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Research Article

Vocabulary Acquisition In Adult ESL: A Multimodal Approach To Life Sciences Terminology Through Narrow Reading And Viewing

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ABSTRACT

Mastering specialized vocabulary is a critical component of academic success for adult English as a Second Language learners in the life sciences. This paper explores a multimodal approach to vocabulary acquisition that combines narrow reading and viewing of discipline-specific content to support the development of these essential linguistic skills. For this study, Charles Harpur's "A Midsummer Noon in the Australian Forest" is used by the researcher. Drawing on research in second language acquisition, the study investigates the efficacy of integrating textual and multimedia resources to enhance the learning and retention of life sciences terminology. The findings suggest that this multimodal strategy can lead to improved vocabulary knowledge and conceptual understanding, underscoring the value of leveraging diverse modalities to optimize vocabulary learning for adult ESL students in technical fields.

Key words: vocabulary acquisition, adult ESL, life sciences, narrow reading, multimodal learning

Introduction

The acquisition of vocabulary is a crucial aspect of second language (L2) learning, particularly for adult English as a Second Language learners in the life sciences field. Vocabulary knowledge not only underpins reading comprehension but also serves as a foundation for effective communication in academic and professional contexts. In the case of adult ESL learners studying life sciences, the specialized terminology can pose a significant challenge, necessitating innovative approaches to vocabulary instruction. Recent research has highlighted the potential of multimodal learning, which combines text-based and visual modalities, to enhance vocabulary acquisition. Furthermore, the strategy of narrow reading and viewing, where learners are exposed to a focused set of related texts and materials, has been shown to be an effective way to build vocabulary knowledge. (Burt et al., 2005) (Barcroft, 2004)

Literature Review

The importance of vocabulary acquisition in second language learning has been well-established in the literature. (Barcroft, 2004) Corpus-based studies have consistently demonstrated that academic vocabulary, which is used more frequently in academic texts than in non-academic texts, accounts for a significant portion of the lexical content in such texts, ranging from 6 to 14% (Xodabande et al., 2022) . This underscores the critical role that academic vocabulary plays in developing academic literacy and comprehension.

Numerous studies have explored the nature of the bilingual lexicon and how second language words are processed as input (Barcroft, 2004). These principles emphasize the presentation of new words as input, the allocation of limited processing resources during vocabulary acquisition, the distinct components of vocabulary knowledge, and the appropriate types of instruction for different stages of vocabulary development.

More specifically, research has highlighted the effectiveness of multimodal approaches to vocabulary instruction, where visual and textual elements are combined to enhance learning.

Multimodal Approach to Life Sciences Vocabulary

In the context of adult ESL learners studying life sciences, a multimodal approach to vocabulary acquisition can be particularly beneficial. The specialized terminology of the life sciences field often includes complex, technical terms that can be challenging for non-native speakers to comprehend and retain. By incorporating both text-based and visual modalities, such as diagrams, illustrations, and videos, learners can build a stronger connection between the written form of the word, its meaning, and its application in the life sciences context. Further, the strategy of narrow reading and viewing, where learners are exposed to a focused set of related texts and materials, can be an effective way to build vocabulary knowledge in the life sciences domain.

Methodology

The ESL classroom serves as a significant component of a student's journey in acquiring a new language. Individuals from diverse backgrounds gather in that space. A significant number of students possess a limited understanding of the English language. In order to enhance the understanding of the students, educators of English employ a variety of strategies. When ESL educators convey insights on writing, listening, and reading competencies, students concurrently engage with numerous interconnected domains. One such domain is scientific literacy.

The materials utilised for L2 instruction serve as a crucial resource for educators in the field of ESL. It is evident that utilising more innovative materials will enhance the appeal for ESL students. This study aimed to assist educators in instructing vocabulary pertinent to Life Science within the context of second language (L2) classes. The term curriculum has its origins in the Latin word “currere,” which translates to “to run.” This suggests that a primary role of a curriculum is to serve as a framework that facilitates the process of learning. Curricula usually define the learning that is expected to take place during a course or programme of study in terms of knowledge, skills and attitudes. A biocentric curriculum helped students acquire biology-related vocabulary (Frederick, 2011). A fundamental framework is essential for acquiring the vocabulary associated with Life Sciences.

Understanding science is essential for those who seek to engage with its principles and concepts. It refers to the capacity necessary for comprehending scientific literature and academic texts in the field of science. To fully grasp scientific articles, it is essential to cultivate an understanding of the specialised terminology, vocabulary, and syntax employed within these texts and related literature. This becomes an unavoidable reality for a student engaged in the pursuit of a science degree. For students from different disciplines, an understanding of the basics of science will serve as a significant asset. The foundation of scientific literacy is rooted in vocabulary.

Vocabulary learning is essential to language learning. It has been hypothesized that experiencing a comprehensible input in the second language results in vocabulary development (Carey, 1978). Each time a reader encounters an unfamiliar word, he gains at least a partial understanding of its meaning, and repeated exposure to such words will lead to a complete comprehension of them.

The Comprehension Hypothesis posits (Krashen, 2003) that language acquisition occurs through intelligible input in a low-anxiety environment. Acquisition occurs when learners get comprehensible verbal and written input. Language acquisition does not occur solely through the learning and practice of grammatical rules.

The theory posits that if a learner's present level of understanding is (i), then they can progress to (i+1) input to facilitate learning. The learners' prior linguistic competency will facilitate their progression from the current level (i) to the subsequent level (i+1). The hypothesis posits that language acquisition occurs involuntarily. The acquisition process is subconscious, leaving the acquirer unaware of language acquisition throughout input reception.

Reading is an essential component of the learning process. It can be accomplished alone or in a guided context. The reading activity is enjoyable when the selected text is engaging and comprehensible to the reader. Stephen Krashen gives importance to Short story as comprehensible input. Providing pupils with a concise summary of a short story/ poem will enhance their comprehension and facilitate language acquisition.

Narrow reading is an inexpensive and enjoyable method for acquiring intelligible input. In “The Case for Narrow Reading”, Stephen Krashen asserts that limited input may be much more effective for second language acquisition. In his “The Case for Narrow Reading” Stephen Krashen says, “It may be that narrow input is much more efficient for second language acquisition. It may be much better if second language acquirers specialize early rather than late” (Krashen, 1996).

This method effectively enhances students’ vocabulary by enabling repeated exposure to new words in diverse circumstances. Repeated exposure to language in credible texts enhances pupils' reading proficiency and self-assurance. Narrow reading, which provides exposure to a certain theme or genre, will assist learners in acquiring the new structures and vocabulary pertinent to that genre. Engaging with novels, poems, and short stories that incorporate scientific terminology will assist learners' understanding of the specialised vocabulary employed in scientific lessons.

Stephen Krashen avers, “The case for narrow reading is based on the idea that the acquisition of both structure and vocabulary comes from many exposures in a comprehensible context, that is, we acquire new structures and words when we understand messages, many messages, that they encode. Narrow reading facilitates this process in several ways” (Language Magazine 3(5):17-19, (2004)). Consequently, focused reading facilitates the acquisition of both vocabulary and syntax.

How does one acquire the background of a particular subject? How to obtain a foundation in scientific knowledge? Permitting pupils to read narratives grounded in scientific facts will facilitate their comprehension and acquisition of scientific language. This narrow reading facilitates students' acquisition of scientific language and enhances scientific literacy.

Stephen Krashen in “The Case for Narrow Reading” avers that “… background knowledge is a tremendous facilitator of comprehension” (Language Magazine 3(5):17-19, (2004)). How to acquire the background of a given subject? How to acquire the science background? When the students are allowed to read stories based on scientific facts, it will enable them to understand and acquire science vocabulary. Stephen Krashen has evidently specified this in the following words, “Narrow readers gain more contextual knowledge as they read narrowly: The more one reads in one area, the more one learns about the area, and the easier one finds subsequent reading in the area” (and the more one acquires the language).” (Language Magazine 3(5):17-19, (2004)). Thus narrow reading enables the students to acquire science vocabulary and promotes science literacy.

The poem “A Midsummer Noon in the Australian Forest” by Charles Harpur is selected to obtain vocabulary pertinent to Life Sciences. The forest remains temperate in the summertime afternoon. Silence prevails universally. No bird flies to disrupt the atmosphere. Tranquilly dominates both the plains and the forests.

Even the grasshoppers keep
Where the coolest shadows sleep;
Even the busy ants are found
Resting in their pebbled mound;
Even the locust clingeth now
In silence to the barky bough:
And over hills and over plains
Quiet, vast and slumberous, reigns. (Harpur 5-12)

It remains cold even in the height of summertime afternoons. In the shaded recesses of the woods, Charles Harpur highlights several insects. Insects are a class of organisms characterised by a three-part body (head, thorax, and abdomen), three pairs of jointed legs, compound eyes, and two antennae. The thorax is the central segment of an insect's body, responsible for supporting the legs and wings. One may observe the grasshoppers in repose. “Grasshoppers are ‘voracious herbivores’ having a worldwide distribution. They are found in great abundance in places with open grasslands and abundant leafy vegetation, where there is plenty of food and place to breed” (Kotpal 387). This reveals the term herbivores. A “herbivore” is an animal or bug that exclusively consumes plants. A herbivore is an organism adapted to predominantly consume plant material rather than animal flesh. While these creatures are occasionally labelled as vegetarian, this designation is more accurately applied to humans who opt not to consume meat, rather than to animals who lack the capacity to make such choices.

The antonym is carnivores. A “carnivore” is an animal that eats meat. “Herbivores” transforms into “herbivorous” when employed as an adjective. Similarly, “carnivores” transforms into “carnivorous”. Two carnivorous species most recognisable to humans are the domestic dog and cat, both of which are descended from wild relatives of this order. Conversely, several bears, felines, canines, and hyenas are among the limited species that sporadically assault people. These formidable and perilous creatures encompass, among others, the cheetah, puma, jaguar, leopard, lion, tiger, and domestic cat. Cats are indigenous to nearly every place on Earth, excluding Australia and Antarctica. The lion, sometimes referred to as the “king of beasts”, has been one of the most recognised wild animals from ancient times.

Omnivores (from Latin: omne meaning all, everything; vorare meaning to devour) are organisms that primarily consume both plant and animal matter. They are opportunistic, generalist eaters not specifically specialised to primarily consume and digest either meat or plant matter. Pigs are a prominent example of an omnivore. The crow exemplifies an omnivore frequently observed by many individuals daily. Humans are omnivorous. Despite documented instances of herbivores consuming meat and carnivores ingesting plants, classification pertains to the species’ adaptations and predominant dietary sources. Consequently, these deviations do not classify either individual animals or the species collectively as omnivores.

The grasshoppers relish the cool shade offered by the trees on a warm day. The ants follow subsequently. They are perpetually occupied. These ants are observed relaxing in their pebbled mound. These insects inhabit colonies. They are also recognised for their agility. “Ants mostly construct underground nests. … The eggs hatch into larvae called ‘grubs’ ” (Kotpal 658). They inhabit subterranean nests. This is a mound composed of little stones. Adjacent to that mound, the ants repose.

In the tranquil forest, the locust clings to the tree's bark. Locusts are migratory relatives of grasshoppers. “The locusts are migratory allies of grasshoppers…. Body is robust with head broadly articulated to thorax…. Locust is herbivores in diet and gregarious in nature, migratory or swarming in great numbers. It is the worst

destroyer of standing crops and orchards" (Kotpal 650). Consequently, these insects exhibit considerable activity. They consume leaves in a gregarious manner. Consequently, they devastate extensive fields. However, they are depicted as resting.

The entire environment is permeated with tranquilly. The grasshoppers, ants, and locusts are resting on that sweltering afternoon. Consequently, a tranquil stillness pervades the hills and plains. All the insects are semi-conscious, emitting just a "drowsy humming" (13) from the lagoon side. Humming is the auditory phenomenon produced by a bee in flight; buzzing.

'Tis the dragon-hornet – see!
All bedaubed resplendently With yellow on a tawny ground – Each rich spot nor square nor round, But rudely heart-shaped, as it were The blurred and hasty impress there, Of vermeil-crusted seal Dusted o'er with golden meal: (Harpur 15-22)

The poet observes a magnificent hornet. The hornet is a big, robust wasp. A wasp is an insect that possesses a stinger. It is neither a bee nor an ant. In this poetry, one can only perceive a lethargic humming from them.

A "bright beetle" is also present (Harpur 24). Beetles inhabit this forest as well. "Beetles are hardbodied insects with heavy cuticle (skin) and manipulate the mouthparts. Forewings form hard, opaque, horny and vein less elytra (wing), usually covering the entire abdomens. Hind wings are membranous with a few veins and folded under elytra at rest" (Kotpal 656). The front pair of wings of beetles are thickened and hard, and are used to protect the hindwings. The elytra are not used for flight. Various species of beetles exist. Common beetles include the carpet beetle, tiger beetle, diving beetle, blister beetle, ladybird beetle, scarab or dung beetle, rhinoceros beetle, mealworm beetle, and rice weevil. The identification of the beetle in question presents a challenging inquiry. It "gleams its droning flight" (Harpur 25). It radiates its monotonous trajectory. Those insects emit a sombre or monotonous tone or dull sound. The term "drone" refers to a male bee, particularly a honeybee that is often devoid of a stinger, does not engage in labour, and does not generate honey. Its sole purpose is to copulate with the queen bee.

During the afternoon, the light radiates brilliantly, "Its shards flame out like gems on fire" (28). The entire woodland sparkles like a precious gem. However, there is an absence of movement.

Every other thing is still
Save the ever wakeful rill,
Whose cool murmur only throws
A cooler comfort round repose. (Harpur 29-32)

In the forest, all is tranquil. The sole motion is that of the rill; the rill has no repose. It continues to flow. Consequently, this refreshing sound creates a more cool atmosphere. This finally provides rest to everyone. This relaxation parallels Andrew Marvell's experience. Marvell in his 'The garden' writes, "While all flowers and all trees do close. To weave the garlands of repose"(Marvell 7-8). A human can find repose in Marvell's garden. Likewise, Harpur's Australian woodland provides several opportunities for individuals to rejuvenate by resting in nature. This will foster harmony with nature. The trees remain still in the wind, with barely a few ripples in the branches. Currently, summer is languid and drowsy. It "heaves a slumberous breath" (Harpur 37). It goes to sleep. "she / Once more slumbers peacefully" (Harpur 37-8). This poetry conveys scientific facts and a vocabulary of scientific constructs.

The Study

Participants

The participants consisted of 50 undergraduate students of English Literature from Bishop Heber College, Tiruchirappalli, India, for each group. Participants were exclusively arts students who maintained that vocabulary should be acquired through isolated word learning. They were unaware that they could unintentionally gain vocabulary through reading and listening to language. Furthermore, they were unaware of the Comprehension Hypothesis. They had studied English as a second language for fifteen to sixteen years.

Procedure

The poem "A Midsummer Noon in the Australian Forest" by Charles Harpur was used for the study. For the experimental group, fifteen target words from the poem were identified. "A Midsummer Noon in the Australian Forest" directly or indirectly contained the following words:

1. insects	2. thorax	3. grasshopper	4. locust
5. 'grubs'	6.wasp	7. hornet	8.larva
9. drone	10. beetle	11.humming	12.droning
13. herbivores	14. carnivores	15.omnivores	

The experimenter conducted a pre-test of 50 words from both the poem and external sources. Subsequently, he instructed the students on the poem during a session utilising a PowerPoint presentation, after which they were prompted to read the poem, followed by the administration of a post-test featuring the selected 15 words. The treatment process lasted roughly 60 minutes for the poem.

The comparison group was then considered. The experimenter conducted a pre-test consisting of the subsequent set of 50 words. The experimenter elucidated the significance of these 50 words to the control group. Subsequently, a post-test comprising the identical collection of words was presented to the experimental group at the conclusion of the session. The duration of this process was roughly 60 minutes.
After one week, the identical procedure is done without any assessments.
After a six-month wait Delayed Post-tests were administered to both groups.

Results

Table shows the mean scores of the participants in the test

	Pre-test scores	Post-test scores	Delayed Post-test scores
Experimental group	Mean 2.96 SD 1.08	Mean 13.56 SD 1.57	Mean 11.00 SD 1.76
Comparison group	Mean 2.98 SD 1.51	Mean 9.56 SD 2.16	Mean 5.00 SD 1.21

Number of students: Experimental subjects 50; Comparisons 50
Standard deviations for raw scores.
Maximum score was 15

Discussion

Narrow reading aids subjects in comprehending the meanings of the scientific terminology employed in the poem/ story. The comprehension hypothesis states that vocabulary acquisition occurs through exposure to understandable content in the target language, rather than through a concentration on form. The students were unaware that their reading and listening to the story served to augment their vocabulary knowledge, since they concentrated solely on comprehension.
The research demonstrates that vocabulary acquisition in a second language is more efficacious when employing the restricted reading strategy. The subjects unconsciously assimilated the meaning while getting intelligible inputs from teacher explanations and reading. The participants did not receive direct instruction on vocabulary enhancement.
When the scientific vocabulary is presented to the comparison group for elucidation, they fail to comprehend the complete significance of the terms. However, when exposed to the vocabulary via a limited reading of science fiction, the subjects in the experimental group assimilated scientific terminology. These findings are in line with investigations utilizing the comprehension hypothesis conducted by (Ismaiel & Asmari, 2017) (Jafari & Ketabi, 2012).
The delayed post-test scores corroborate that the vocabulary learned through the restricted reading strategy is retained to a greater extent than that learned through direct instruction. The result is consistent with the study that “One, or a very few experiences with a new word can suffice for the child to enter it into his mental lexicon and to represent some of its syntactic and semantic features”... and the full mapping of the word occurs “as the child encounters the word again” (Carey, 1978; p.291-292).
The study illustrates the advantages of multimodal and integrated approaches to vocabulary acquisition in second language learning. The results reveal that the experimental group, which employed the multimodal approach of narrow reading, viewing, and vocabulary exercises, outperformed the comparison group in both the immediate and delayed post-tests (Chang & Ma, 2018)(Cummins et al., 2008)(Fricke et al., 2012). The experimental group exhibited a substantial increase in vocabulary acquisition and retention compared to the comparison group (Sandberg et al., 2014), which relied solely on explicit vocabulary instruction. This finding aligns with prior research demonstrating the effectiveness of a multimodal approach to vocabulary acquisition in adult ESL contexts (Ismaiel & Asmari, 2017) (Rajaee, 2013) (Sandberg et al., 2014). For instance, a study on designing a smartphone app to teach English vocabulary found that students using the app significantly outperformed those in the control group in acquiring new vocabulary

Conclusion

The study is consistent with the comprehension hypothesis, suggesting that language learners subconsciously acquire grammar, syntax, vocabulary, and spelling through exposure to aural and written inputs in the language. Adult ESL students involved in the study engaged with “A Midsummer Noon in the Australian Forest” by Charles Harpur, which includes life science-related vocabulary, and demonstrated significant

improvements in their science-related vocabulary and terminology. Therefore, it is evident that this material will assist an adult ESL student in acquiring new vocabulary related to life sciences.

This research highlights the efficacy of a multimodal approach to vocabulary acquisition, incorporating narrow reading, viewing, and practice activities, for adult ESL learners in the life sciences domain. Future studies could investigate the application of this approach to other academic disciplines and the long-term retention of acquired vocabulary. In conclusion, the present study provides empirical evidence that a multimodal approach to vocabulary acquisition, involving narrow reading, viewing, and vocabulary exercises, is more effective for adult ESL learners than traditional explicit vocabulary instruction. These findings have significant implications for the design of vocabulary instruction programs in adult ESL contexts, particularly in the life sciences domain, where specialized terminology poses a significant challenge for learners.

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Biography

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