellectual and social competency when they expand their vocabulary as children and teenagers.

According to Anderman and Sinatra (2012), communication abilities are crucial in the field of science. Adolescents are capable of communicating clearly about abstract ideas but often struggle to do so. There are two different forms of communication: oral communication and written communication. Due to students' limited language, teachers have difficulties when teaching science in both approaches. As a result, some students struggled to understand simple questions, others had trouble putting ideas in the right order, others had trouble following instructions, some read passages in small chunks and couldn't connect the ideas, and still others had trouble drawing inferences or figuring out concepts that weren't explicitly stated.

Recognizing the significance of vocabulary skills for student's success in school, the researcher is motivated to carry out research to test Vocabulary Aid (VocAid) as a tool to improve the vocabulary skills of Grade 10 students in Science.

## **Theoretical Framework**

The ongoing research work is anchored on the learning Theories of Schema, Second Language Acquisition and Zone of Proximal Development (ZPD). These demonstrate the active role of learners when constructing meaning and play a role in vocabulary instruction when students are asked to use prior knowledge in connecting to new words and ideas.

Schema Theory by Sir Frederic Charles Barlett as cited by Moody (2018) discusses the conceptual and cognitive organization and representation of knowledge. It explains how information is gathered, processed, and mentally structured. The ability to process, encode, organize, and retrieve information is made possible by schemas, which can be compared to mental filing cabinets. Schemas that provide a framework for describing things and events inside a text are activated during comprehension. According to the theory, a schema can be memorized and used without the user even being aware of it; b) once a schema is developed, it tends to remain stable over a long time; c) the human mind uses schemata to organize, retrieve, and encode significant information; and d) schemas are accumulated over time and through various experiences. A generic knowledge will be used to construct the generic knowledge. When teachers assist students in creating new schemata and making connections between them, memory retention in learners can be increased during the educational process.

The Krashen Theory of Second Language Acquisition is another theory that supports the study. In the study of Wang and Yang (2013), it refers to the process of picking up a second language in addition to one's mother tongue, whether through deliberate instruction or even naturally. The Language Input Hypothesis, one of the theory's five core tenets, was thought to be its most vital component. Krashen asserted that comprehensible input is a crucial and important element in language acquisition. Without this, there are four issues that are likely to arise when teaching vocabulary: a) students finding the right word during communication; b) students expressing their feelings with the right words; c) students putting the words they have learned into practice; and d) students being unable to identify the words when listening to others speak. It is emphasized that a learner's ability to communicate effectively depends on using the right words.

Further support of the study is the Theory on Zone of Proximal Development (ZPD) by Lev Vygotsky which is described as the difference between what learner can achieve without help and what he or she can do with help (Vygotsky, 1978). The fundamental framework of a child's thinking is formed by the linguistic structures he has mastered. One's habitual language usage has an impact on how he interprets his surroundings. A child initially appears to utilize language for surface-level social contact, but eventually this language disappears to become the framework of the child's thought process. It is seen to be important that teachers use and build considerable language and communication opportunities within the classroom

environment in order to build comprehension (Nath, 2012). This theory suggests that learning new words gets simpler as learners' word experience increases. It strengthens the idea that students' inadequate oral and written vocabularies may negatively influence their abilities to excel.

The aforementioned theories support and prove that when language skills are strengthened, students may increase their performance in science. As the students are given Vocabulary Aid (VocAid), they will read it, define words, learn how to use proper words, retain the information and apply them to communicate concepts and ideas.

### Conceptual Framework

The illustration below reveals the research paradigm which describes how this study will be accomplished.

Figure 1 shows the research paradigm of the study. The Input focused on three variables which include: a) topics in Science 10 Unit 3 consisting of the Nervous System, Neurons, Control of Body Processes Through the Nervous System, Endocrine System, Effects of Hormones in the Body, and Reproductive System; b) selection of words; c) readings for lexical descriptions such as spelling, word classes, definition, synonym, antonym, and etymology. In the Process of acceptability in terms of Appearance, Content, Usability, Conformity, Accuracy and Clarity was validated by the Science Teachers that are currently in the teaching field.

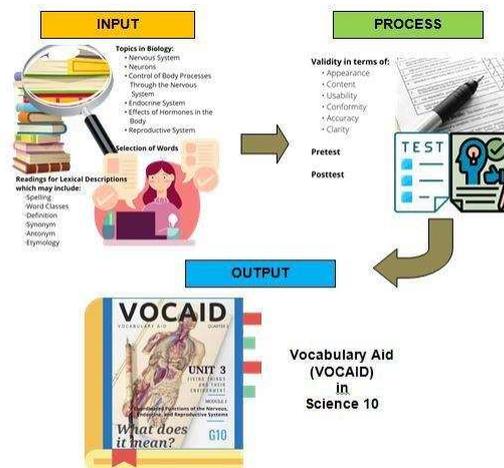


Figure 1. Paradigm of the Study

To measure the performance of the student respondents, Pretest and Posttest was conducted. The mean level of the increase in scores for each topic was compared using statistical treatment, thus, will be the basis on concluding the effectiveness of the tool. The Output is the Vocabulary Aid (VocAid) in Science 10.

### Objectives of the Study

The purpose of the study was to develop a Vocabulary Aid (VocAid) that matches the DepEd-released Learner's Material in Science 10. The study aimed to determine the acceptability and effectiveness of Vocabulary Aid (VocAid) in improving the level of vocabulary skills in Science of Grade 10 students of San Roque National High School.

Specifically, it sought the following questions:

1. Determine the level of acceptability of Science teachers in the validation of the Vocabulary Aid (VocAid) in Science for Grade 10 students in terms of:
  - 1.1. Appearance;
  - 1.2. Content;
  - 1.3. Usability;
  - 1.4. Conformity;
  - 1.5. Accuracy; and
  - 1.6. Clarity.
2. Find out the level of learners' performances in the use of Vocabulary Aid (VocAid) in terms of:
  - 2.1. Pretest, and
  - 2.2. Posttest.
3. Determine the significant difference in the pretest and posttest scores of Grade 10 students on the use of Vocabulary Aid (VocAid)?

### **Null Hypothesis**

The statement below will be the hypothesis to be proven throughout the study.

H<sub>0</sub>: There is no significant difference in the pretest and posttest scores of Grade 10 students on the use of Vocabulary Aid (VocAid).

### **Significance of the Study**

As the Vocabulary Aid (VocAid) be validated and proven to be an effective tool in improving level of vocabulary skills in Science of Grade 10 students, the result of the study will merit the following:

#### **Students**

This will help the students develop their interest toward Science by aiding them to understand the subject. They will have the ability to express their ideas and improve not only their vocabulary skills but also their critical thinking skills. Students will also be able to relate and apply their knowledge in Science to the real world.

#### **Teachers**

The result of this study may give additional information regarding the best practices and different techniques and strategies on the methods of vocabulary integration in Science which can be adapted in their classroom. This would also evaluate their competencies in adapting effective ways in teaching the students to further improve their vocabulary skills in Science.

#### **School Administrators**

The result of this study may help them empower teachers to gain more knowledge and skills in teaching Science subject by sending to higher level of seminars and trainings.

#### **San Roque National High School**

The locale of the study will highly benefit as evaluation of its students in terms of effective learning tools and their increase in performance. It will give them advances on developing strategies to further uplift their quality of education.

#### **Future Researchers**

This study will be helpful to researchers who will be conducting relevant studies on testing other ways to improve the skills necessary in teaching and learning Science.

### **Scope and Limitation**

The study used both descriptive and quasi-experimental designs. It focused on the acceptability of the Vocabulary Aid (VocAid) and its effect to the improvement of vocabulary skills in Science of Grade 10 students. This module was validated by fifteen (15) science teachers in Laguna. The subject of the study that underwent the use of Vocabulary Aid (VocAid) was fifty (50) former Grade 10 students of San Roque National High School from S.Y. 2019-2020.

The topics covered in the creation of Vocabulary Aid (VocAid) include the six activities in Unit 3 - Living Things and their Environment, Module 1 - Coordinated Functions of the Nervous, Endocrine, and Reproductive Systems.

### Definition of Terms

For better clarification and understanding of the terms related in this study, the following terms are defined operationally:

**Acceptability.** The quality of being satisfactory and be able to be agreed to or approved of. It refers to the characteristic of the Vocabulary Aid (VocAid) being subject to acceptance.

**Accuracy.** It is how close a measured value is to the -realll, -truell or -actualll value; the fact of being exact or correct of the Vocabulary Aid (VocAid).

**Antonym.** A word of opposite meaning.

**Appearance.** The outward aesthetic or visible aspect of the Vocabulary Aid (VocAid).

**Clarity.** The quality of being clear and easy to understand the contents of the vocabulary tool.

**Conformity.** The process of a product being made as it was designed without mistakes or faults and in accordance to legal bases.

**Content.** The ideas that are contained in the Vocabulary Aid (VocAid) which follows a required and theorized format.

**Definition.** An explanation of the meaning of a word, phrase, etc.

**Etymology.** An explanation of where a word came from.

**Learning Science.** It refers to the result and/or the difference of the Pre-Test and Post-Test given to grade 10 students.

**Pre-Test.** This is a test given to Grade 10 students to test their prior knowledge and skills in Science.

**Post-Test.** A test given to Grade 10 students after using the Vocabulary Aid (VocAid).

**Spelling.** A sequence of letters composing a word.

**Synonym.** A word that has the same meaning as another word in the same language.

**Usability.** The easy to use Vocabulary Aid (VocAid) or the degree to which something is able or fit to be used.

**Vocabulary Skills.** As defined in this study, it refers to the level of understanding of Grade 10 students to a body of words as to meaning, pronunciation, word class, and word use.

**Vocabulary Aid.** It refers to an instructional intervention similar to a dictionary using set of words which are related to specific topic/s. The vocabulary of each term will include spelling, word class, definition, synonym, antonym, and etymology (optional)

**Word Class.** Categories of word such as nouns, verb, adverbs, adjectives, and prepositions.

## 2. Review of Related Literature and Studies

This chapter presents the related literature and studies after the through and in-depth search done by the researcher. It describes the authors' and researchers' ideas and information which were found relevant to the present study under investigation.

### 2.1 Related Literature

Science provides ways of making sense of the word systematically. It develops students' scientific inquiry skills, values and attitudes, such as objectivity, curiosity, and honesty and habits of mind including critical thinking. Improving Science education is essential in addressing glaring industrial and agricultural needs that will boost the economic growth of our country. However, science education in the Philippines cannot be considered as strength. Based on results from 2014, the passing rate for the National Achievement Test (NAT) for high school is only 46.38%. Aside from the NAT result, the Philippines have exhibit a consistently abysmal performance in international surveys such as Trends in International Mathematics and Science Study (TIMSS). In 2003, the country ranked 43<sup>rd</sup> out of the 46 participating countries in HS II Science. Our country stopped participating in the survey in 2008, perhaps after getting such a lackluster scores (Ambag, 2018).

Students' low academic performance particularly reading comprehension, writing power, and communication skills are because of lack of vocabulary knowledge Afzal (2019). Students can access academic language and discourse with the help of specific vocabulary instruction, which makes it easier for them to comprehend increasingly complicated texts.

The below statements used by the researcher support the vocabulary as prerequisite in comprehension otherwise the lack of reading fluency of some students is one of the problems that should be aided by the teaching force.

Learning vocabulary is a lifelong process of language and literacy development that starts in childhood and continues through school and beyond. The ability of children to understand and use words appropriately during the language actions of listening, speaking, reading, and writing is influenced by their knowledge of vocabulary meanings. Such knowledge has an impact on the complexity and nuances of children's thinking, as well as how they communicate in oral and written languages and how effectively they comprehend printed texts Sinatra, Zygouris-Coe, and Dasinger (2011).

There is several definition of vocabulary by some experts. According to Vossoughi (2012), Vocabulary is one element of language component that should be learnt and taught. In addition, word vocabulary is the tool we use think, to express ideas and feelings, and learn about the world. It is said that vocabulary is used by people as the basic knowledge of learning a language in order to make communication and interaction among them in their daily life.

According to Napa (in Badingatussalamah, 2013) -vocabulary is the components of language and no language exist without words. Meanwhile, states that vocabulary is the total numbers of words in language as Tyani (2014) cited by Hornby (in Wakidah, 2013).

From the definitions above, it can be concluded that vocabulary is all the words in language and which enhance the skill in language. Because mastering language is impossible without vocabulary and vocabulary mastery is the basic requirement for learning.

Herman and Dole (2018) cited that only fairly thorough understanding of words improves comprehension of a given text. Then, the roles of direct instruction and incidental acquisition of word meanings are explored. There are three approaches to vocabulary instruction --- definitional, contextual, and conceptual. The combination of definitional and contextual approaches effectively improves comprehension. The conceptual approach builds more thorough word knowledge and is more likely to affect comprehension, but it is time consuming in terms of teacher preparation and allocated class time. Not all words need the in-depth instruction to which the conceptual approach lends itself. This type of instruction is recommended for words crucial to understanding a text.

Diamond and Gutlohn (2011) stated one of the four components of an effective vocabulary program that in order to make sure students understand the definition, words should be taught explicitly. Students understand a word with unknown definition if it is shown in variety of contexts. When students are engaged with the words interactively, they generate their own definitions.

Gemert (2017) stated the reasons why vocabulary should be taught. It includes: improving reading

comprehension; improving subject-specific mastery and performance; writing and speaking skills; and deepening students' ability to put their thoughts into most appropriate word possible. Students need to be exposed to the vocabulary over and over in order to use the words effortlessly. When words or texts are repeated, students gain more word knowledge.

Vocabulary is one of important factors in language learning and develops the language skills. The learners may experience difficulty if they are lack of vocabulary. Meanwhile, vocabulary is central to teaching subjects that use English as a medium of instruction because without sufficient vocabulary, students cannot understand others or express their own ideas.

As Griffiths (2018) states that vocabulary is the basic component of language proficiency which provides the basis for learners' performance in other skill, such as: speaking, reading, listening, and writing. In addition, Bromley (2014) also cited that the students who have good vocabulary mastery will have good reading comprehension and high score on achievement test than students who are lack of vocabulary.

Vocabulary represents one of the most important skills necessary for teaching and learning Essays, UK. (2018). They quoted David Wilkins, a linguist who argued that –without grammar little can be conveyed, without vocabulary nothing can be conveyed. It is proven by an experience when they noticed the fact that students usually find it difficult to speak English fluently. Speaking and writing activities were considered to be very exhausting because students keep on using the same expressions and words and conversation will eventually be interrupted due to missing words. And the main reason for such communication problems is the lack of vocabulary.

Based on the given statements, it can be seen that vocabulary is very important to master the four language skill such as: speaking, reading, listening and writing and additionally vocabulary can help people communicate with others.

Teaching vocabulary to students is essential to their learning. Therefore, strategies towards improving it should be done to increase word knowledge. Below are the readings on the strategies applied inside and outside the classroom in enriching one's vocabulary.

Hutchinson (2021) suggested that with carefully crafted statements that incorporate vocabulary and prompt discussion, students learn scientific terms and concepts more readily. Posing true/false questions is one of the best strategies to encourage conversation among students and aid in the development of their scientific vocabulary. Additionally, the way that statements are constructed strategically helps students learn more naturally, retain information longer, and develop a greater interest in the material they are studying.

In order to enrich vocabulary, a student does not only need to learn many words, they also need to remember them because, learning is remembering. To help teachers make the process of learning easier for students, it is important to help learners learn words efficiently. To keep the words in their memory, practicing and repeating vocabulary is strongly recommended. However, repetition alone will not be effective. They need to understand the meaning of those particular words and be closely related to modifying them with other similar words that they have already learned (Essays, UK 2018).

The teachers should do something to overcome this difficulty with students' vocabulary skills. Vocabulary should be integrated into teaching the four skills; listening, reading, speaking and writing. It can be said that vocabulary is the main source in using language. That is why vocabulary should be taught first. To make the teaching vocabulary effective, Coxhead, A.J (2012) gives six considerations for teachers when they are teaching vocabulary. This includes choosing useful words, letting the learners do the work, focusing on different aspects of a word, providing meaningful learning opportunities, implementing a regular testing schedule, and being patient with their learners. These six principles are not only the principles for vocabulary teaching and learning, but they offer teachers a good starting point for decisions about the vocabulary teaching.

Johnson O'Connor Research Foundation (2022) emphasized that learning how to build a better vocabulary can be pleasurable and profitable investment of both time and effort. As one's vocabulary grows, it becomes easier to associate new words with familiar words and remember their meanings. There are no

magic shortcuts to learning words; however, there are four basic steps to building vocabulary which includes the use of dictionary to look up for a word's meaning. Once you have begun looking up words and you know which ones to study, vocabulary building is simply a matter of reviewing the words regularly until you fix them in your memory.

The contents of dictionaries and thesauri, as well as the technical specifications needed to create the tailored Vocabulary Aid, are listed below (VocAid).

The Lund University (2011) defined dictionary as a reference book about words and as such it describes the functioning of individual words (sometimes called lexical items). The list of words is arranged in alphabetical order in the form of headwords. It gives information about certain items in the communication system (the language) used by people to exchange messages. The types of information given in a typical entry are spelling, frequency information, pronunciation, word class, sense(s), and collocations, phrasal use and the syntactic operation of the word.

The dictionary's content is derived through research into words that were employed at some point in the language's history or in the current state of a living language. The starting point for a dictionary is a collection of texts. The editor's first problem is deciding which words to include in the dictionary. The second is to determine the information to include in each word. The third is to extract the required information from the text of the corpus. And finally, to organize all the information obtained and make it available to other scholars (Bratley and Lusignan, 2016).

According to Gemert (2017), when selecting words to be explicitly taught, there are a number of factors to consider. These factors include word familiarity, requirement for comprehension, word association with context, and frequency of contact.

Beck (2013) introduced the three levels structure to the authors' framework for selecting the words to be taught through rigorous vocabulary education. The first are daily words, which are typically learned in the early grades and are not required to teach intensively. Second, there are academic words, which are more likely to be read in texts than to be heard in interactions. These words may appear in technical or informational texts, as well as poetic works with advanced vocabulary as they frequently improve the precision of words. They are cross-domain words that can be found in a range of fields. Lastly, the domain-specific words that only appear in relation to a given content area. They're the ones in textbooks that are bolded and/or listed in the glossary.

Smith (2022) stated that the details you require about a term will depend on what you intend to accomplish with it. For instance, knowing the meaning suffices if all you want to do is comprehend it in a reading text. On the other hand, other information, like spelling and pronunciation, is crucial if you wish to be able to apply it in writing or speaking. He listed all the crucial details regarding English vocabulary that you must be aware of in order to study it properly, including: 1) meaning, which is best studied in context, focusing on a single meaning rather than all possible meanings; 2) spelling, is important if you want to use the word in your writing; 3) pronunciation; 4) part of speech, which designates whether a word is a noun, verb, adjective, or adverb. It will be challenging to appropriately utilize the word in speaking or writing without this information; 5) word family; 6) Frequency; 7) Usage; 8) Register; and 9) collocation.

Super Teacher Worksheets (2022) demonstrated the various components of a dictionary, such as the definition, entry word, guide words, pronunciation, part of speech (the abbreviation that indicates the part of speech the defined word belongs to), and definition (which explains the meaning of the entry word). If there are multiple meanings, the definition is separated into sections by numbers and origin-shows the word's etymology.

According to Mardianawati (2012), learners can learn the following aspects of vocabulary; 1) Meaning, where a word may have more than one meaning when used in different contexts; 2) Spelling, the letter's connector sound, which is essential for reading; 3) Pronunciation, the way to say words or letters; 4) Word Classes, the categories of words like nouns, verbs, adverbs, adjectives, and prepositions; and 5) Word Use, the way a word, phrase, or concept is used in a language. It may involve grammar as well, making them

the subject of a thorough analysis to identify patterns of regional or social usage.

Macmillan Dictionary (2019) stated that a dictionary entry is a set of information that describes a word or phrase. A typical entry in Macmillan Dictionary consists of: (1) a headword; (2) information about the word's meaning or meanings, called definition(s); (3) number of definitions listed; (4) information about the word's grammatical behavior, word class; and a Thesaurus which link to one or more lists of synonyms and related words.

Armbruster and Osborn (2011) highly suggested that students must learn how to use dictionaries, glossaries, and thesauruses to expand and deepen their knowledge of words, even though these resources can be difficult to use. The most helpful dictionaries include sentences providing clear examples of word meanings in context.

The resources a teacher offers are crucial tools for student learning. The work that students accomplish in class and outside of it is complemented and improved by effective instructional aids and resources. It underwent multiple checks and edits to verify its quality before being made available to students. The criteria used to gauge whether the Vocabulary Aid (VocAid) is appropriate for use as a teaching aid in science classes may be found in the following readings.

According to Tomlinson (2018), learning materials have an impact when they have a discernible impact on students, which happens when students' curiosity, interest, and attention are stimulated.

The criteria for selecting quality instructional aids are mentioned in India Study Channel (2011). These include: 1) teaching aids are large enough for students to see them; 2) teaching aids are meaningful and always stand to serve a useful purpose; 3) teaching aids are up to date in every way; 4) teaching aids are simple, cheap, and can be improvised; 5) teaching aids are accurate and realistic; 6) teaching aids are according to the mental level of the learners; 7) their purpose may be informative but it is not solely educational; 9) teaching aids can be employed in numerous lessons and at different class levels; and 10) teaching aids are helpful for enhancing the teaching process but they cannot take the position of the teacher.

Educational contents also influence the choice of materials because a teacher should select a format that will enable methodical application of the educational content, credible depiction of it, and consideration of the many learning phases. The media (in terms of methodologies) can be a tool for teaching and learning support, a tool for self-directed learning, or a source and transmitter of information. This is crucial when selecting resources because the right selection will increase students' engagement, motivation, and readiness to learn. We must be aware of and take into account students' skills, gender, age, experience, prior knowledge, working tempo, and learning progress while taking into account the characteristics of students and teachers Mazgon & Stefanc (2012) as cited by Kalin (2004).

Bates (2019) defines content as things like facts, ideas, beliefs, evidence, descriptions, and procedures. It's critical to define our educational objectives clearly while planning instruction for the digital age. Students need some sort of organization within their subject areas because, among other reasons, some material needs to be learned in "the right order," without organization, the subject matter would just be a jumble of unrelated subjects, and students can't know or figure out what is important and what isn't until they begin studying it. Structure includes the choice and sequencing of content, the creation of a particular focus or approach to particular subject areas, aiding students in the study, interpretation, or application of content, and the integrating and linking of various subject areas. To manage knowledge effectively, you must understand what content is relevant and why, where to find it, and how to evaluate it.

Texts have long been an integral component of classroom instruction, skill development, and language learning situations. It has long been understood that selecting texts that are engaging and motivating is important, but we also need to make sure that the substance is rich and relevant. A good text should be interesting, but it should also contain material that the student may still utilize after the session is complete. Texts must offer readers something they can use to advance their linguistic abilities and gain knowledge of the actual world Oxford University Press ELT (2014).

According to Wikipedia (2022), a dictionary is a listing of lexemes from the lexicon of one or more

specific languages, often arranged alphabetically (or by radical and stroke for ideographic languages), which may include information on definitions, usage, etymologies, pronunciations, translation, etc. It is a lexicographical reference that shows inter-relationships among the data.

Oxford Languages (2022) stated that the words in dictionaries are tailored to suit the needs of the user: a dictionary for children at primary school level, for example, will contain words and definitions appropriate to that age group.

Usability, according to Idler (2021), means user-centered design. The prospective user is at the center of both the design and development processes to ensure that their objectives, mental models, and requirements are satisfied. Therefore, it is to create items that are both efficient and easy to use. An educational material's usability depends on whether it is available, understandable, credible, easy to learn, and relevant to the users who will really use it.

Usability is a quality attribute that evaluates how easy something is to use. The term "usability" also describes techniques for improving ease-of-use throughout the design process. Learnability, efficiency, memorability, mistakes, satisfaction, and utility are the five quality factors that constitute usability Nielsen (2012).

According to the Usability Professionals' Association (2012), usability refers to how user-friendly and well-suited something is to the people who use it, whether it be software, hardware, or anything else. It is a feature or quality of a product. It concerns a product's effectiveness, efficiency, and user satisfaction. It is the name of a collection of methods created by usability experts to aid in the development of useful products.

A good text book should convey the teaching material generating the themes, types of texts and speech acts as stated in the core competence and basic competence in the curriculum. The mark of a good set of learning objectives is conformity to the ABCDs of well-stated learning objectives. These are audience, behavior, conditions, and degree Kurt (2016).

Based on DM No. 441s. 2019 Guidelines and Process for LRMS Assessment and Evaluation of Locally Developed and Procured Materials, Requirements Standards and specifications along with documented guidelines are provided to ensure that all resources available are of a high quality and educational value. Importantly, they are deemed fit for purpose, easy to access and use. The following are parameters in evaluating the quality of the content of the materials to be assessed: 1) Integrity and Consistency - Does the material reflect the philosophy of the K to 12 curriculum and the goals of the subject area in the curriculum?; 2) Organization - Is there a smooth flow of ideas in the material and are the topics locally organized? Does the material contain advance organizers, summaries, evaluation, and other features that facilitate synthesis of learning? Do the features of the material show agreement and harmony?; 3) Accuracy and Recency - Are content (text, illustrations, exercises) in the material accurate? Are the examples provided realistic? Are the content up-to-date (e.g., statistics should not be more than 5 years old)?; 4) Appropriateness - Is content of the material appropriate to local situations and/or the ability of the learners at the particular grade level? Are activities and exercises engaging and interesting to the learners? Is there variety of activities and exercises to suit the different intelligences and learning styles of learners? Are the objectives attainable? Are the suggested materials easily available? Are suggested strategies practical, challenging, and stimulating? Are the tests: properly constructed? useful in evaluating learning outcomes? congruent with the objectives?; 5) Sensitivity - Are all aspects of the material acceptable to significant groups (i.e., parents, teachers, students, or other stakeholders)? Is the material mindful of cultural biases? Does it avoid sexism/ racism or regionalism? Is it mindful of ageism/ disability/ geography/ religion? Are controversial issues addressed fairly, objectively, and within the level of the learners?; 6) Comprehensiveness - Are relevant learning competencies adequately covered? Are concepts adequately explained to avoid misconceptions? Is content sufficient to attain the objectives of instruction and the articulated learning competencies?; 7) Balance - Is there balance and fair treatment of other aspects such as: gender / the domains of learning (cognitive, affective, psychomotor)/ the locale (rural, urban, upland, lowland)?; 8) Readability and Presentation - Are concepts presented in a clear and concise manner? Are the procedural text easy to follow? Is the language appropriate for the grade level?

Is the format of the material helpful in understanding the content? Is the design attractive? Is the print size and font type used appropriate and legible? Is the material handy for daily use? Is the style of illustration and layout appropriate for the target grade level? Are there enough illustrations to facilitate learning? Does the material have other essential parts that will make the material more useful (i.e., glossary, index, appendix)?

Meriam Webster (2022) defined accuracy as freedom from mistake or error. It is ensuring that information is correct and error-free Al-khayari (2011).

Maniyani (2022) says success depends on accuracy, honesty, and transparency, both personally and professionally. While truth and transparency bring accountability, stability, and security, accuracy offers a high degree of quality and precision.

Perelman (2011) identified three key areas where writing accuracy might be developed as follows: (1). Document accuracy means that your topics are properly covered and are covered in sufficient detail; (2). Stylistic accuracy is the precise use of words to convey meaning. To properly describe and analyze your topics, your language must be accurate. This calls for careful consideration of paragraph and sentence structure as well as word choice; (3). While stylistic accuracy is necessary, technical accuracy is not exclusively dependent on it. A technically accurate comprehension and representation of the topic must be the foundation of an excellent science and technology document. Technical accuracy depends on the writer's conceptual understanding of the topic, his or her command of the vocabulary, and their capacity to evaluate and mold facts with the least amount of distortion.

Oxford Languages (2022) defines clarity as the quality of being coherent and intelligible. If we want the information to be fully understood, clarity is essential. Therefore, it's imperative to refrain from employing language that is unnecessarily complex and obscures the major points of the text. To be clear and direct, it should be presented in a logical order Delgado (2016).

According to B2B Tech Writer (2012), clarity is one of the essential components of effective communication. No amount of persuasion, accuracy, or interesting subject matter will help a message get across if the audience has problems understanding it. She listed some guidelines for writing understandable content, like being concise, specific, using familiar words, and organizing the text.

Study Smarter Survival Guide (2019) mentioned that a piece of writing is clear when concepts are expressed precisely and concisely so they may be understood. Being precise implies utilizing precise words to convey the intended message. Details, examples, and explanations must be given in order to make the message clear. Use of appropriate technical language is required (discipline-specific terminology refers to the phrasing and technical words used within a discipline). Short and to the point writing is concise. By writing in this manner, you make it simple for your reader to comprehend you without having to unpack too many words.

Idler (2021) pointed that the core of usability is clarity. A clear and usable design can be achieved through simplicity, familiarity, consistency, guidance, and good information architecture.

According to the readings stated above, there are criteria that must be fulfilled in order to develop an effective supplemental material that could encourage learners to open, read and use them. Overall, the material must be compelling, provides rapidly available information, and is directly useful for teaching-learning process. Additionally, it should adhere to standards, concepts, and should help students advance.

One of the key aspects when measuring learning improvement is assessment. Therefore, the following literatures explained and stated the important points of pretest and posttest.

The American Heritage Dictionary of the English Language defines a pretest as an examination given before an educational experience or course of study to ascertain a student's foundational knowledge or level of readiness. A component of a method that can be used as a diagnostic tool for instructions to evaluate and enhance teaching efficacy is provided at the beginning of an introductory course.

As defined by Webster, posttest is a test given to students after completion of an instructional program or segment and often used in conjunction with a pretest to measure their achievement and the effectiveness of the program.

Downie (2013) stated that pretest and posttest are the best-known kinds of test done before and after to judge students' progress prior to the infusion of facts and procedures as basis for arguing out of their skills, knowledge, capacities, or attitudes and compare the results in terms of score so as to adjudge the strengths and weaknesses of teachers' instructional service delivery within the classroom.

A pretest-posttest design is a style of experiment in which a group is assessed prior to and following the administration of the specific experiment or activity. By doing so, it is able to ascertain what changes, if any, have occurred and assess the experiment's effectiveness or worth White (2019).

Zach (2020) described pretest-posttest design as an experiment in which measurements are taken on individuals both before and after they're involved in some treatment. Both experimental and quasi-experimental research can make use of pretest-posttest designs, which may or may not include control groups. In a quasi-experimental study, the steps are as follows: 1) give a group of people a pre-test and record their scores; 2) give them a treatment that aims to change their scores; 3) give the same group of people a post-test and record their scores; and 4) analyze the difference between pre-test and post-test scores.

Adams (2015) suggested in advance her viewpoints regarding pretest and posttest as measures to determine whether or not students' listening, reading, speaking and writing skills are behind or ahead in their learning activities as basis for leveling out the effectiveness of teachers' instructional service delivery within the classroom.

Holly (2022) claims that pre- and post-tests are made to gauge how much students have learned about a certain subject. These are helpful for both students and teachers because they: 1) help identify prior knowledge; 2) help teachers create small groups of students with similar abilities; 3) help guide lesson content and delivery; 4) help with the pressure to continually gather data on students' learning journeys; 5) help when giving feedback to students and their parents; and 6) help with goal setting in the classroom.

Thus, assessment is key component in determining how well learning is progressing. By comparing pre- and post-test results, teachers may track students' development from one class to the next, between topics, and even from day to day. Pre- and posttests are helpful diagnostic tools that can be used to improve teaching while also allowing you to see how your students have progressed.

## 2.2 Related Studies

The following are studies from the different sources, which are related to the variables of the present study.

In the study of Naggy and Townsend (2012) entitled *Learning Academic Vocabulary As Language Acquisition*, it was found out that instruction in academic vocabulary must approach words as means for communicating and thinking about disciplinary content, and must therefore provide students with opportunities to use the instructed words for these purposes as they are learning them.

The study entitled *Effects of Supplemental Vocabulary Intervention on the Word Knowledge of Kindergarten Students at Risk for Language and Literacy Difficulties* showed results of within-subjects comparisons which indicated that, overall, at-risk students made greater gains in word knowledge on target words that received the supplemental intervention as compared to words that received only classroom-based instruction. In addition, at-risk students who received the supplemental intervention demonstrated word-learning gains than those of their peers who received classroom instruction alone Loftus and Coyne (2012).

According to Glende (2013) in his study *Vocabulary and Word Study to Increase Comprehension in Content Areas for Struggling Readers*, vocabulary strategies positively impacted students' ability to comprehend social studies content. He further suggested that many opportunities should be provided for students to interact with words on a regular basis across a variety of contexts.

Chen (2011), in his study about *Dictionary Use and Vocabulary Learning in the Context of Reading* said that the use of dictionary can effectively facilitate vocabulary comprehension and enhance

incidental vocabulary acquisition. He also added that dictionary use is more effective strategy of vocabulary learning than contextual guessing. It is proven when the subjects were asked to read an English passage and perform a reading task under one of three conditions: with the aid of a paper dictionary, with the aid of electronic dictionary, and without access to any dictionary. After completing the task, students were given with unexpected retention test on the target lexical items included in the reading passage. The same retention test was repeated one week later.

The study on -Systematic Review of the Research on Vocabulary Instruction That Impacts Text Comprehension identified the effective characteristics of vocabulary instruction. Among the findings include: teaching of word meanings supported comprehension of text containing the target words in almost all cases; and instruction that focused on some active processing was typically more impactful than a definition or a dictionary method for supporting comprehension of text containing the target words (Wright and Cervetti, 2016).

Jones (2018) studied -Using a Concept of Definition Word Map to Teach Science Vocabulary and found out those students' vocabulary knowledge and ability to independently generate vocabulary definitions significantly increased. The focus group showed that students felt more confident in their understanding of science vocabulary and concepts and were better able visualize what word meant during classroom lessons or while reading.

Farjami and Aidinlou (2013), in their study, -Analysis of the Impediments to English Vocabulary Learning and Teaching argued that learning a foreign or second language at various levels of proficiency requires a high number of words for which the learners make efforts to retain words in their long-term memory. Language learners have a serious problem remembering the large amounts of vocabulary necessary to achieve fluency. Lack of sufficient input and output are the sources resulting in forgetting. The researchers suggested that teachers should present new vocabulary items, which are rich enough to enhance the students' vocabulary knowledge.

Afzal (2019) on -A Study on Vocabulary-Learning Problems Encountered by BA English Majors at the University Level of Education confirmed that the learners face vocabulary-learning problems even at the university level of education. The problems include difficulties with pronouncing new words, spelling new words, appropriately using new words, identifying grammatical structure of words, and guessing meanings from context. Hence, he argued that students have a limited 'word repository,' an issue that should be addressed seriously. Due to a lack of vocabulary understanding, these vocabulary-learning issues cause students' reading comprehension, writing ability, and communication abilities to deteriorate.

According to Alqahtani (2015), who wrote about "The Importance of Vocabulary in Language Study and How to be Taught," lexical knowledge is essential to communicative competence and the learning of a second or foreign language, and a deficiency in this area is a learning barrier. Through a variety of teaching methods used by ESL/EFL teachers, an effort is made to review the trends in the vocabulary-teaching field. Teachers must consider the type of vocabulary, the level and characteristics of the students, as well as the value of the strategies for the learners as it may affect their learning before presenting the meaning or form of vocabulary items. Additionally, they can give their pupils opportunity to learn vocabulary by repeated exposure to words in various contexts.

The research listed above showed that students who received extra intervention made more progress in learning the target words. In order to increase students' reading comprehension, writing skills, and communicative competence, numerous opportunities for word interaction with students on a regular basis in a number of contexts should be offered.

### 3. Research Methodology

This chapter presents the methods and procedure employed by the researcher in analyzing and interpreting the data pertaining to the variables of this study. It tackles the research design, research locale, respondents of the study, instruments, data gathering and the statistical analysis and treatment of data.

#### 3.1 Research Design

The proponent used both descriptive and quasi-experimental research design. According to Price, Jiangiani, Chiang, Leighon and Cuttler (2021), One-Group Pretest-Posttest Design is a type of quasi-experimental design where the dependent variable is measured once before the treatment is implemented and once after it is implemented. This design was used in order to determine the effectiveness of the utilization of Vocabulary Aid (VocAid). The researcher measured scores before and after following a treatment, then compared the difference between pretest and posttest scores.

A Descriptive Design as defined by Formplus Blog (2021) is a type of research that describes a population, situation, or phenomenon that is being studied. It focuses on answering the how, what, when, and where questions of a research problem, rather than the why. In this study, descriptive design was utilized to determine the acceptability in terms of appearance, content, usability, conformity, accuracy, and clarity of the Vocabulary Aid (VocAid).

#### 3.2 Respondents of the Study

The acceptability of the Vocabulary Aid (VocAid) was validated by selected fifteen (15) Science teachers of Victoria, Laguna that are in the teaching field.

The subject of the study was a group of fifty (50) former Grade 10 students of San Roque National High School in Victoria, Laguna from S.Y: 2019-2020. They are considered as the respondents because they are the last pre-pandemic student group that has actually performed and completed the activities in the science learner's material where the Vocabulary Aid (VocAid) is based.

The researcher employed purposive sampling technique in gathering the data needed for the acceptability and validity of the material. The purposive sampling technique suits this study because it has no rigid procedure of choosing the sample as long as it suits the target characteristic of the samples needed in the study. As explained by Formplus (2021), purposive sampling also known as subjective sampling is a technique where researcher relies on their discretion to choose variables for the sample population. Here, the entire sampling process depends on the researcher's judgment and knowledge of the context, thus, lowers the margin of error of the data.

#### 3.3 Research Procedure

Initially, the researcher proposed the study entitled -Utilization of Vocabulary Aid (VocAid) in Improving the Vocabulary Skills in Science of Grade 10 Students at the LSPU Sta. Cruz Campus to conduct the study. Following the panelists' approval, the researcher started the investigation and employed the procedures which were shown in the figure below.



**Figure 2. Research Procedure**

### **3.1.1 Selection of Topics/Activities**

The coverage of the Vocabulary Aid (VocAid) was the six (6) activities/topic in the first module of third quarter that focuses on coordinated functions of the nervous, endocrine and reproductive systems. These include the Nervous System, Neurons, Control of Body Processes Through the Nervous System, Endocrine System, Effects of Hormones in the Body, and Reproductive System.

### **3.1.2 Selection of Words**

The researcher selected the words to be included in the Vocabulary Aid (VocAid). The collection of texts include daily words, academic words, and cross-domain words. Further, the selection criteria took into account things like word familiarity, requirement for comprehension, word association with context, and frequency of contact Gemert (2017).

### **3.1.3 Development of the Vocabulary Aid (VocAid)**

After the words had been gathered, readings for lexical descriptions, such as spelling, word classes, definition, synonym, antonym, and etymology, were conducted. The gathered data was then organized. Headwords are used to arrange the words into an alphabetical list.

An instrument used to test the performance was a total of one hundred twenty (120) multiple choice items. The total number of items was distributed in six (6) activities where each has a 10-item pre-test and 10-item posttest respectively.

### **3.1.4 Evaluation of the Material**

The Vocabulary Aid (Vocaid), the testing instrument, and the Evaluation-Questionnaire were sent to selected fifteen (15) science teachers for validation. The acceptability of the Vocabulary Aid (VocAid) was validated terms of appearance, content, usability, conformity, accuracy and clarity.

### **3.1.5 Field Testing**

The one hundred twenty (120) multiple choice items was field tested among selected fifty (50) former grade 10 students (from S.Y: 2019-2020) of San Roque National High School for reliability. This was implemented during the second quarter of the school year 2021-2022 where a copy of Vocabulary Aid (VocAid) was delivered to each respondent.

The researcher was committed to make honest reports prior to the validity and ethical issues as well as reporting of findings which were not favorable to the research study.

The forms included for this study were one (1) parent consent addressed to parents whose students participated in the study, one (1) permission letter to conduct research addressed to the School Head or Principal, one (1) certificate of validation from science coordinators of participating schools, and the copy of Vocabulary Aid (VocAid).

## **3.4 Statistical Treatment of Data**

The responses on the survey questionnaire for the validation of Vocabulary Aid (VocAid) were tabulated to find out whether the material was appropriate and substantial in helping students understand terminologies used in science activities. The Mean and Standard Deviation were used as the basis of descriptive presentation of data in the validation of the Vocabulary Aid (VocAid) in terms of Appearance, Content, Usability, Conformity, Accuracy, and Clarity.

To test the effectiveness of the Vocabulary Aid (VocAid), based on pretest and posttest, paired t-test was used. The mean posttest score and mean pretest score for each module were compared and their difference was assessed for statistical significance.

**Table 1. Statistical Treatment of Data**

Variables	Statistical Tools
Validation of the Vocabulary Aid (VocAid)	Weighted Mean, Standard Deviation
Level of Performance of Students in the Use of Vocabulary Aid (VocAid)	Weighted Mean, Standard Deviation
Acceptability Level of Vocabulary Aid (VocAid)	Weighted Mean, Standard Deviation
Significant Difference of Pretest and Posttest Scores	Paired t-test

#### 4. Presentation, Analysis, and Interpretation of Data

This chapter presents the statistical analysis of data with the corresponding interpretation and analysis of the results. The data are presented in accordance with the statement of the problem of this study, specifically, (1) level of acceptability of Vocabulary Aid (VocAid) in terms of Appearance, Content, Usability, Conformity, Accuracy and Clarity, (2) level of learners' performances in the use of Vocabulary Aid (VocAid) in terms of Pretest and Posttest, (3) is there a significant difference in the pretest and posttest scores of Grade 10 students on the use of Vocabulary Aid (VocAid).

##### The Acceptability Level of the Vocabulary Aid (VocAid)

In line with the first objective in this study, science teachers rated Vocabulary Aid (VocAid) in terms of Appearance, Content, Usability, Conformity, Accuracy and Clarity.

**Table 1. Respondent's Level of Acceptability on Vocabulary Aid (VocAid) in terms of Appearance**

Indicative Statement	Mean	SD	Verbal Interpretation
<b>The Vocabulary Aid (VocAid) in Science...</b>			
1. shows an attractive and eye-catching cover.	3.80	0.41	Highly Acceptable
2. is handy and easy to carry.	3.87	0.35	Highly Acceptable
3. uses appropriate font size and style.	4.00	0.00	Highly Acceptable
4. has adequate margins and spacing.	3.87	0.35	Highly Acceptable
5. is legible and items are properly arranged.	3.87	0.35	Highly Acceptable
<b>Overall Mean</b>	<b>3.88</b>	<b>0.33</b>	<b>Highly Acceptable</b>

##### Legend:

Rating	Scale	Verbal Interpretation
4	3.26-4.00	Highly Acceptable
3	2.51-3.25	Acceptable
2	1.76-2.50	Slightly Acceptable
1	1.00- 1.75	Not Acceptable

The Science Vocabulary Aid (VocAid) got a Highly Acceptable remark in terms of having an attractive and eye-catching cover (M=3.80, SD=0.41), font size and style used is appropriate with the learners

( $M=4.00$ ,  $SD=0.00$ ), adequate margin and spacing, items are properly arranged, handy and easy to carry ( $M=3.87$ ,  $SD=0.35$ ). The overall mean of 3.88 indicates that the Vocabulary Aid (VocAid) is Highly Acceptable. Small standard deviation value in almost all of the items means that respondents have almost the same test perception as the level of acceptability of the material.

This implies that the Vocabulary Aid (VocAid) was attractive, handy, easy to carry, and possess qualities of a good resource that encourage the learners to open, read and utilize it as a supplemental material to better understand terms and concepts in Science and improve learners' communication as well.

Tomlinson (2018) commented that the impact of instructional aids and materials are achieved when materials have a noticeable effect on learners that are when the learners' curiosity, interest, and attention are attracted.

Cited in India Study Channel (2011) are the criteria in judging good teaching aids. These include: 1) teaching aids are large enough to be seen by the students for whom they are created; 2) teaching aids are meaningful and they always stand to serve a useful purpose; 3) teaching aids are up to the mark and up to date in every respect; 4) teaching aids are simple, cheap and may be improvised; 5) teaching aids are accurate and realistic; 6) teaching aids are according to the mental level of the learners; 7) their purpose may be informative but it is not just entertainment; 8) teaching aids helps in realization of stipulated learning objects; 9) teaching aids are really very useful and can be used in many lessons and at different class levels; 10) teaching aids are useful for supplementing the teaching process but they cannot replace the teacher.

**Table 2. Respondent's Level of Acceptability on Vocabulary Aid (VocAid) in terms of Content**

Indicative Statement	Mean	SD	Verbal Interpretation
<b>The Vocabulary Aid (VocAid) in Science...</b>			
1. contain words that are logically related to the topic.	3.80	0.41	Highly Acceptable
2. provides necessary information for the intended users.	3.80	0.41	Highly Acceptable
3. contain words that are parallel with the terms used in the Science 10 Learners' Material issued by the Department of Education.	4.00	0.00	Highly Acceptable
4. offers adequate and straightforward lexical descriptions to achieve desired sense.	3.87	0.35	Highly Acceptable
5. state operational meaning that may contribute to the acquisition of concepts, understanding, and skills in science.	3.67	0.49	Highly Acceptable
<b>Overall Mean</b>	<b>3.83</b>	<b>0.38</b>	<b>Highly Acceptable</b>

**Legend:**

Rating	Scale	Verbal Interpretation
4	3.26-4.00	Highly Acceptable
3	2.51-3.25	Acceptable
2	1.76-2.50	Slightly Acceptable
1	1.00-1.75	Not Acceptable

The Science Vocabulary Aid (VocAid) got a Highly Acceptable remark in terms of containing words that are logically related to the topic, providing necessary information for the intended users ( $M=3.80$ ,  $SD=0.41$ ), contain words that are parallel with the terms used in the Science 10 Learners' Material issued by the Department of Education ( $M=4.00$ ,  $SD=0.00$ ), offers adequate and straightforward lexical descriptions to achieve desired sense ( $M=3.87$ ,  $SD=0.35$ ). The material got a Very Acceptable remark in terms of stating

operational meaning that may contribute to the acquisition of concepts, understanding, and skills in science ( $M=3.67$ ,  $SD=0.49$ ). The overall mean of 3.83 indicates that the Vocabulary Aid (VocAid) is Highly Acceptable. Small standard deviation value in almost all of the items means that respondents have almost the same test perception as the level of acceptability of the material.

The respondents strongly agreed that the content of the Vocabulary Aid (VocAid) are adequate, substantial, and relevant to a particular topic/activity indicated in the Curriculum Guide of the Department of Education. This may contribute to the learners' acquisition of concepts, understanding, and skills in Science.

Beck (2013) introduced the three levels structure to the authors' framework for selecting the words to be taught through rigorous vocabulary education. The first are daily words, which are typically learned in the early grades and are not required to teach intensively. Second, there are academic words, which are more likely to be read in texts than to be heard in interactions. They are cross-domain words that can be found in a range of fields. Lastly, the domain-specific words that only appear in relation to a given content area. They're the ones in textbooks that are bolded and/or listed in the glossary.

Furthermore, Macmillan Dictionary (2019) stated that a dictionary entry is a set of information that describes a word or phrase. A typical entry in Macmillan Dictionary consists of: 1) a headword; 2) information about the word's meaning or meanings, called definition(s); 3) number of definitions listed; 4) information about the word's grammatical behavior, word class; and a Thesaurus which link to one or more lists of synonyms and related words.

**Table 3. Respondent's Level of Acceptability on Vocabulary Aid (VocAid) in terms of Usability**

Indicative Statement		Mean	SD	Verbal Interpretation
<b>The Vocabulary Aid (VocAid) in Science...</b>				
1.	contain lexical items that follow proper sequence.	3.93	0.26	Highly Acceptable
2.	provides tools for understanding and testing ideas.	3.87	0.35	Highly Acceptable
3.	incorporates vocabulary education that may help enhance comprehension in science activities.	3.87	0.35	Highly Acceptable
4.	can be suitable for books or manuals which may be difficult to process.	3.73	0.46	Highly Acceptable
5.	is appropriate for the learner's level of comprehension.	3.87	0.35	Highly Acceptable
<b>Overall Mean</b>		<b>3.85</b>	<b>0.36</b>	<b>Highly Acceptable</b>

**Legend:**

Rating	Scale	Verbal Interpretation
4	3.26-4.00	Highly Acceptable
3	2.51-3.25	Acceptable
2	1.76-2.50	Slightly Acceptable
1	1.00-1.75	Not Acceptable

The Science Vocabulary Aid (VocAid) got a Highly Acceptable remark in terms of containing lexical items that follow proper sequence ( $M= 3.93$ ,  $SD= 0.26$ ), providing tools for understanding and testing ideas, incorporating vocabulary education that may help enhance comprehension in science activities, appropriateness for the learner's level of comprehension ( $M=3.87$ ,  $SD=0.35$ ), suitability for books or manuals which may be difficult to process ( $M= 3.73$ ,  $SD=0.46$ ). The overall mean of 3.85 indicates that the Vocabulary Aid (VocAid) is Highly Acceptable. Small standard deviation value in almost all of the items means that respondents have almost the same test perception as the level of acceptability of the material.

The result indicates that the Vocabulary Aid (VocAid) can be used to help enhance comprehension in science activities by incorporating word meanings during activities. Understanding unknown terms make students' learning more at ease and constructive.

Usability is a quality attribute that evaluates how easy something is to use. The term "usability" also describes techniques for improving ease-of-use throughout the design process. Learnability, efficiency, memorability, mistakes, satisfaction, and utility are the five quality factors that constitute usability Nielsen (2012).

The Lund University (2011) defined dictionary as a reference book about words and as such it describes the functioning of individual words. The list of words is arranged in alphabetical order in the form of headwords. The types of information given in a typical entry are spelling, frequency information, pronunciation, word class, sense(s), and collocations, phrasal use and the syntactic operation of the word.

Oxford Languages (2022) stated that the words in dictionaries must be tailored to suit the needs of the user: a dictionary for children at primary school level, for example, will contain words and definitions appropriate to that age group.

Johnson O'Connor Research Foundation (2022) emphasized that learning how to build a better vocabulary can be pleasurable and profitable investment of both time and effort. As one's vocabulary grows, it becomes easier to associate new words with familiar words and remember their meanings. Similarly, Gemert (2017) stated that students need to be exposed to the vocabulary over and over in order to use the words effortlessly. When words or texts are repeated, students gain more word knowledge.

**Table 4. Respondent's Level of Acceptability on Vocabulary Aid (VocAid) in terms of Conformity**

Indicative Statement	Mean	SD	Verbal Interpretation
<b>The Vocabulary Aid (VocAid) in Science...</b>			
1. matches the terms/ terminologies in the required Science activities of Department of Education.	3.80	0.41	Highly Acceptable
2. contain suitable and carefully selected terms that are based on the Learner's Material in Science 10 issued by the Department of Education.	3.87	0.35	Highly Acceptable
3. contain different set of words that are clearly defined to understand Science concepts.	3.93	0.26	Highly Acceptable
4. contain Vocabulary aspect that may be found in standard vocabulary tools like dictionary.	3.87	0.35	Highly Acceptable
5. contain word definitions that are stylistically appropriate for the intended user.	3.67	0.49	Highly Acceptable
<b>Overall Mean</b>	<b>3.83</b>	<b>0.33</b>	<b>Highly Acceptable</b>

**Legend:**

Rating	Scale	Verbal Interpretation
4	3.26-4.00	Highly Acceptable
3	2.51-3.25	Acceptable
2	1.76-2.50	Slightly Acceptable
1	1.00-1.75	Not Acceptable

The Science Vocabulary Aid (VocAid) got a Highly Acceptable remark in terms of matching terms/terminologies in the required Science activities of Department of Education (M=3.80, SD=0.41), containing suitable and carefully selected terms that are based on the Learner's Material in Science 10 issued

by the Department of Education, containing Vocabulary aspect that may be found in standard vocabulary tools like dictionary (M=3.87, SD=0.35), containing different set of words that are clearly defined to understand Science concepts (M= 3.93, SD=0.26), containing word definitions that are stylistically appropriate for the intended user (M= 3.67, SD=0.49). The overall mean of 3.83 indicates that the Vocabulary Aid (VocAid) is Highly Acceptable. Small standard deviation value in almost all of the items means that respondents have almost the same test perception as the level of acceptability of the material.

The respondents strongly agreed that the content of the Vocabulary Aid (VocAid) are appropriate and suitable for students' use as it contains terms/terminologies that could be found in their Science 10 Learner's Material issued by the Department of Education. Moreover, it conforms to the standard vocabulary tools like dictionary which makes the Vocabulary Aid (VocAid) a dependable resource for word meanings.

According to Gemert (2017), when selecting words to be explicitly taught, there are a number of factors to consider. These factors include word familiarity, requirement for comprehension, word association with context, and frequency of contact.

The dictionary's content is derived through research into words. The starting point for a dictionary is a collection of texts. The second is to determine the information to include in each word. The third is to extract the required information from the text of the corpus. And finally, to organize all the information obtained and make it available to other scholars (Bratley and Lusignan, 2016).

Macmillan Dictionary (2019) stated that a dictionary entry is a set of information that describes a word or phrase. A typical entry in Macmillan Dictionary consists of a headword, definition(s), information about the word's grammatical behavior, word class, and a Thesaurus which link to one or more lists of synonyms and related words.

**Table 5. Respondent's Level of Acceptability on Vocabulary Aid (VocAid) in terms of Accuracy**

Indicative Statement	Mean	SD	Verbal Interpretation
<b>The Vocabulary Aid (VocAid) in Science...</b>			
1. Contain well- expressed ideas and concepts.	3.67	0.49	Highly Acceptable
2. uses suitable vocabulary and proper words needed to understand the topic.	3.73	0.46	Highly Acceptable
3. contain scientifically accurate contents and concepts.	4.00	0.00	Highly Acceptable
4. contain word definitions that show accuracy to develop and enhance their understanding.	3.80	0.41	Highly Acceptable
5. focuses on the development of vocabulary skills in Science.	3.93	0.26	Highly Acceptable
<b>Overall Mean</b>	<b>3.83</b>	<b>0.38</b>	<b>Highly Acceptable</b>
<b>Legend:</b>			
<b>Rating</b>	<b>Scale</b>	<b>Verbal Interpretation</b>	
4	3.26-4.00	Highly Acceptable	
3	2.51-3.25	Acceptable	
2	1.76-2.50	Slightly Acceptable	
1	1.00-1.75	Not Acceptable	

The Science Vocabulary Aid (VocAid) got a Highly Acceptable remark in terms of containing well-expressed ideas and concepts (M=3.67, SD=0.49), using suitable vocabulary and proper words needed to understand the topic (M=3.73, SD=0.46), containing scientifically accurate contents and concepts (M= 4.00,

SD=0.00), containing word definitions that show accuracy to develop and enhance their understanding (M= 3.80, SD=0.41), focusing on the development of vocabulary skills in Science (M= 3.93, SD=0.26). The overall mean of 3.83 indicates that the Vocabulary Aid (VocAid) is Highly Acceptable. Small standard deviation value in almost all of the items means that respondents have almost the same test perception as the level of acceptability of the material.

This implies that the contents and concepts which comprise the Vocabulary Aid (VocAid) are accurate. Vocabulary accuracy may develop and enhance learners' understanding.

Perelman (2011) identified three key areas where writing accuracy might be developed as follows: (1). Document accuracy means that your topics are properly covered and are covered in sufficient detail; (2). Stylistic accuracy is the precise use of words to convey meaning. To properly describe and analyze your topics, your language must be accurate. This calls for careful consideration of paragraph and sentence structure as well as word choice; (3). While stylistic accuracy is necessary, technical accuracy is not exclusively dependent on it. A technically accurate comprehension and representation of the topic must be the foundation of an excellent science and technology document. Technical accuracy depends on the writer's conceptual understanding of the topic, his or her command of the vocabulary, and their capacity to evaluate and mold facts with the least amount of distortion.

In table 6, the Science Vocabulary Aid (VocAid) got a Highly Acceptable remark in terms of containing concepts that are clear and easy to understand (M=3.93, SD=0.26), having structure of entries that help users to clearly understand the words (M=4.00, SD=0.00), containing words that are well- arranged to provide sequence of understanding and appropriate to each lesson (M= 3.80, SD=0.41), containing simplified terms for the target users (M= 3.67, SD=0.49). The overall mean of 3.84 indicates that the Vocabulary Aid (VocAid) is Highly Acceptable. Small standard deviation value in almost all of the items means that respondents have almost the same test perception as the level of acceptability of the material.

**Table 6. Respondent's Level of Acceptability on Vocabulary Aid (VocAid) in terms of Clarity**

	Indicative Statement	Mean	SD	Verbal Interpretation
<b>The Vocabulary Aid (VocAid) in Science...</b>				
1.	contain concepts that are clear and easy to understand.	3.93	0.26	Highly Acceptable
2.	has structure of entries that help users to clearly understand the words.	4.00	0.00	Highly Acceptable
3.	contain words that are well- arranged to provide sequence of understanding.	3.80	0.41	Highly Acceptable
4.	contain set of words appropriate to each lesson.	3.80	0.41	Highly Acceptable
5.	contain simplified terms for the target users.	3.67	0.49	Highly Acceptable
<b>Overall Mean</b>		<b>3.84</b>	<b>0.37</b>	<b>Highly Acceptable</b>

**Legend:**

Rating	Scale	Verbal Interpretation
4	3.26-4.00	Highly Acceptable
3	2.51-3.25	Acceptable
2	1.76-2.50	Slightly Acceptable
1	1.00-1.75	Not Acceptable

The respondents strongly agreed that the entries in the Vocabulary Aid (VocAid) are well-arranged

and follows sequence of understanding for target users' ease-of-use.

Idler (2021) pointed that the core of usability is clarity. A clear and usable design can be achieved through simplicity, familiarity, consistency, guidance, and good information architecture.

Following the second objective of the study, the level of learners' performances in the use of Vocabulary Aid (VocAid) were gauged in terms of pretest and posttest.

Based on the result of the pretest and posttest from week 1 to week 6, all the performances of the students improved. Week 1 performance in pretest (M= 6.80, SD= 1.91) is Good while the performance in posttest (M= 8.68, SD= 1.13) is Excellent. Week 2 performance in pretest (M= 6.08, SD= 1.66) is Good while the performance in posttest (M= 7.84, SD= 1.22) is Good. Week 3 performance in pretest (M= 5.50, SD= 1.58) is Average while the performance in posttest (M= 6.88, SD= 1.35) is Good. Week 4 performance in pretest (M= 6.08, SD= 1.68) is Good while the performance in posttest (M= 7.96, SD= 1.14) is Good. Week 5 performance in pretest (M= 5.34, SD= 1.87) is Average while the performance in posttest (M= 7.08, SD= 1.29) is Good. Week 6 performance in pretest (M= 5.32, SD= 1.78) is Average while the performance in posttest (M= 7.24, SD= 1.30) is Good.

**Table 7. Mean Performance of the Respondents in Science Vocabulary Skill in terms of Pretest and Posttest**

Weeks	Test	Mean	SD	Interpretation
Week 1	Pre-test	6.80	1.91	Good
	Post-test	8.68	1.13	Excellent
Week 2	Pre-test	6.08	1.66	Good
	Post-test	7.84	1.22	Good
Week 3	Pre-test	5.50	1.58	Average
	Post-test	6.88	1.35	Good
Week 4	Pre-test	6.08	1.68	Good
	Post-test	7.96	1.14	Good
Week 5	Pre-test	5.34	1.87	Average
	Post-test	7.08	1.29	Good
Week 6	Pre-test	5.32	1.78	Average
	Post-test	7.24	1.30	Good

Range	Verbal Interpretation
8.01-10.00	Excellent (E)
6.01-8.00	Good (G)
4.01-6.00	Average (A)
2.01-4.00	Fair (F)
0.00-2.00	Poor (P)

This imply that the Vocabulary Aid used by the teacher help to improve the performance of the students in the posttest. The concept and structure were easy to understand and develop understanding.

Downie (2013) stated that pretest and posttest are the best-known kinds of test done before and after to judge students' progress prior to the infusion of facts and procedures as basis for arguing out of their skills, knowledge, capacities, or attitudes and compare the results in terms of score so as to adjudge the strengths and weaknesses of teachers' instructional service delivery within the classroom.

The third objective of this study was accomplished by identifying the significant difference between the pretest and posttest scores.

**Table 8. Difference in the Mean Performance of the Respondents in Science Vocabulary Skill in terms of Pretest and Posttest**

Weeks	Mean	Mean Difference	Computed t-value	p-value	Interpretation	
Week 1	Pre-test	6.80	1.88	-8	0.000	Significant
	Post-test	8.68				
Week 2	Pre-test	6.08	1.76	-9.03	0.000	Significant
	Post-test	7.84				
Week 3	Pre-test	5.50	1.38	-7.65	0.000	Significant
	Post-test	6.88				
Week 4	Pre-test	6.08	1.88	-8.52	0.000	Significant
	Post-test	7.96				
Week 5	Pre-test	5.34	1.74	-7.4	0.000	Significant
	Post-test	7.08				
Week 6	Pre-test	5.32	1.92	-10.15	0.000	Significant
	Post-test	7.24				

The result of pretest and posttest obtained a mean difference of 1.88, 1.76, 1.38, 1.88, 1.74 and 1.92, respectively. On the other hand, the computed p- value were all 0.00 which is lower than 0.05 level of significance indicating that there is a significant difference in the performance of the respondents in the pretest and posttest. Therefore, the null hypothesis indicating that there is no significant difference in the performance of the respondents in terms of pretest and posttest were rejected. The data revealed that the Vocabulary Aid is an effective instructional tool in enhancing students' performance as seen by the result of their assessments.

The study entitled -Effects of Supplemental Vocabulary Intervention on the Word Knowledge of Kindergarten Students at Risk for Language and Literacy Difficulties| showed results of within-subjects comparisons which indicated that, overall, at-risk students made greater gains in word knowledge on target words that received the supplemental intervention as compared to words that received only classroom-based instruction. In addition, at-risk students who received the supplemental intervention demonstrated word-learning gains than those of their peers who received classroom instruction alone Loftus and Coyne (2012).

As Griffiths (2018) states that vocabulary is the basic component of language proficiency which provides the basis for learners' performance in other skill, such as: speaking, reading, listening, and writing. In addition, Bromley (2014) also cited that the students who have good vocabulary mastery will have good reading comprehension and high score on achievement test than students who are lack of vocabulary.

## 5. Summary, Conclusion, and Recommendation

This chapter presents the summary, findings, conclusions and recommendations of the study.

### 5.1 Summary

The -Utilization of Vocabulary Aid (VocAid) in Improving the Vocabulary Skills in Science of Grade 10 Students used Quasi-experiment specifically one-group type and descriptive research design. The acceptability and effectiveness of the material focus on the increase of posttest scores of students for each vocabulary-aided activities in Science 10.

The subject of the study was a group of fifty (50) former Grade 10 students of San Roque National High School in Victoria, Laguna from S.Y: 2019-2020. They are considered as the respondents because they are the last pre-pandemic student group that has actually performed and completed the activities in the science learner's material where the Vocabulary Aid (VocAid) is based.

The acceptability of the Vocabulary Aid (VocAid) in terms of appearance, content, usability, conformity, accuracy and clarity was validated by selected fifteen (15) science teachers. The coverage of the Vocabulary Aid (VocAid) was the six (6) activities/topic in the first module of third quarter that focuses on coordinated functions of the nervous, endocrine and reproductive systems.

The level of acceptability of the Vocabulary Aid (VocAid) in terms of Appearance, Content, Usability, Conformity, Accuracy and Clarity was Highly Acceptable. Statistical analysis also shows an increase in posttest over pretest which shows that the learners' performance was enhanced. The difference in pretest and posttest is significant as manifested by the probability value less than 0.05 level.

### 5.1 Conclusion

Vocabulary Aid (VocAid), a tool to enhance learners' vocabulary skills, was the goal of this research. The results suggest that the Vocabulary Aid is a useful teaching tool for improving students' Science performance. It can be inferred that the instrument can be used in conjunction with subject instruction and discussion. The findings demonstrated that students who use Vocabulary Aid (VocAid), which allows them to quickly generate vocabulary definitions, comprehend science concepts more fully. Hence, the null hypothesis stating that there is no significant difference in posttest and pretest is rejected.

### 5.3 Recommendations

Based on the interpreted conclusions formulated from the findings, the researcher come up with the following recommendations specifically with consideration;

1. Encourage teachers to develop or modify teaching tools that may benefit students in acquiring scientific concepts, comprehension, and abilities.
2. Science teachers may create comparable content for other topics and areas in Science. It is significant to note that the words and terminologies used should correspond to those found in the Department of Education's Learner's Material for Science 10.
3. Building Vocabulary Aids (VocAid) for other subject areas is strongly advised to help students' vocabulary development.
4. To make the Vocabulary Aid (VocAid) more engaging and practical to use, the researcher advises converting it into a digital app.

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## References

- Adams, G. (2015). *Measurements and Evaluation in Education, Psychology and Guidance*. New York: Manual for Teachers, Psychologist and Guidance Counselors.
- Afzal, N. (2019). A Study on Vocabulary-Learning Problems Encountered by BA English Majors at the University Level of Education. *Arab World English Journal*, 10 (3)81-98. DOI: <https://dx.doi.org/10.24093/awej/vol10no3.6>
- Alexander, F. (2018). *Understanding Vocabulary*. Scholastic Inc.
- Al-khayari, H. (2011). *Information Ethics and Security*. Retrieved from <https://sites.google.com/site/iformationethicsandsecurity/ethics-of-information/accuracy>
- Alqahtani, M. (2015). *The Importance of Vocabulary in Language Learning and How to be Taught*.

- International Journal of Teaching and Education, Vol. III(3), pp. 21-34., 10.20472/TE.2015.3.3.002. Retrieved from file:///D:/Downloads/12-2-213.pdf
- Ambag, R. (2018). Teaching Science in the Philippines: Why (and How) We Can Do Better. Retrieved from <https://www.flipscience.ph/news/features-news/features/teaching-science-philippines/>
- Anderman, E. & Sinatra, G. (2012). The Challenges of Teaching and Learning about Science in the 21st Century: Exploring the Abilities and Constraints of Adolescent Learners. National Academy of Education. Retrieved from [https://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse\\_072608.pdf](https://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_072608.pdf)
- Angeles, V.M. (2019). -Info-graphical Corrective Learning Module in Chemistry for the Least Learned Students|
- Armbruster and Osborn (2011). Put Reading First: The Research Building Blocks for Teaching Children to Read. National Institute for Literacy (NIFL) Publications. Retrieved from [https://lincs.ed.gov/publications/html/prfteachers/reading\\_first1vocab.html](https://lincs.ed.gov/publications/html/prfteachers/reading_first1vocab.html)
- Bates, A.W. (2019). Teaching in a Digital Age. Creative Commons Attribution-NonCommercial 4.0 International License. Retrieved from <https://opentextbc.ca/teachinginadigitalage/chapter/5-4-managing-content/>
- Beck, I. (2013). Bringing Words to Life. Second Edition: Robust Vocabulary Instruction. Guilford Press
- Bratley & Lusignan (2016). Information Processing in Dictionary Making: Some Technical Guidelines. Springer Link. Volume 10, Issue3, pp 133-143
- Bromley, K. (2014). Rethinking Vocabulary Instruction. The Language and Literacy Spectrum. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1059520.pdf>
- B2B Tech Writer (2012). 10 Principles for Clarity in Writing. KC Communications. Retrieved from <https://kc-communications.com/ten-principles-clear-writing/>
- Chen, Y. (2011). Dictionairy Use and Vocabulary Learning in the Context of Reading. International Journal of Lexicography, Volume 25, Issue 2, 216-247
- Coxhead,A.J. (2012). A New Academic Word List. TESOL Quarterly. Vol. 34(2), 213-238. Department of Education. (2018). Report on School Performance. Retrieved from <https://www.deped.gov.ph>
- DepEd Order No. 39, s. 2016 Adoption of the Basic Education Research Agenda. Retrieved from <https://www.deped.gov.ph/2016/06/10/do-39-s-2016-adoption-of-the-basic-education-research-agenda/>
- Delgado, A. (2016). Scientific Writing: Accuracy, Clarity and Brevity. School of Authors. Retrieved from <https://www.revistacomunicar.com/wp/school-of-authors/scientific-writing-accuracy-clarity-and-brevity/>
- Diamond, L. & Gutlohn, L. (2011). Vocabulary Handbook. Consortium on Reading Excellence, Inc.
- Diamond, L. & Gutlohn, L. (2022). Teaching Vocabulary. WETA Public Broadcating. Retrieved from <https://www.readingrockets.org/article/teaching-vocabulary>
- DM No. 441s. 2019 Guidelines and Process for LRMDs Assessment and Evaluation of Locally Developed and Procured Materials. Retrieved from <https://www.depednaga.ph/wp-content/uploads/Memos/DM%20No.%20441,%20s.%202019%20Guidelines%20and%20Process%20for%20LRMDs%20Assessment%20and%20Evaluation%20of%20Locally%20Developed%20and%20Procured%20Materials.pdf>
- Downie, N.M. (2013). The fundamentals of Measurements, Techniques, Practices. Second Edition. Oxford University Press
- Ebel, R.L. (2012). -Measuring Educational Effectiveness|. Maine: Teachers' Quarterly Publication.
- Essays, UK. (2018). The Importance of Teaching and Learning Vocabulary English Language Essay. Retrieved from <https://www.ukessays.com/essays/english-language/the-importance-of-teaching-and-learning-vocabulary-english-language-essay.php?vref=1>

- Farillon, L.F. (2022). Scientific Reasoning, Critical Thinking, and Academic Performance in Science of Selected Filipino Senior High School Students. *Journal of Ultimate Research and Trends in Education*, Vol.4, No.1.
- Farjami, F., & Aidinlou, N. A. (2013). Analysis of the Impediments to English Vocabulary Learning and Teaching. *International Journal of Language and Linguistics*. Special Issue: Language Teaching and Learning Key Principles (LTLKP), 1(4-1), 1-5.
- Formplus Blog (2021). Purposive Sampling: Definition, Types, Examples. Retrieved from <https://www.formpl.us/blog/purposive-sampling%202021>
- Gemert (2017). Strategies for Teaching Vocabulary: Theory and Technique. Retrieved from <https://www.giftedguru.com/strategies-teaching-vocabulary-theory-technique/>
- Glende (2013). *Vocabulary and Word Study to increase Comprehension in Content Areas for Struggling Readers*. Fisher Digital Publications
- Griffiths, C. (2018). *Lessons from good language learners*. Cambridge: Cambridge University Press.
- Herman P. & Dole J. (2018), -Theory and Practice in Vocabulary Learning and Instruction, *The Elementary School Journal* 89, no. 1: 42-54.
- Holly (2022). Pre and Post Tests: Are They Beneficial in the Classroom?. *Teach Starter*. Retrieved from <https://www.teachstarter.com/au/blog/pre-and-post-tests-are-they-beneficial-in-the-classroom/>
- Hornby (1984). *Oxford Advanced Learner's Dictionary of Current English*. Oxford: Oxford University Press.
- Hutchinson, H. (2021). How to Support Vocabulary Building in Science Classes. George Lucas Educational Foundation. Retrieved from <https://www.edutopia.org/article/how-support-vocabulary-building-science-classes>
- India Study Channel (2011). Teaching Aids, Their Characteristics, Advantages, and How and Where to Use Teaching Aids. Retrieved from [https://www.indiastudychannel.com/resources/120369-Teaching-Aids-Their-Characteristics-Advantages-And-How-And-Where-To-Use-Teaching-Aids.aspx#:~:text=1\)%20Teaching%20aids%20are%20large,cheap%20and%20may%20be%20improved](https://www.indiastudychannel.com/resources/120369-Teaching-Aids-Their-Characteristics-Advantages-And-How-And-Where-To-Use-Teaching-Aids.aspx#:~:text=1)%20Teaching%20aids%20are%20large,cheap%20and%20may%20be%20improved)
- Idler, S. (2021). 5 Key Principles of Good Website Usability. *The Daily Egg*. Retrieved from <https://www.crazyegg.com/blog/category/web-design/>
- Innovative Learning Zone of Proximal Development. Retrieved from [https://www.innovativelearning.com/educational\\_psychology/development/zone-of-proximal-development.html](https://www.innovativelearning.com/educational_psychology/development/zone-of-proximal-development.html)
- Johnson O'Connor Research Foundation (2022). Effective Ways To Build Your Vocabulary. Retrieved from <https://www.jocrf.org/resources/effective-ways-build-your-vocabulary>
- Jones (2018). Using a Concept of Definition Word Map to Teach Science Vocabulary. *Journal of Teacher Action Research JTAR* Volume 5, Issue 1
- Kalin, J. (2004). Vloga medijev pri sodobnem pouku in presojanje njihove učinkovitosti (The Role of Media in Modern Lessons and the Judgment of their Efficiency). In M. Blažič (Ed.), *Media in Education* (pp. 210– 215). Novo mesto: Higher Education Centre.
- Kent State University (2022). SPSS Tutorials: Paired Samples T-Test. Retrieved from <https://libguides.library.kent.edu/spss/pairedsamplestest#:~:text=The%20Paired%20Samples%20t%20Test,between%20the%20two%20time%20points>
- Krashen S.D. (1982). *Principles and Practice in Second Language Acquisition*. Oxford: Pergaman Press.
- Kurt, S. (2016). ASSURE: Instructional Design Model. *Educational Technology*. Retrieved from <https://educationaltechnology.net/assure-instructional-design-model/>
- Loftus & Coyne (2012). Effects of Supplemental Vocabulary Intervention on the World Knowledge of Kindergarten Students At Risk for Language and Literacy Difficulties. *Semantic Scholar*
- Lund University (2011). *Academic Writing in English*. Retrieved from <https://awelu.srv.lu.se/grammar-and->

- words/dictionaries/general-information-on-dictionary-use/  
 Macmillan Dictionary (2019). Anatomy of a Dictionary Entry. Retrieved from <https://www.macmillandictionary.com/us/learn/dictionary-entry.html>
- Malipot, M. (2019). YEAR-END REPORT: DepEd in 2019: The quest for quality education continues. Retrieved from <https://mb.com.ph/2019/12/29/year-end-report-deped-in-2019-the-quest-for-quality-education-continues/>.
- Maniyani, RK (2022). The Importance Of Accuracy, Truth & Transparency In Intent Data. Demand Gen Report. Retrieved from <https://www.demandgenreport.com/features/demanding-views/the-importance-of-accuracy-truth-transparency-in-intent-data/#:~:text=Whether%20personal%20or%20professional%2C%20accuracy,offer%20accountability%2C%20stability%20and%20security.>
- Mardianawati, D. (2012). Aspects of Vocabulary Learning. Retrieved from <file:///D:/Downloads/25902608.pdf>
- Mazgon, J. & Stefanc, D. (2012). Importance of the Various Characteristics of Educational Materials: Different Opinions, Different Perspectives. *The Turkish Online Journal of Educational Technology*, Volume 11 Issue 3. Retrieved from <https://files.eric.ed.gov/fulltext/EJ989210.pdf>
- Merriam-Webster Dictionary (2022). Retrieved from <https://www.merriam-webster.com/>
- Moody, S. (2018). Vocabulary Instruction: A Critical Analysis of Theories, Research, and Practice. *Education Sciences*, 8, 180; doi:10.3390/educsci8040180.
- Nagy W. & Townsend D. (2012). Words As Tools: Learning Academic Vocabulary As Language Acquisition. *Reading Research Quarterly*, 47, 91-108. doi:10.1002/RRQ.001
- Napa (2013). Retrieved from <http://repository.ump.ac.id/7159/3/Cahyani%20Wulandari%20BAB%20II.pdf>
- Nath B. (2012). Major Language Theorists Influencing Learning of Mathematics. Retrieved from <https://files.eric.ed.gov/fulltext/ED512896.pdf>
- Nebeker (2022). Basic Research Concepts. Office of Research Integrity. Retrieved from <https://ori.hhs.gov/education/products/sdsu/accuracy.htm>
- Nielsen, J. (2012). Usability 101: Introduction to Usability. Nielsen Norman Group. Retrieved from <https://www.nngroup.com/articles/usability-101-introduction-to-usability/>
- Oxford Languages (2022). How We Create Language Content. Oxford University Press. Retrieved from <https://languages.oup.com/our-story/creating-dictionaries>
- Oxford University Press ELT (2014). The Importance of Content Rich Texts to Learners and Teachers. Oxford University Press. Retrieved from <https://oupeltglobalblog.com/2014/11/06/the-importance-of-content-rich-texts-to-learners-and-teachers/>
- Perelman, L. (2011). *The Mayfield Handbook of Technical & Scientific Writing*. Mayfield Publishing Company, Inc. Retrieved from <https://web.mit.edu/course/21/21.guide/accuracy.htm>
- Price, P., Jiangiani, R., Chiang, I., Leighon, D. and Cuttler, C. (2021). One-Group Designs. Pressbooks. R.A. 10533 Enhance Basic Education Act of 2013. Retrieved from <https://www.officialgazette.gov.ph/2013/05/15/republic-act-no-10533/>
- Sinatra, R, Zygouris-Coe, V & Dasinger, S (2011). Preventing a vocabulary lag: What lessons are learned from research, *Reading & Writing Quarterly*, 28(4), pp. 333-334
- Smith, S. (2022). Features of Vocabulary. EAPFoundation.com. Retrieved from <https://www.eapfoundation.com/vocab/features/>
- Study Smarter Survival Guide (2019). *Academic Writing Style: Clarity*. The University of Western Australia. Retrieved from [https://www.uwa.edu.au/students/-/media/Project/UWA/UWA/Students/Docs/STUDYSmarter/GE12-Academic-Writing-Style\\_Clarity.pdf](https://www.uwa.edu.au/students/-/media/Project/UWA/UWA/Students/Docs/STUDYSmarter/GE12-Academic-Writing-Style_Clarity.pdf)
- Super Teacher Worksheets (2022). Parts of a Dictionary. Retrieved from <https://www.superteacherworksheets.com/featured-items/pz-parts-of-a-dictionary.html>

- The American Heritage Dictionary of the English Language, 5<sup>th</sup> Edition. Retrieved from <https://www.wordnik.com/words/pretest>
- Thyer (2012). Quasi-Experimental Research Designs
- Tomlinson, B. (2018). Materials Development in Language Teaching. Cambridge: Cambridge University Press.
- UP NISMED. (2004). Science framework for Philippine basic education. Retrieved from <https://www.dost.gov.ph>
- Usability Professionals' Association (UPA) (2012). The Usability Body of Knowledge. User Experience Professionals' Association. Retrieved from <https://www.usabilitybok.org/what-is-usability>
- Villegas, B. (2021). Addressing the Philippine Education Crisis. BusinessWorld Publishing. Retrieved from <https://www.bworldonline.com/addressing-the-philippine-education-crisis-2/>
- Vinney, C. (2019). What is the Zone of Proximal Development? Definition and Examples. ThoughtCo. Retrieved from <https://www.thoughtco.com/zone-of-proximal-development-4584842>
- Vossoughi, H. (2012). Using Word-Search-Puzzle Game for Improving Vocabulary Knowledge of Iranian EFL Learners. Journal of Teaching English as a Foreign Language and Literature of Islamic Azad University. Retrieved from file:///D:/Downloads/1676-Article%20Text-4555-1-10-20190129.pdf
- Vygotsky, L.S. (1978). Mind in Society: The Development of Higher Psychological Processes. Harvard University Press.
- Wang Y. & Yang J. (2013). Steven Krashen's SLA Theories and Vocabulary Teaching in College Oral English. International Academic Workshop on Social Science (IAW-SC 2013). Retrieved from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.827.9271&rep=rep1&type=pdf>
- White, A. (2019). Handbook of Research on Critical Thinking and Teacher Education Pedagogy. DOI: 10.4018/978-1-5225-7829-1. Retrieved from <https://www.igi-global.com/chapter/information-literacy-and-critical-thinking-in-higher-education/226437>
- Wikipedia The Free Encyclopedia (2022). Retrieved from <https://en.wikipedia.org/wiki/Dictionary>
- Wright & Cervetti (2016). A Systematic Review of the Research on Vocabulary Instruction That Impacts Text Comprehension. International Literacy Association
- Zach (2020). Pretest-Posttest Design: Definition & Examples. Statology. Retrieved from <https://www.statology.org/pretest-posttest-design/>