

## Visual - Spatial Learning To Enhance Teaching Vocabulary

Aprendizaje Visual - Espacial para Mejorar el Vocabulario Docente

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### Abstract

Visual-spatial learning of students is a key factor in ensuring students' success in learning a second language. Different research papers show that the way vocabulary words are taught can significantly improve students' knowledge, skill development, attitudes, and performance in learning a second language while other research papers revealed that visual-spatial learning positively influenced on vocabulary learning. The current article is based on the problem: how visual-spatial learning can improve vocabulary knowledge through English as a second language lessons with the aid of various kinds of teaching media? A longitudinal study was conducted with fifth-grade students of Eugenio Espejo School in which the above-mentioned teaching media were used to teach English vocabulary words. Vocabulary development of students was compared in two different moments, at the beginning and at the end of a twelve-week period by means of the vocabulary knowledge scale (VKS). 46 fifth-grade students were randomly taken as a sample. Different research methods were used such as literature review and surveys as well as mathematical-statistical procedures to gather, organize and presentation of dataset by means of tables. The data were gathered and process by means of a quantitative questionnaire. The statistical analyses showed that taking the advantages of student visual-spatial intelligent and learning style by means of various kinds of teaching media such as: pictures, concept maps, maps, drawing and video can improve student vocabulary knowledge.

**Keywords:** learning; English; visual-spatial; vocabulary.

### Resumen

El aprendizaje visual-espacial de los estudiantes es un elemento fundamental para mejorar los resultados en el aprendizaje de una segunda lengua. Diferentes investigaciones muestran que las vías utilizadas para la enseñanza del vocabulario influyen significativamente en el conocimiento, el desarrollo de

habilidades, las actitudes y los resultados en el aprendizaje de una segunda lengua mientras que otras investigaciones revelan que el aprendizaje visual-espacial influye positivamente en el aprendizaje del vocabulario. El objetivo del presente artículo fue: ¿Cómo el aprendizaje visual-espacial puede mejorar el conocimiento del vocabulario a través de las clases de inglés como segunda lengua, con la ayuda de diferentes medios de enseñanza? Se realizó un estudio longitudinal con estudiantes de quinto grado de la Escuela Eugenio Espejo con los cuales se comparó el conocimiento del vocabulario en dos momentos diferentes, al inicio y al concluir doce semanas mediante la escala de conocimiento del vocabulario (ECV). Se utilizó una muestra no probabilística intencional, compuesta por 46 estudiantes de quinto grado. Se utilizaron diferentes métodos de investigación de nivel teórico y empírico, así como procedimientos matemáticos-estadísticos para recoger y organizar los datos. El análisis estadístico reveló que si se aprovechan las ventajas de la inteligencia y el estilo de aprendizaje visual-espacial, apoyada en medios de enseñanza como fotos, mapas conceptuales, mapas, dibujos y videos se puede mejorar el conocimiento del vocabulario.

Se concluye que el aprendizaje Visual -espacial contribuye de manera positiva en el aprendizaje de vocabulario de una segunda lengua toda vez que se emplee elementos que captan la atención de los aprendices.

**Palabras Clave:** aprendizaje; inglés; visual-espacial; vocabulario.

## **Introduction**

The cognitive activities that students engage in when encountering academic or technical learning tasks are of crucial importance. These activities can be modified through instruction, training, and testing to make them more effective. Teachers have to find the correct strategies and techniques to teach because each student has a particular type of intelligence. Teaching vocabulary to primary school learners should be oriented toward the facilitation of these cognitive activities.

It is recognized that the theory of multiple intelligences was developed by psychologist Howard Gardner at the end of 1970s and the beginning of 1980s (Davis, Christodoulou, Seider, & Gardner, 2011). According to these referred authors, individuals possess eight relatively autonomous intelligences which most authors identified as: Verbal-Linguistic Intelligence, Logical-Mathematical Intelligence, Visual-Spatial Intelligence, Bodily-Kinesthetic Intelligence, Musical Intelligence, Interpersonal Intelligence, Intrapersonal Intelligence and Naturalist Intelligence.

Taking into consideration the complexity and extension of Gardner theory and according with the purpose of this article it is necessary to highlight that Visual-Spatial Intelligence is associated with:

Visual perception of the environment, the ability to create and manipulate mental images, and the orientation of the body in space. It may be developed through experiences in the graphic and plastic arts, sharpening observation skills, solving mazes and other spatial tasks, and exercises in imagery and active imagination. (Gardner, 2011, p.6)

In addition, the concept of visual-spatial learner is seen as: “learners or individuals who think in pictures rather than in words” (Silverman L. , 2003, p.6). However, an intelligence is not a learning style. “A style designates a general approach that an individual can apply equally to every conceivable content.” (Gardner, 1985, p. 102). This is why teachers have to find the correct techniques and strategies to teach because each student has a particular type of intelligence and a learning style as stated by the theories

of multiple intelligences and learning styles. This is essentially important when teaching and learning a second language (L2).

In accordance with Gardner conception of learning style, (Sternberg, 1994) states that a learning style is not an ability but a preferred way of using one's abilities (Sternberg, 1994). From this perspectives, the term learning style could be defined as the way in which each person learn by means of particular strategies (Sánchez, 2019).

English as a foreign language learning (EFL), also known as Second Language Learning (SLL/L2) demands many challenges, one of these challenges is gasping the vocabulary (Goundar, 2019). Vocabulary knowledge is necessary for teaching and learning a second language because it is the basic for the development of reading, writing, listening and speaking (Aries, 2020). However, teaching vocabulary is not easy because each student has different intelligence, ability and learning style. Thus, teachers should be creative to find new strategies to satisfy students diversity in terms of students' intelligence types, abilities and learning styles.

Susanto, (2017) considered vocabulary learning as an essential part in EFL because lexical knowledge is critical to the acquisition of the target language and a lack of vocabulary knowledge became an obstacle to learning. In this regard, vocabulary knowledge contributes to appropriately and accurately communication of students but it requires students' cognitive academic language proficiency (Abdalla, 2021).

Children acquire vocabulary indirectly, first by listening when others speak and secondly by using words to talk to others. However, as children begin to read and write, they intentionally acquire more vocabulary words and incorporate those words into their knowledge (Abdalla, 2021). In fact, vocabulary acquisition experienced a fast growth in childhood but it continues its development throughout life. In this sense, vocabulary acquisition is increased and words are not acquired instantaneously. Vocabulary knowledge is not a language issue that can ever be fully mastered and it requires time. (Susanto, 2017; Abdalla, 2021 and Abdullaeva & Islomova, 2020).

Abdalla, (2021) considered that, in EFL learning, vocabulary acquisition is seen as a matter of learning vocabulary. Language acquisition is referred to a natural process when children learn any component of a language in a natural setting. Meanwhile, second language acquisition takes place after the learners have acquired their mother tongue or first language (L1).

The literature review revealed several definitions of vocabulary knowledge. According to the purpose of this article vocabulary knowledge is assumed as the ability to recognize the components of words and as the receptive and productive expertise and fluency (Schmitt, 2019). Vocabulary knowledge, as the biggest part of learning a language (Teng, 2015), includes two dimensions: breadth of vocabulary knowledge and depth of vocabulary knowledge. Breadth of vocabulary knowledge is related to vocabulary size whereas depth of vocabulary knowledge is related to the quality of knowing a word.

Vocabulary acquisition can be developed either through intentional or incidental teaching and learning. It is said to be intentional when the acquisition of vocabulary is a result of an activity designed to learn components of vocabulary knowledge. Whereas it is incidental when vocabulary knowledge is the by-product of a reading, listening or writing activity, usually involving comprehension, which is not explicitly designed for vocabulary learning (Hindley Rodgers, 2013).

Researchers considered that intentional learning of vocabulary as the most effective method of students' vocabulary acquisition (Nicolay & Poncelet, 2013; Zhao, Pandian, & Mehar Singh, 2016 and Li, Ying, Chen, & Guan, 2022). According to Hindley Rodgers, (2013), intentional development of vocabulary should be supported with activities that promote incidental vocabulary acquisition. Such activities can expose students to vocabulary development in real-life context. For example, vocabulary acquisition through reading usually involves the process of learning an unknown word and searching for its meaning (Zhao, Pandian, & Mehar Singh, 2016).

General intellectual skills are involved in learning, in general, and in vocabulary learning in particular. First language (L1) vocabulary knowledge influenced on student's conceptual development and because this referred conceptual development influence second language (L2) vocabulary acquisition it is assumed that L1 vocabulary knowledge impact on L2 vocabulary acquisition and vice versa.

Vocabulary is acquired incidentally, through indirect exposure to words and intentionally through explicit teaching of specific words (Abdullaeva & Islomova, 2020). Researchers suggest that students' textbook is not sufficient for developing vocabulary knowledge (Teng, 2015; Abdullaeva & Islomova, 2020 and Abdalla, 2021). Intentionally acquisition of vocabulary includes: explaining vocabulary items in a meaningful context, using visual aids motivate students and develop their vocabulary, using the new technology has a great role in developing English vocabulary (Abdalla, 2021). It is in this sense that the current article explores the effectiveness of using strategies which takes advantages of visual-spatial intelligences and learning styles to improve vocabulary knowledge.

EFL is a dynamic and complex process that could be improved from students by means of different learning strategies (Ghalebi, Sadighi, & Bagheri, 2020). In other words, the role of teachers in the process of language development is to facilitate and guide students learning both inside and outside of the classroom. Accordingly, teachers facilitate students' vocabulary development but developing student vocabulary knowledge is important to look at how to use effective learning strategies. This current article assumed that these strategies should be in accordance with students learning styles, particularly visual-spatial learning.

Researchers have suggested that adopting strategies such as active and cooperative learning which focuses on student participation, cooperation and interaction contribute to exchange ideas, take responsibilities, develop critical thinking of students (Zhao, Pandian, & Mehar Singh, 2016). Some of the proposed strategies include role play, act on real-life situations, modeling, research projects. It involves research work about real-life problems and the reporting of the findings in various ways such as presentations, newspapers, plays and debates, in which visual-spatial intelligence is substantially important.

Abdullaeva & Islomova, (2020) suggested a variety of direct and indirect methods of teaching vocabulary. Such methods include: word-learning strategies, dictionary use, morphemic analysis, cognate awareness and contextual analysis. In this article, the vocabulary learning strategies assumed are summarized in Table 1.

**Table 1:** Vocabulary learning strategies. Source: (Letchumanan, Muthusamy, Govindasamy, & Farashaiyan, 2016)

Categories of Strategies	Types of Strategies
Memory	Creating Mental Images
	Applying Images and sounds
	Reviewing Well
	Employing Action
Cognitive	Practice
	Receiving and Sending Messages
	Analyzing and Reasoning
	Creating Input and Output
Compensation	Guessing Intelligently
	Overcoming Limitations
Metacognitive	Centering Learning
	Planning Learning
	Evaluating Learning
Social	Asking Questions
	Cooperating
	Empathizing
Affective	Lowering Anxiety
	Encouraging
Determination	Analyzing speech, affixes
	Contextual Guessing
	Check L1 Cognate
	Consulting Dictionary

The development of Information and Communication Technologies (ICTs) have positively impact on education, particularly on teaching aids. Visual tools became key teaching aids which have been widely used to teach all subjects. Students and teachers are generating new scenarios that are different from traditional classrooms.

Researchers recognized the strengths of visual learning contexts where the students get familiar with objects, estimate size, shape, depth, color. In addition, identify where they are and observe process and phenomena difficult to see at the first site in a relative short time. If a teacher takes the advantage of such media and visual-spatial learning styles of students the vocabulary knowledge could be improved.

As said by (Silverman L. K., 2002), there are some strategies which produce good results teaching with visual-spatial intelligence, amongst them:

- Visual teaching aids such as overhead projectors and pitchures.
- Find out previous knowledge of students before teaching new content.
- Let students discover their own methods of problem solving.
- Engage students in independent studies or group projects which involve problem-finding as well as problem-solving.
- Allow students to construct, draw, or otherwise create visual representations of concepts.
- Use computers so that material is presented visually.

Along with the above mention ideas, the results of the baseline and diagnostic assessments, as well as fifth-grade lesson observations of Eugenio Espejo School revealed different perceived limitations in vocabulary knowledge through English as a second language lessons. These limitations are:

- Poor use of teaching aids that enhance student visual-spatial intelligence and learning style to develop vocabulary knowledge.
- Teachers frequently present fragmented subject content that is decontextualized from real life situations.
- Teachers persistent use of traditional problems far from real life problems.

A balance of the above limitations reveled the following problem: how visual-spatial learning can improve vocabulary knowledge through English as a second language lessons with the aid of various kinds of teaching media? The main purpose of this research was to evaluate the appropriateness of taking advantages of visual-spatial learning style to enhance vocabulary knowledge of fifth-grade students.

## **Methodology**

In this current research paper, a quantitative research approach was applied (Hofman & Sutherland, 2018). Quantitative data were gathered by means of a variety of research methods such as analysis-synthesis, induction-deduction, observation, survey and VKS to summarize dataset with the aid of tables. Descriptive statistics was also included for measuring central tendencies such as mean, standard deviation, Cronbach alpha and T-Test in order to look for patterns and make inferences regarding vocabulary knowledge.

A descriptive-comparative study was planned based on a quantitative approach with a longitudinal design. This study included a population of 65 fifth-grade students. A non-probabilistic sample of 46 fifth-grade students (9-10 years old) was selected. The students of the sample were selected from

Eugenio Espejo School in Latin American educational context. All participants of this study took EFL courses in the selected school.

The study developed with the referred students included the use of a variety of teaching media to teach English vocabulary words. Vocabulary knowledge of students was compared in two different moments, at the beginning and at the end of a study (Twelve-week period). In other words, before and after various kinds of teaching media such as pictures, concept maps, maps, drawing and video were introduced in the teaching and learning process. The study helped to explore the appropriateness of taking advantages of visual-spatial learning style to enhance vocabulary knowledge of fifth-grade students.

For this research paper, the enhancement of vocabulary was measured using the vocabulary knowledge scale (VKS) (Paribakht & Wesche, 1993). According to these authors, VKS consists of five stages of vocabulary knowledge. A short test is proposed to characterize where each particular word is placed on the scale. The five mentioned stages are defined as statements that best describe student knowledge of a particular word. These statements are as follow:

1. I don't remember having seen this word before.
2. I have seen is word before but I don't know what it means.
3. I have seen is word before and I think it means...
4. I know this word. It means...
5. I can use this word in a sentence e.g...

The scale ratings range from entire unfamiliarity or lower stage (1) to the highest stage where student use the word in context with grammatical and semantic accuracy (5). The participants took VKS test with a target word list in two different moments, at the beginning (pre-test) and at the end of a semester (post-test). VKS sheet with twenty vocabulary words were designed and provided in these two particular movements. Students had to choose the option that best describe their knowledge of a particular word (Table 2).

**Table 2,** Vocabulary Knowledge Scale sheet. Source: (Paribakht & Wesche, 1993)

Think about the word list below. You are asked to place a tick on the right box according to the following key:						
1. I don't remember having seen this word before.						
2. I have seen is word before but I don't know what it means.						
3. I have seen is word before and I think it means _____ (synonym or translation).						
4. I know this word. It means _____ (synonym or translation).						
5. I can use this word in a sentence e.g.: _____.						
No	Words	1	2	3	4	5
1						
...						

19						
20						

Two Vocabulary Knowledge Scale Sheet (VKSS) were designed to be applied at the beginning (Pre-test) and at the end (Post-test) of this study. Each VKSS consist of an introduction as well as a balanced and appropriate word list of fifth-grade English curriculum. Words were classified as nouns, adjectives, verbs and adverbs. Participants were asked to complete the VKSS. The Pre-test VKSS is shown in Table 3.

**Table 3:** Pre-test VKSS. Source: (Paribakht & Wesche, 1993)

Think about the word list below. You are asked to place a tick on the right box according to the following key:						
<ol style="list-style-type: none"> <li>1. I don't remember having seen this word before.</li> <li>2. I have seen is word before but I don't know what it means.</li> <li>3. I have seen is word before and I think it means _____ (synonym or translation).</li> <li>4. I know this word. It means _____ (synonym or translation).</li> <li>5. I can use this word in a sentence e.g.: _____.</li> </ol>						
No	Words	1	2	3	4	5
1	Car (n.)					
2	Cat (n.)					
3	Food (n.)					
4	Kitchen (n.)					
5	Street (n.)					
6	Fat (adj.)					
7	Funny (adj.)					
8	Good (adj.)					
9	Happy (adj.)					
10	Tall (adj.)					
11	Go (verb.)					



12	Depart (verb.)					
13	Erase (verb.)					
14	Read (verb.)					
15	Listen (verb.)					
16	Always (adv.)					
17	Far (adv.)					
18	Many (adv.)					
19	Quickly (adv.)					
20	Lastly (adv.)					

The teaching aid to be used must be carefully and intentionally selected. Some criteria were defined to make the right selection. The best selection would match the following criteria: age, gender, cultural background, educational level, core curriculum guidelines, school infrastructure and visual-spatial weakness and strengths. Teaching aids such as: pictures, concept and mind maps, maps, drawing and video generally match these criteria but need to be contextualized in accordance with core syllabus outlines. The Post-test VKSS is shown in Table 4.

**Table 4:** Post-test VKSS. Source: (Paribakht & Wesche, 1993)

Think about the word list below. You are asked to place a tick on the right box according to the following key:						
1. I don't remember having seen this word before.						
2. I have seen is word before but I don't know what it means.						
3. I have seen is word before and I think it means _____ (synonym or translation).						
4. I know this word. It means _____ (synonym or translation).						
5. I can use this word in a sentence e.g.: _____.						
No	Words	1	2	3	4	5
1	Bus (n.)					
2	Dog (n.)					
3	Brother (n.)					
4	Backyard (n.)					

5	Park (n.)					
6	Fat (adj.)					
7	Boring (adj.)					
8	Bad (adj.)					
9	Angry (adj.)					
10	Small (adj.)					
11	Come (verb.)					
12	Say (verb.)					
13	Erase (verb.)					
14	Write (verb.)					
15	Speak (verb.)					
16	Never (adv.)					
17	Close (adv.)					
18	Much (adv.)					
19	Slow (adv.)					
20	Firstly (adv.)					

The study included a hypothesis test. A T-test was selected knowing that only five sets of means (nouns, adjective, verbs adverbs and total) were compared (less than 30). That is why a hypothesis test for two dependent means was selected with two tails and a significant level of 0.05. As a result, an alternative hypothesis was formulated as  $H_a: \mu \neq H_0$ , with  $H_0$  as the null hypothesis. Treatments 1 is composed for Pre-test VKSS results and Treatment 2 is composed by Post-test VKSS results. The value of p was determined with the aid of an online statistical calculator (Source: <https://www.socscistatistics.com>).

## Results

Absolute and relative frequencies revealed lower level of vocabulary knowledge in Pre-test and higher level of vocabulary knowledge in Post-test. The higher frequencies in Pre-test corresponded to levels 1 and 2 which are the lower levels of VKS. Oppositely, the highest frequencies in Post-test corresponded to 3, 4 and 5 levels which are the higher levels of VKS. Table 5 shows absolute and relative frequencies for each vocabulary word assessed during the study.

**Table 5:** Absolute and relative frequencies

Type of word	Pre-test										Post-test										
	Words	f <sub>1</sub>	f <sub>2</sub>	f <sub>3</sub>	f <sub>4</sub>	f <sub>5</sub>	f <sub>1</sub> <sup>r</sup>	f <sub>2</sub> <sup>r</sup>	f <sub>3</sub> <sup>r</sup>	f <sub>4</sub> <sup>r</sup>	f <sub>5</sub> <sup>r</sup>	f <sub>1</sub>	f <sub>2</sub>	f <sub>3</sub>	f <sub>4</sub>	f <sub>5</sub>	f <sub>1</sub> <sup>r</sup>	f <sub>2</sub> <sup>r</sup>	f <sub>3</sub> <sup>r</sup>	f <sub>4</sub> <sup>r</sup>	f <sub>5</sub> <sup>r</sup>
<b>Nouns</b>	W1	23	13	6	0	0	58,4	31,0	14,3	0,0	0,0	0	2	16	12	12	0,0	4,8	38,1	28,6	28,6
	W2	16	21	5	0	0	38,1	50,0	11,9	0,0	0,0	0	2	16	14	10	0,0	4,8	38,1	33,3	23,8
	W3	17	19	4	2	0	40,5	45,2	9,5	4,8	0,0	0	2	1	13	26	0,0	4,8	2,4	31,0	61,9
	W4	7	29	4	2	0	16,7	69,0	9,5	4,8	0,0	0	2	2	32	6	0,0	4,8	4,8	76,2	14,3
	W5	26	12	4	0	0	61,9	57,1	9,5	0,0	0,0	0	0	18	18	6	0,0	0,0	42,9	42,9	14,3
<b>Adjectives</b>	W6	23	13	6	0	0	54,8	31,0	14,3	0,0	0,0	1	3	9	23	6	2,4	7,1	21,4	28,6	14,3
	W7	23	13	6	0	0	54,8	31,0	14,3	0,0	0,0	1	3	9	23	6	2,4	2,4	21,4	33,3	14,3
	W8	21	15	6	0	0	50,0	35,7	14,3	0,0	0,0	2	2	0	8	30	4,8	4,8	0,0	31,0	71,4
	W9	6	30	6	0	0	14,3	71,4	14,3	0,0	0,0	1	3	1	28	9	2,4	7,1	2,4	76,2	21,4
	W10	14	21	7	0	0	33,3	50,0	16,7	0,0	0,0	1	0	12	23	6	2,4	0,0	28,6	42,9	14,3
<b>Verbs</b>	W11	22	15	5	0	0	52,4	35,7	11,9	0,0	0,0	0	2	7	23	10	0,0	4,8	16,7	54,8	23,8
	W12	21	15	6	0	0	50,0	35,7	14,3	0,0	0,0	0	2	18	19	3	0,0	4,8	42,9	54,8	7,1
	W13	20	14	8	0	0	47,6	33,3	19,0	0,0	0,0	0	2	1	6	33	0,0	4,8	2,4	19,0	78,6
	W14	8	26	8	0	0	19,0	61,9	19,0	0,0	0,0	0	2	13	17	10	0,0	4,8	31,0	40,5	23,8
	W15	17	18	7	0	0	40,5	42,9	16,7	0,0	0,0	0	0	9	30	3	0,0	0,0	21,4	71,4	7,1
<b>Adverbs</b>	W16	27	9	6	0	0	64,3	21,4	14,3	0,0	0,0	0	2	18	11	11	0,0	4,8	42,9	26,2	26,2
	W17	27	9	6	0	0	64,3	21,4	14,3	0,0	0,0	0	2	18	11	11	0,0	4,8	42,9	26,2	26,2
	W18	24	12	6	0	0	57,1	28,6	14,3	0,0	0,0	0	2	2	3	35	0,0	4,8	4,8	7,1	83,3
	W19	7	29	6	0	0	16,7	69,0	14,3	0,0	0,0	0	2	5	23	12	0,0	4,8	11,9	54,8	28,6
	W20	17	23	2	0	0	40,5	54,8	4,8	0,0	0,0	2	0	18	11	11	4,8	0,0	42,9	26,2	26,2

Cronbach's coefficient of the VKS used in this longitudinal study varied from 0.66 to 0.86 ( $0,66 \leq \alpha \leq 86$ ) in all vocabulary words. This is consistent with (Paribakht & Wesche, 1993) validated VKS. That is to say, the result obtained from this dataset has an appropriate level of accuracy and reliability. Cronbach's coefficients, means and SD for each type of word (nouns, adjectives, verbs and adverbs) as well as the total are displayed in Table 6.

**Table 6:** Cronbach’s coefficients, means and SD

Word Type	Pre-test		Cronbach $\alpha$	Post-test		Cronbach $\alpha$
	Mean	SD		Mean	SD	
Nouns	1,84	0,34	0,68	4,12	0,24	0,74
Adjectives	1,99	0,36	0,66	4,14	0,29	0,81
Verbs	1,96	0,37	0,68	4,10	0,26	0,69
Adverbs	1,82	0,27	0,69	4,11	0,26	0,86
TOTAL WORDS	1,90	0,34	0,74	4,12	0,26	0,77

Post-test exhibited higher values of Means after visual-spatial learning style was introduced with new teaching aids. The adverbs mean (Pre-test) was 1,82 while adverbs mean (Post-test) was 4,11. There is a difference of +2,29. The statistical result of the T-test is displayed in Table 7.

**Table 7:** Statistical result of the T-test.

<https://www.socscistatistics.com/tests/studentttest/default2.aspx>

Vocabulary words	Treatment 1 Mean	Treatment 1 Mean	Dev (T2-T1)	Dev (Diff-M)	Sq. Dev
Nouns	1,84	4,12	3	40,7	1656,49
Adjectives	1,99	4,14	-72	-34,3	1176,49
Verbs	1,96	4,10	3	40,7	1656,49
Adverbs	1,82	4,11	-85	-47,3	2237,29
TOTAL	1,90	4,12	3	40,7	1656,49
			-86	-48,3	2332,89
			3	40,7	1656,49
			-71	-33,3	1108,89
			3	40,7	1656,49
			-78	-40,3	1624,09
			M: -33.7		S: 16762,1

It was worked with a significance level of 0.05. Difference score calculation was displayed as follow:

Mean:  $-37,7$

$$\mu = 0$$

$$S^2 = \frac{SS}{df} = \frac{1676,1}{(10 - 1)} = 1862,46$$

$$S_M^2 = \frac{S^2}{N} = 1862,46/10 = 186,25$$

$$S_M = \sqrt{S_M^2} = \sqrt{186,25} = 13,65$$

$$t = \frac{(M - \mu)}{S_M} = (-37,7 - 0)/13,65 = -2,76$$

The value of  $t$  was  $-2,762475$ . The value of  $p$  was  $0,02202$ . The result is significant at  $p < 0,05$ .

## Discussion

Absolute and relative frequencies in Pre-test got higher values for levels 1 and 2 which ranged from entire unfamiliarity to lower familiarity stages (1 and 2) in VKS. Oppositely, the highest frequencies in Post-test got higher values for levels (4 and 5) which are the higher stages where student use the word in context with grammatical and semantic accuracy according to VKS.

Comparing the mean and standard deviation of Pre-test and Post-test, it can be observed that means of nouns, adjectives, verbs, adverbs and the total changed. Post-test exhibited higher values of Mean, after visual-spatial learning style was introduced with new teaching aids. Whereas, Pre-test exhibit lower values of Mean.

It can be seen that adverbs mean (Post-test) was  $4,11$  while adverbs mean (Pre-test) was  $1,82$ . There is a mean difference of  $+2,29$ . The result is similar for the other type of words. It can also be seen that adjective mean (Pre-test) was  $1,99$  while adjective mean (Post-test) was  $4,14$ . There is a mean difference of  $+2,15$ .

The hypothesis test applied revealed that the value of  $t$  was  $-2,762475$ . The value of  $p$  was  $0,02202$ . The value of  $p$  is less than  $0,05$ . In other words, the result is significant at  $p < 0,05$ . Therefore, the null hypothesis was rejected.

This result proved that there is a significant difference in in terms of vocabulary knowledge between Pre-test and Post-test means. In other words, statistical analysis showed that vocabulary knowledge was improved. Putting into practice the advantages of student visual-spatial intelligent and learning style by means of various kinds of teaching aid such as: pictures, concept maps, maps, drawing and video which were intentionally selected can improve fifth-grade student vocabulary knowledge.

## Conclusion

The longitudinal study displayed in this research paper evaluated the appropriateness of taking advantages of visual-spatial learning style to enhance vocabulary knowledge of fifth-grade students.

Results revealed that visual-spatial learning style by means of various kinds of teaching aid such as: pictures, concept maps, maps, drawing and video which were intentionally selected can improve fifth-grade student vocabulary knowledge in a second language learning at Eugenio Espejo School.

The alternative hypothesis was supported ( $H_a: \mu \neq H_o$ ). It was concluded that there is a significant difference between Pre-test and Post-test results in terms of vocabulary knowledge of seventh-grade students from Eugenio Espejo School showing that visual-spatial learning styles can improve vocabulary knowledge.

Other facets of student vocabulary knowledge such as age, gender, working memory, metacognition, environment, context, social, economic and cultural background were not measured in this study. Future studies and research papers would aim to explore these other aspects and its impact on student vocabulary knowledge.

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