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COLOR CODING AS A TEACHING STRATEGY TO ACQUIRE VOCABULARY IN THE LONG-TERM
MEMORY OF FOURTH-GRADE STUDENTS AT 16 DE ABRIL ELEMENTARY MIDDLE SCHOOL.

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Abstract

In order to master English, it is essential for students to know that the acquisition of words helps them to understand the English language. Therefore, this research seeks to introduce a strategy to support the acquisition of vocabulary in English about professions through color coding for students in 4th grade. According to the literature review, some authors such as Chávez (2019) y Farley (1976) manifest that color is a memory stimulant that helps the acquisition of words, but above all, it helps to retain the information for a more extended period. In addition, this study follows a quasi-experimental design with a quantitative and qualitative approach. The key instruments for data collection were the pre-test and post-test which helped to determine the effectiveness of the strategy. Finally, the main result is that color coding strategy (CCS) It is a tool to organize the content, easily accessible to the teacher and especially for the student that allows them to acquire vocabulary in their long-term memory.

Keywords: short-term memory, long-term memory, color coding, retention, acquisition, strategy.

Resumen

Para dominar el inglés, es esencial que los alumnos sepan que la adquisición de palabras les ayuda a comprender la lengua inglesa. Por lo tanto, esta investigación busca introducir una estrategia para apoyar la adquisición de vocabulario en inglés sobre profesiones a través de la codificación por colores para los estudiantes de 4º grado. De acuerdo con la revisión bibliográfica, algunos autores como Chávez (2019) y Farley (1976) manifiestan que el color es un estimulante de la memoria que ayuda a la adquisición de palabras, pero, sobre todo, ayuda a retener la información por un periodo más prolongado. Además, este estudio sigue un diseño de investigación diseño cuasi experimental con un enfoque cuantitativo y cualitativo. Los instrumentos clave para la recogida de datos fueron el pre-test y el post-test que ayudaron a determinar la eficacia de la estrategia. Finalmente, el resultado principal es que la estrategia de codificación por colores es una herramienta para organizar el contenido, de fácil acceso al docente y sobre todo para el estudiante que le permite adquirir vocabulario en su memoria a largo plazo.

Palabras claves: memoria a corto plazo, memoria a largo plazo, codificación de colores, retención, adquisición, estrategia.

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“Time and memory are true artists; they remold reality nearer to the heart’s desire.”

John Dewey (1859-1952)

1 Introduction

Throughout history, humans have dealt with difficulties in communication due to the diversity of languages in the world. Nevertheless, English has overcome the barriers in recent years, becoming an international, standard, and shared communication tool. Parmawati (2018) manifests that English can link and make it easy for people in most countries to communicate with each other across a diversity of fields like economics, business, education, and politics. So, it has become one of the most popular communicative languages in many countries. Consequently, this highly motivates society to learn English to expand personal and professional opportunities.

However, in Ecuador the educational reality of English is different. English Proficiency Index (2022), manifests that Ecuador maintains a shallow level of English language skills. Also, this low level is a result lack of knowledge and skills from professors because they are not well-prepared (Angelis, 2022; Ponce et al., 2019). Additionally, Cáneppa et al. (2018) mention that English in previous years was not considered one of the main subjects in the school's curriculum taught. Therefore, the institutions taught one class of English a week and it affects students to have more opportunities to learn this language.

Further, the MINEDUC (2019), boost the EFL through programs and projects to enable teachers to innovate in their classes. Also, it encouraged the creation of new degrees when teachers in training specialized in the domain of the English language and their respective didactic (UNAE, 2019). This means that both future and practicing teachers are encouraged to use and create strategies and resources that allow them to innovate in their classrooms, leading students toward meaningful learning.

Likewise, the lack of different resources in the classroom, low academic performance, and overall inefficient strategy that help students retain knowledge affect the teaching-learning English process. In addition, considering that English is more meromictic than other subjects it is said that strategies to students interiorized the English language content are ineffective for a long time (Pacurucu, 2019). This problem began from kindergarten until the baccalaureate (Parra and Paucar, 2019).

In like manner, the 16 de Abril school is a public urban institution located in Azogues that was created as an innovative project to improve the education system in Ecuador. It is inside the program of millenary schools. It contains the initial level, Basic general education (EGB), it contains basic preparatory sublevel, elementary, middle, and higher. Also, it has a Unified general baccalaureate (BGU) and the English subject is taught at all these levels. In relation to its philosophy and educational model according to the Institutional Curricular Planning (PCI) of 16 Abril school, it seeks to introduce innovative approaches that encourage creativity, autonomy, and critical thinking to support students in the acquisition of knowledge and skills to put into practice in their personal and professional lives.

Through participatory observation, it has been identified that the institution has ample spaces such as classrooms, offices, and patios that promote educational quality. Specifically, the 4th grade of EGB has a structure with great luminosity and the desks are arranged in rows. The size of the desks is in accordance with the height of the students, which provides comfort and space for different activities. On the other hand, this course has several resources and tools within easy reach such as paints, markers, papers, crayons, and watercolors of many colors. Despite these benefits in the classroom, the English teacher does not involve in this. Additionally, the classroom has technological equipment such as a

projector. Although the projector is a very useful resource, the teacher's teaching process is limited and affected by technical inconveniences. In addition, this resource demands a costly investment for the institution.

1.1 Problem Statement

In Elementary 16 de Abril school, through participatory observation, it was found that the students of 4th grade EGB like activities that involve coloring. Because; this activity is accessible to the students and also to the teacher. In addition, when students colored, it was observed that there was calm, good behavior (better control of discipline) compared to other strategies that involve jumping, walking, moving, or leaving their post. However, it has been observed that the teacher implements a methodology that is not very pleasant for the students, specifically, when it comes to teaching a certain vocabulary.

For example, the teacher asks students to copy a certain number of words several times in the notebook. Then, the students repeat each word 10 or more times, and similar tasks are even sent home. Additionally, it is evident that students use only one to two colors when doing these types of tasks. "Our brain works like a muscle, therefore, we constantly need to work on it, to develop its capacities to the maximum" (Laufer, 2003, p.11). Similarly, it is observed that students do not show motivation towards this type of activity and consequently, there is a dislike towards learning English. Likewise, this is reflected in low grades. Consequently, there is no meaningful, active and creative learning, which leads the student to higher-order cognitive levels such as improving long-term retention. Knowing that; vocabulary is one of the most important elements in English language acquisition since students cannot communicate effectively without it.

According to Kuśnierek (2016), nowadays, developing communicative skills means having a high knowledge of vocabulary. This means that, if learners know enough words, they would be able to express their ideas and interact with others easily. Consequently, if students cannot retain vocabulary for an extended period, they will be not able to improve their skills and increase their language proficiency. Therefore, these barriers limit the learning of English, so the concern arises to know how to improve the acquisition of the English language by means of a strategy that implements color and that allows them to retain in the long term the contents such as the vocabulary learned in a given unit.

1.2 Justification

English as a foreign language has become one of the most transversal languages Mirman (2018). However, Ecuador has a low level of English specifically in rural communities. This means that students who finish high school do not reach the B1 level of English and skills established by the Ecuadorian curriculum mainly due to the low quality of education in the classroom (Ortega y Auccahuallpa, 2017; IEP, 2022).

Additionally, in the teaching practicum, it was observed that the English area at the 16 de Abril school follows a teacher-centered methodology. This means that the student participates less, turning them into passive participants. However, to acquire the English language it is necessary that the students become active participants since this language demands the impulse of more skills that cannot be developed only through observation (Restrepo and Waks, 2018).

Consequently, Sosa and Chacín (2013), emphasize that someone could read a text almost without knowing much about grammar, but without vocabulary, they will not be able

to read the text. Then, strategies used in the classroom should have a more active approach that helps students to meaningfully internalize the vocabulary because if students retain the vocabulary they will be able to master the language. However, for the fourth-grade level active mental strategies should be taken into consideration instead of physical ones because this is a numerous energetic group that when applying strategies that demand body movements produces a disorder and indiscipline. Therefore, Orosz et al. (2018), provide evidence indicating that acquisition seems to depend on different cognitive active processes, ranging from memorization processes to the establishment of associations of elements to be learned.

To students become more active and aware of their learning Restrepo and Waks (2018) mention that active strategies that involve colors help students to acquire vocabulary. Since colors in English for children play a very important role in their development and learning of English at an early age. Not all people perceive colors in the same way. Therefore, each color conveys a different feeling and emotion than the previous one. Color-based instruction helps students develop cognitive skills for early English language acquisition. Each color conveys emotions and feelings Pruisner (1993).

Also, as part of the National University of Education (UNAE) that trains teachers with strong knowledge in English language pedagogy, but above all innovative teachers in the implementation of strategies and methodologies (Resolution RPC-SO-03-No-021-2018), the researchers of this study seek a modern strategy to help improve this problem. Also, this project encourages the reduction of gaps and social differences, because, through the EA of the English Language, students respond better to their reality and, in this way, it is linked to

the 4th Sustainable Development Goal (SDG) which refers to the quality and educational inclusion (UNAE, 2015).

Finally, this study makes a slight approach to the concepts of neuroeducation from the psychology of color. For example, various phenomena in the natural and social environment influence people's learning (Martinez et al., 2019). Of these, the eye receives diverse visual stimuli, including color. This stimulus is transformed into memories and emotions (Pruisner, 1993; Ostos, 2021). Therefore, the teaching and learning of English should be modeled according to the context of the student, allowing whole and meaningful learning (Perkins, 2010; Ausubel, 2002).

1.3 Research Question

How color-coding strategy let to boost English vocabulary in fourth-grade students at 16 de Abril school?

1.3.1 Sub Question

Does the color Coding Strategy allow the best flow of English vocabulary?

Does Color Coding Strategy have a relationship between emotions and reality?

1.4 General Objective

To analyze the effectiveness of the color-coding strategy about mastery of English vocabulary reviewed in fourth-grade students at 16 de Abril school.

1.4.1 Specific Objectives

To diagnose the study context in relation to the teaching and learning of English process specifically in the acquisition of the vocabulary reviewed in fourth-grade students of the “16 de Abril school”.

To determine the theoretical and methodological referents that help in the establishment and building of knowledge about strategies for vocabulary acquisition and the color codification for the didactic of English.

To examine the application of the CCS for interpretation of its effectiveness in the mastery of English vocabulary reviewed in 4th grade.

2 Literature Review

2.1 Theoretical framework

This section will present specific definitions and fundamental concepts that will frame the theoretical context of this study. Understanding the context or conceptual background of a study helps readers grasp the importance and significance of the research Kivunja, C. (2018).

2.1.1 English as a Universal Language

English is progressively becoming a common tongue among non-native speakers all over the world. People are strongly motivated to learn English because it will put them in touch with more people and information; however, people know that it will be challenging to acquire it accurately.

According to the British Council (2020), English has become the main method of communication in fifty- three nations and over four hundred million people prefer to use it as their first language. Crystal (1997) considers that because English is widely spoken in a variety of contexts, cultures, and countries, it is considered global. As a result, many people all around the world choose English as their second language.

2.1.2 Learning English

Christopher (2016) mentioned that learning English involves conquering four skills: listening, reading, speaking, and writing. Mastering these skills will increase the speaker's communicative and cognitive abilities. Reading, writing, speaking, and listening are four different language skills that can be acquired using different methods and approaches; however, all of them are closely related because the lack of domain in any of them would affect the others as well.

Nation (2014) established certain phases or steps learners should undertake while learning a foreign language. First of all, they mention that students should look at their needs and identify what is most beneficial to address. Second, students should balance their learning. This means, that if they are good with their listening skills, but struggle with speaking, students need to push up and work on their speaking skills. All four skills need to be at a similar level, only in this way students will succeed easily in learning. Third, students should apply challenges that help them learn. These challenges can be within content or skills. These should be more difficult than their level, in order to enhance and stimulate their knowledge. For example, if a student is at A1 level he needs to read or start to learn

vocabulary related to an A2 level to go up. Lastly, students must keep themselves motivated, work hard, and overall, always do what needs to be done.

Krashen and Terrell (1983) mentioned children typically comprehend language before producing one-word utterances, two-word sentences, and so on. Additionally, they sustain that many variables influence how rapidly pupils acquire words, including their degree of official education and environment.

2.1.3 English Vocabulary Acquisition/Retention

The acquisition and retention of English vocabulary are essential while learning the language. To understand what acquisition and retention imply, it is necessary to deal with these issues from a psycho-pedagogy perspective, where each concept is characterized in a specific way. That is to say, retention is seen as a superior cognitive process consequent to acquisition.

Acquisition in learning implies an indirect approach to knowledge. For example, when interacting in a social environment, the student recognizes the objects located in the environment in which initially there is a physical and later a cognitive observation. The student first handles the thing concretely through the different sensory structures and then makes a mental representation (Rodriguez, 2008). In simple words, the information students learn follows a process in which retention continues after learners have acquired the knowledge.

Beltrán (2017) says that it is indeed clear that learning has another focus than mastering a new language. Students begin by studying a language; however, not all students

reach to master it. In other words, this author says that learning is a compound process where students need to develop different abilities to succeed. It is not only referred to acquiring knowledge, but rather in using it; and according to this author, you can use knowledge if you have acquired it first, and retained it.

2.1.4 Short Term Memory

A memory operation is not easy to understand its benefits have helped students organize, code, analyze and retrieve information. According to Baddeley (2007), when students receive information, their memory is responsible for carrying this information to the short or long-term memory. When the information is not so significant for a student or it was received at a time of stress, or anxiety usually the information goes directly to the short-term memory. However, it can be transferred to the long-term memory due to other components of capacity that the short-term memory does not have.

Badr and Abu-Ayyash (2019) stated that, short term memory has two slave buffer stores, one specialized for storing visuospatial information and the other to store verbal communication. The verbal buffer, for instance, is a temporary phonological storage in which newly learned knowledge might evaporate within several seconds, unless reloaded by repetition and visualization. Memory uses these two buffers to strengthen the permanence information in memory.

On the other hand, Chein, Ravizza and Fiez (2003) manifest that the information established in the short-term memory is very significant since it helps to retain instantaneous data. Additionally, they mentioned that although repetition and visualization help to transport the information from short term to long-term memory, children also can do it through striking

information. Considering this, the type of material, strategies, and methodologies that educators implement need to be highly attractive to produce a positive impact on students' memory (striking information). When this memory shock occurs, information that is permanent in the short-term memory goes directly into the long-term memory.

2.1.5 Long-term memory

Being able to remember information, in an educational process is essential. According to Mujin and Reynolds (2011) memory is classified into three parts: sensory, working and long-term memory. The first stage is in charge of collecting information; however, it does not have the capacity to store it for an extended period of time. Content in the sensory buffer is sent to the working memory, where thinking occurs, but it is still not maintained. The data in the working memory is analyzed, and the human develops a logical understanding of the learning obtained. However, retention is still not achieved.

The third part, known as long-term memory, is the one that promotes retention. The process of long-term memory is made up of several elements as a puzzle, each part of which is indispensable to gradually form meaningful learning. This means that learning will remain longer in the memory of the learner. (Muji and Reynolds, 2011). If the three elements work together (the sensory buffer, working memory, and long-term memory), information will be processed and will have a sequence that will help humans remember information more easily. In accordance, it can be assumed that the participants of this study, who are not able to retain English vocabulary, are only using the parts of the sensory buffer and working memory, which is why they quickly forget the vocabulary learned in English classes. Therefore, it is

vital to carry out a procedure that helps students activate the third part of the memory and retain information.

Greene (1987) states that long-term memory is where skills and knowledge are developed and it is difficult to know their permanence in the memory since each student is a different person, so their memory processes and retains information in a varied way. In other words, long-term memory alludes to a data storage facility over an amplified period. This sort of memory tends to be steady and can last a long time as often as possible.

A study carried out by Dudai (2004) and Liu (2012) concluded that neurons are distinguished by the existence of a tiny space where a synapse exists. This synapse is responsible for making connections between two neurons, in other words for the transmission of information among neurons. This study showed that the recorded data in the short-term memory is employed in long-term memory due to a synaptic consolidation that was activated at the moment where the connections between what was learned in the short term are made so that it can be used in the long term. This is to illustrate that the short term greatly influences the use of the long term.

Initially, the language of English is acquired through seeing, listening, and reading, this process is done consciously by the learner and is even rote. However, a subconscious learning process occurs when learning moves from acquired to retained (VanPatten, B., & Oikkenon, S., 1996). As Wilkins (1974) mentioned, vocabulary is more important than grammar because the lexicon is loaded with a meaning that allows us to say precisely what we want to say without confusion in understanding the message.

In addition, Alvarez (2001) mentioned that retention is a process that occurs in the mind where information is encoded and associated with ideas and words that are previously stored. In response to this, color is considered as an element that helps develop this process because it activates the cognitive part of students and allows the retention of new information. Furthermore, if color coding is implemented in activities such as guessing or deducing the meaning of a new term, that word is more likely to be remembered. Based on this, it can be said that color coding is a strategy that helps increase retention.

2.1.6 Language Teaching/Learning Strategies

A language teacher delivers an important pedagogical process in the classroom while developing lexical retention among students through learning strategies. Language learners overall use language-learning strategies as an aid to acquire new cognitive and demanding linguistic structures and content.

In recent years, many studies have focused on education, specifically on the influence and implementation of classroom strategies. Generally, teachers use strategies to keep learners engaged in every activity and practice different skills. In addition, Chamot (2005) mentioned that the use of strategies reduces the difficulties in the learning process. Therefore, using strategies while teaching is important and effective. Students that learn through strategies have control over their learning and ease the process significantly. Based on the authors stated above, strategies are essential to facilitate the process of acquiring new information. Learning strategies train the ability to learn and solve problems, immerse student's intellectual development, and enhance their abilities.

Many strategies promote linguistic retention to improve students' memory. As proved through observation, students tend to forget or relegate linguistic forms and meanings of new vocabulary after a specific time. In the last century, authors such as Ausubel (1990), Chal (1983), and Dickens (2004) promoted lexical input and lexical retention by admitting the importance of the predominance of its development in order to reach language proficiency. They mention that learning strategies are essential and influential pedagogical tools that help organize vocabulary and its contents, facilitating the development of linguistic retention.

2.1.7 Vocabulary Acquisition through the use of Strategies

Chavez (2019), in his studies, mentioned that strategies could help and influence vocabulary and second language acquisition. Her studies used strategies such as memorization, repetition, synonyms, and antonyms, classifying words and words in context. She got positive results because after using strategies to teach vocabulary, students increased their vocabulary acquisition and retained vocabulary for a long period of time. She concluded that students who use learning strategies regularly and develop healthy learning habits would improve their learning process efficiency.

Lindsay et al (2010) published an article called “Memory Vocabulary Learning Strategies and Long-Term Retention,” which mentioned that teachers and students typically use a variety of methods to acquire vocabulary, including flashcards, notebooks, bilingual and monolingual dictionaries to discern meaning, synonyms, and antonyms, to mention a few. He claims that using memory strategies is rare because students rarely apply these tactics, mainly since just 4% of the brain is used actively during formal language learning. By this, he means that more memorization strategies should be implemented when

vocabulary is taught since they are what help students retain the vocabulary. This is why this study sustains that color coding is believed to influence students' memory, so that they can retain it longer.

Acknowledging that learning strategies improve vocabulary acquisition, it is valuable to mention Chavez (2019), who in his investigation exposed that color-coding worked better than other strategies because his participants' understanding of weather and clothing vocabulary, which was taught using this strategy, significantly improved. The memorization of words influenced but the colors had more weight since they helped to promote learning. Students can acquire the vocabulary through play and interaction and linking activities with color. Also, color increases students' attentional level, which helps them remember information without difficulties. Color draws students' attention and transmits the knowledge acquired to the long-term memory space (Chavez, 2019).

2.1.8 Color-Coding Strategy

Educators often use certain stimuli to improve students' abilities to recall, stimulate memory, and reinforce learning of some contents (Malays, 2013). Farley and Grant (1976) state that colors are likely to be considered a language used to transmit information, activate memory, and create emotions. For example, the red color is a color that attracts attention, is aggressive, assertive, and represents war. Pink symbolizes tenderness, feminine, maternity, and love. Orange expresses joy and happiness just like yellow, although it also means selfishness, jealousy, and envy; while the color gray is associated with sadness, discouragement, and boredom. Black is the color of the night, and it is the one that has a more significant number of associations with negative meanings such as death, duel, and

wickedness (Ortiz et al., 2011). Due to this framed conception that every color has an implicit and permanent meaning, researchers such as Noga Alon, Raphael Yuster, and Uri Zwick (1994) created the theory of “color-coding.” They defined color coding as a system for displaying information using different colors.

With the color-coding teaching strategy, learners can acquire vocabulary intuitively. In other words, students will be able to increase their ability to understand things without context nor explanation, or justification. This relates to how most students acquire vocabulary incidentally through indirect exposure to words during everyday life, like at school, home, TV, books, magazines, etc. Color-coding strengthens visual representation, which aids students in internalizing their learning (Caudill, 2018). Dzulkifli and Mustafar (2012) stated that color can improve memory because with these element students can better visualize the content and colors in turn help to retain information because they help the connection of ideas.

2.2 Previous Studies

This section will present and analyze international studies from 2010 to the present to support the color-coding strategy's usefulness and efficiency. The following researchers have carried out projects that support the implementation of color-coding. Moreover, they have demonstrated the importance of acquiring English vocabulary in the long-term.

It is reasonable to say that the functionality of our memory is a complex phenomenon, but it must somehow cause or should cause information retrieval and retention. Understanding how information is deeply processed and used in memory is essential. The Decay Theory from Brown (1958) mentions that the information acquired must be reviewed

from time to time because if this process is not carried out, the information that is even in the term memory could be lost.

2.2.1 Vocabulary Retention

The “Cue-dependent forgetting” theory from Tulving and Pearlstone (1966) mentioned that the information students generally memorize the words and many of these words are remembered for a certain period however, these fade as the days go by but Through certain activities, students can easily remember what they have learned.

Supporting the idea and importance of retaining vocabulary for an extended period of time, Cayubit (2012), in his research, observed that students forget words that are taught to them after a short period of time, and this makes it challenging to improve their English language skills. He realized that vocabulary is a crucial component of all four language skills and that vocabulary retention is essential while learning a second language. This study is relevant because it is of great importance to language teachers, considering the issues revolving around vocabulary retention or how students forget the words taught to them after a short period of time. Cayubit (2012) deduces that activities or strategies that help to stimulate memory and retention should be implemented during the learning process to avoid extra academic reinforcement activities since it increases the advantage in time. Most of the time students forget what they learn; therefore, teaching while applying memory strategies is an excellent way to benefit students’ learning because it provokes long-lasting knowledge.

2.2.2 Teaching Using Memory Strategies

Nemati (2009), as a result of his study, reiterates the importance and effectiveness of teaching using memory strategies. He focused on just memory strategies and their effect on long-term retention and contributed to stating the efficacy of deep-level processing in vocabulary retention (Nanda, 2017). As a result of this author's study, the group which used rote memorization strategy had better results than those who did not use the strategy. Then Badr and Ayyash (2019) stated that memorization strategies are useful for learning.

2.2.3 Color-Coding as a Vocabulary Teaching Strategy

Given that retaining vocabulary is an educational problem that affects language learning, many educators and researchers began searching for strategies, methodologies, and materials that help improve memory. Zahedi and Abdi (2012) discovered that using colors as a teaching instrument positively impacts memory. For example, Wu, J. H., & Yuan Y. (2003) indicate that the subjects who studied the new information using the color-coded format had higher retention than the subjects who learned in a conventional design such as listening to teacher's explanation and copying all the information in their notebook. Their findings were consistent with the color-coding effect.

Regarding the effectiveness of color coding for vocabulary acquisition in long-term memory, Chávez (2019) affirms that this strategy is useful for students because it helps them concentrate; in fact, much of its implementation is based on memory work. Pruisner (1993) claims that color-coding improves retention; therefore, he sustains that implementing color-coding while teaching vocabulary is a valuable tool for students learning a second language and proposes it as a reliable teaching strategy.

In a study led by Khan and Liu (2020), participants were taught for three consecutive days. This group was selected to experiment, this author implemented flashcards focused on the codification of color where students from 2 until 3 years participate to learn words. Each day the session lasted for ten to 15 minutes. In this case, the posttest was implemented two weeks after the intervention finish. Many respondents in the experimental group obtained high scores. This study shows that color is a visual element that helps memory 80%, but a percentage that can be improved if it is applied consistently and more time. In support of this idea, (Zhou et al., 2016) mentions that colors have a positive influence on the connection of ideas and help to remember more information than when using other strategies because it stimulates memory.

Wu and Yuan (2003) these authors with the implementation of the coding strategy was able to observe that students had better results when learning vocabulary. Students manifested that they liked this technique because it helped them improve their memorization skills while doing something fun in learning. They mentioned it was not stressful nor tedious because they could work in groups or individually, and colors motivated them to be more creative and participate actively. In this research, there were two groups, the control, and the sample group. To demonstrate the efficiency of the color-coding strategy, the researchers implemented a pre and post-test in the control students' results. Researchers Wu and Yuan were able to conclude that the seventh graders had more positive results than the control group. These results helped to manifest that color coding helps to retain vocabulary.

Besides, they had fun learning, and they did not get stressed or bored during the teaching-learning activity. In other words, in addition to acquiring vocabulary, this strategy

helps students motivate and internalize the words in their memory in a calm way without any pressure on the mind and students (Nurdiansyah et al., 2019).

Holmes (2014) considers that teachers should adopt a teaching approach that assist retention, so that students who may have memory limitations to acquire vocabulary and new data can process the information better and avoid memory overload. Therefore, color coding can be a worthy strategy, but it must be implemented appropriately according to the needs of students and educators to prevent overloading information in memory. Dzulkifli and Mustafar (2013) mentioned that the colors activate the mind and make the student promote other abilities to the capture and retain information; however, teachers must always be attentive to the needs of their students. In their studies, it was discovered that certain students had improve with the color coding but others did not show improvements, therefore had to implement new teaching strategies based on the learning styles of each student in order to improve their learning and achieve progress.

Difino and Lombardino (2004) consider that color-coding strategies can aid learners to acquire vocabulary or practice different parts of speech, such as verbs, adjectives, and adverbs. These authors assert that this strategy is advantageous because it is adaptable to anyone. Teachers can only make certain modifications and adapt it to the student's level of knowledge. In addition, they recall that this strategy makes it easy to practice vocabulary based on categorization.

Overall, it was broadly mentioned by the authors of these studies that the use of color-coding, as a strategy to teach vocabulary, has high levels of efficiency. However, other authors state that this strategy can present certain drawbacks if it is not appropriately applied;

therefore, other factors such as the needs of the students, level, and learning methods are significant to consider while planning to use this strategy. If these aspects are not taken into consideration, this strategy would not be effective for specific students, or in some cases, on the contrary, it can overload memory.

2.2.4 Color-Coding Origins

Considering the difficulties in learning grammatical structures that participants have in second language Scott and Hilliard (2016) created the color-coding system; they assigned one color for each word to help their students acquire vocabulary easily and remember the words for a longer period. These authors realized that color stimulates students’ brains, positively. While creating the system they decided to code colors in the following table:

Table 1

Scott’s color-coding system

| Block color | The six sides of each block each contain different word sets |
|-------------------------------------|---|
| Blue (verbs) block | See/sees/saw; like/likes/liked; get/gets/got; find/finds/found; point/points/pointed; play/plays/played |
| Black (terminal) block | ./!/?? |
| Red (noun) block | Sally/Tom/Jack/Bill/Suzy/One Blank Side |
| Yellow (adverbial qualifier) Block | Sometimes; now/then; somewhere; here/there; somehow/one blank side/at home/by you |

| | |
|--------------------------------------|--|
| Red (noun) block | Boy/boys; dog/dogs; egg/eggs; girl/girls; horse/horses; one blank side |
| Orange (adjective) block | Big/small; smooth/rough; cold/hot; bright/dark; loud/quiet; sweet/sour |
| Salmon (number) block | No; one/a/the; two; some/the; many; all |
| Blue green (auxiliary) block | Can/can't; did/didn't; must/mustn't; may/may not; should/should not; will/ won't |
| Pink (pronoun) block | I/me; we/us; you; he-she/him-her; it; they/them |
| White (conjunction) block | And; or; but; |
| Gray (subordinate conjunction) block | If; because; so; when; where; although |

Note. Scott's color-coding system from Robert Ian Scott (2016).

Table two shows Scott's color-coding system. In his study he teaches sentence construction to first-language English speakers aged five and a half. Scott created six-sided blocks of various colors, each labeled with a distinct word type, so that youngsters could practice forming accurate sentences, grammatically speaking. To do so students had to rearrange the blocks in the correct order. The color-coding system provided support while forming new and correct sentences due to its capacity to visually show words and phrases with a color distinction, which facilitated learner's manipulation and reorganization.

With this codification in mind the group of learners before structuring sentences, acquire useful vocabulary. In this study, the participants used eleven colors, and each one had assigned a specific type of word. The blue color was used for verbs, the red for nouns, yellow for adverbial quantifiers, blue green for auxiliaries, gray for subordinate conjunction, orange for adjectives, salmon for number, pink for pronouns, and white for conjunction. Results showed that colors helped students recognize and remember words. Students who worked with color-coding also demonstrated improvements firstly in vocabulary acquisition and secondly accuracy in English writing skills and sentence structures. He states that color coding helps learners to be able to check or revise the work they do without the teacher's help. This means that the color-coding chart would become a support to check whether or not the students have correctly completed the sentences.

To illustrate, one of the activities that were used was the puzzle activity, the students had cards with a word that they were going to use to form a sentence, it should be noted that the sent or flashcards did not have color, so the students had to create the sentence without seeing the encoding table. With this in mind, the author concludes that students used their memory since they did not resort to the coding table that means they create most of the color sequences for themselves.

Table 2

Color Association

| | | | | |
|----------------|----------------|--------------|----------------|--------------|
| Pink | Purple | Brown | Black | White |
| Imaginative | Wisdom | Serious | Sophistication | Cleanness |
| Passionate | Luxury | Earthiness | Security | Clarity |
| Transformation | Wealth | Reliability | Authority | Purity |
| Balance | Spirituality | Authenticity | Substance | Simplicity |
| Creativity | Sophistication | Warmth | | Freshness |
| | Royalty | Support | | |
| Blue | Orange | RED | Green | Yellow |
| Trust | Confidence | Power | Health | Optimism |
| Loyally | Warmth | Excitement | Hope | Warmth |
| Dependability | Innovation | Passion | Nature | Happiness |
| Logic | Friendliness | Energy | Growth | Creativity |
| Security | Energy | | Freshness | Friendliness |
| | Bravery | | Prosperity | |

Note. Hiliard (2013). Color Association.

In table 2, color association, the author Bruce Hilliard shows ten blocks of different colors. These colors are pink, purple, brown, black, white, blue, orange, red, green, and yellow. Here the personalities of people have been categorized by colors. Each color has between four to six traits. Each color has personalities that are closely related.

To implement the color-coding strategy in this research project, we adapted Scott's color-coding system and Bruce Color Association. For these adaptations, the elements to consider were the colors and the relationships that each color has with the meaning of the word.

Table 3

Color coding for carrier vocabulary

| Colors | Professions |
|---------------|-----------------------------|
| Blue | Lawyer |
| Red | Surgeon, firefighter |
| Green | Veterinarian, nurse |
| Black | Judge |
| Yellow | Engineer, architect |
| Pink | Painter |
| Orange | Journalist |

Table three presents the color-coding adaptation for this research where seven colors were implemented. The first one is blue, which was linked with lawyer because it symbolizes trust, confidence, and intelligence, also it is considered appropriate for the words, since the information or images in blue color provide wisdom to solve problems.

The red color is related to blood. It is generally associated with energy and power, and it is used to indicate courage. This color was designed for surgeons, since it is related to blood, and to firefighters, since it represents courage and alert.

Green is directly related to nature, it symbolizes hope, growth, and harmony. Green corresponds with safety and money, so for that reason, it was related to health careers;

therefore, veterinarian and nurse words were linked to this color. On the other hand, black denotes strength and authority, commonly it is a very formal, elegant, and prestigious color. Also, it is associated with power and formality, which is why it was related to the word judge, since this word represents authority (Cerrato, 2012).

Yellow is the color that represents sunshine, it is set to indicate honor and loyalty. It is associated with happiness, intellect, and energy, and it stimulates mental activity. To this color the word teacher was assigned because this word can be associated with sunshine. Teachers bring new knowledge to children. Also yellow was the color for engineer and architects since these two careers entail a certain level of creativity, intellect, and energy. Pink is related to compassion. This color was related to the word painter, since it can be said that this career has a lot to do with hope and compassion.

Orange is stated to be the combination of the color red and yellow. In other words, orange represents a combination of energy (red), and happiness (yellow). It represents enthusiasm, fascination, creativity, success, and encouragement. Moreover, in color-psychology means adventure, optimism, self-confidence, and sociability. For that reason, the color orange was designated for journalists, since they are creating new things all the time and are seeking to develop, through their writing, contact with society (Cerrato, 2012).

3 Chapter: Methodology

The problem addressed by this study seeks to implement a methodology with a mixed approach based on the use of both qualitative and quantitative techniques and tools. Therefore, a pretest and posttest, temple observation were implemented to collect data.

3.1 Context

This research occurs at “16 de Abril” public school in Azogues, during the 2021-2022 scholar year. This school is located in the urban center of Azogues, specifically on the three of November Street. The teaching modality that is offered is face-to-face and there are primary, preparatory, basic, and high levels. Also, it has 960 students, 556 females and 404 males. The number of teachers is 36, female 29 and male 7. The authorities are divided between 4 women and 3 men.

The institution's classrooms have wide spaces where different activities can be carried out to improve the teaching-learning process. In comparison with other public institutions, the classrooms are comfortable and spacious, allowing the development of activism and creativity. Also, there are ample light, colors, and decorations in accordance with the values and principles instilled by the institution. Therefore, a harmonious and quality educational environment is generated.

However, this institution presents some difficulties in the English area. Specifically, in the 4th grade, since, the strategies used in the classroom do not help students to develop meaningful learning. For instance,

Through observation, it was identified that teacher use a traditional methodology specially for the acquisition of vocabulary because she asks students to write word several time. For instance, the English teacher taught vocabulary on careers on Monday, and for Friday when she implemented an activity that involved that vocabulary taught on Monday; it was noticed that students could not remember most of the vocabulary taught. Event students said in some occasions "I cannot remember, teacher". The teacher indicates that she performs this activity with the intention of having students retain the words and memorize them for the next evaluations.

Consequently, students of 4th grade have low English level because the activities implemented by the teacher do not promote higher order cognitive levels such as improving long-term retention. On the other hand, it was observed that students of 4th grade showed interesting in color activities. It is easy to manipulate and easy to access for teacher and students this activity reduce anxiety and help to control bad behavior. All this information was collected using a contextualization sheet the English teacher filled out before the intervention, but it did not work for some students.

Therefore, it is a good group of students who show interest in learning English but some students have difficulties when traditional methodologies are implemented in the classroom. The group showed learning deficiencies, lack of motivation and difficulties in English language proficiency. Then, it is inferred that there are many more variables to be addressed to guarantee a better learning of the students, but this study focuses on the acquisition of English vocabulary as it is the most indispensable and the students with low performance are selected.

3.2 Participants

According to Dewey (1991), the classroom is such as a lab. So, the group of participants in this project are 36 students, 20 males and 16 females of 4th grade at “16 de Abril School”. Participants’ age ranges from 8 and 9 years old. For this research, this classroom is divided into two groups. One group denominated ‘A’ is which will be applied CCS, “treatment group”. While the other group ‘B’, A’ is which will be applied the traditional teaching with the English. In the group ‘A’ are students with a low academic performance in English, this group is formed by 7 girls and 11 boys. Rather, this division result a benefit, because, 16 students per classroom it’s a ratio recommendation (Restrepo and Tapia, 2020).

Based on the information provided by the Department of Student Counseling (DECE) of the 16 de Abril school, no student has presented disadvantages or special needs in the learning process. Therefore, they could participate actively in educational development in an optical way.

Since the participants of this study are underage students, it was necessary to implement a consent to get parents' permission to work with their children (Annex C). Seinke (2004) declared that authorization allows to carry out research with participants without any inconvenience, meaning voluntary participation. This authorization provides all the information that the participants must know in the process before making any decision in regards to participating in the study.

3.3 Research design

Educative research is a complex process that articulates various retrospective, integrative and evolutionary processes. In other words, iterative action establishes and develop solutions to the problem. On the other hand, the method tries to organize and form scientifically agreed meanings. Thus, quasi experimental design is characterized by counting with a specific sample of participants (not randomly) and follows a statistical process. Then, it develops an approach to the pre-experimental conjoint to the participative observation that seeks to understand the process of teaching-learning vocabulary thought in 4th grade EGB. Similarly, this investigation has a connection to a case study (detailed at the beginning). So, generalizations were made through critical, argumentative, and interpretative descriptions of the context where the object of the study is developed and explained below. (MINEDUC, 2022; Albert, 2007; Morales, et al. 2008; Hernández-Sampieri and Mendoza, 2018).

3.3.1 Object of study: specification and disintegration

Dimension Color – Coding Strategy. It is founded in the wide use of colors to develop connectors of various contexts with emotions and educational realities of students in the classroom, also, contains various indicators such as connection, projection, and production that are explained below:

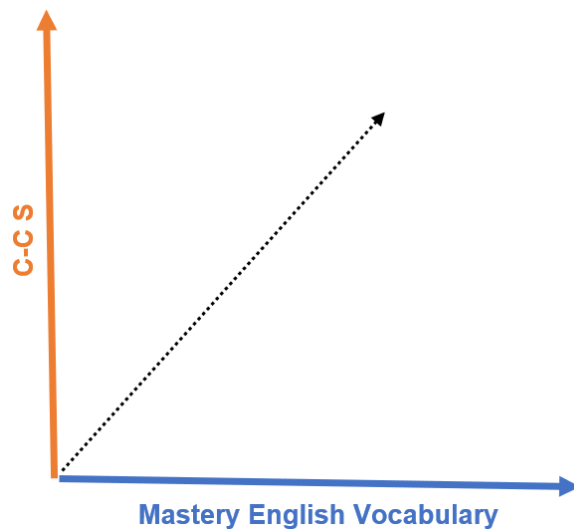
- The use of 7 colors
- Connection to emotions
- Relationship with the context and reality of the student.
- Autonomous, active and collaborative work.

Dimension retention of the vocabulary of the professions. It is broad and is applied to several areas. According to four skills, therefore, there are the following indicators:

- Students identify words based on small texts.
- Students build sentences using the vocabulary of professions.
- Students answer simple questions using the vocabulary of the professions.

Figure 1

Relationship of the variables involved in the object of study.



Note: The y-axis, highlighted in red, is the independent variable; the x-axis, highlighted in blue, is the dependent variable.

3.4 Instruments and techniques

The instruments and techniques used for this study help to collect essential information to measure, analyze data, and propose solutions (Bastos, 2014). So, the

observation guide, the pretest and posttest, were validated by teachers of the English area of the 16 de Abril School. The documentary analysis technique is also used.

3.4.1 Contextualization sheet

It is a tool that was implemented at the beginning of the research. It allowed to gather information related to the context as well as other things pertaining to the diagnosis.

3.4.2 Observation sheets

The observation guide (Annex A) provides information about the context of the study. It also allows information to be collected during the application of the CCS.

Classroom observation is one of the most common strategies to gather essential data from a teaching and learning process. It entails the registration of the logic connection that occurs during the development of an event. Observation is used to register the development of a class or an intervention and even a student's behavior (McGreal, 1983). Classroom observation is a planned and concentrated procedure done intentionally and methodically. It necessitates the observer's undivided attention (Hyman, 1975) and the ability to document what has transpired in the observational situation. Observing the events helps record the participants' natural behavior.

According to Hinds (2002), observation sheet allows synthesizing the information to clarify the problems found. It brings specific aspects that are useful for the study. The observation highlights essential information such as the objective of the lesson, the summary of the content, the development of the class, the commitments of the students, their strengths and weaknesses (Annex A).

3.4.3 Pre and Post Test

From the use of different methods, techniques and educational research instruments that allow the collection of information from different angles. The pretest and posttest instrument is presented below. In this section, an approach is made to the relevant data that interrelate and converge in the systematization of the research project.

The pre-test and post-test presented four question types. The first one required each student to listen to a word (one of the words chosen to be tested) and write the missing letter to complete the word. This question was evaluated over 5 points, which means each letter was evaluated with 0.25 points because it is an item of low difficulty. Students had six words to complete, four of them had 4 missing letters and two of them had 2 missing letters (completing 20 missing letters). The second question asked student to write to complete the tense. This item proved visual support as guide for the students it is evaluated by one point for each one. In the third section, students had four pictures and four career names. They had to use a line to match the name with the picture. Each item was worth 0.5 points. Finally, students talk about the profession answering who is he or she?

The pretest was implemented before the intervention, to diagnose the deficiencies in the vocabulary of the professions. It was administered to figure out which words students were unfamiliar with and which words they knew about, concerning careers. Also, this test evaluates vocabulary based on the 4 English skills of listening, reading and writing. This means that the test has four items.

The vocabulary used in the pretest were chosen taken into consideration the vocabulary that books of the Ministry of Education establish to teach every scholar year. The

words considered where the most two common and the two less common carrier words taught in each previous level. The total of word evaluated were 10 such as lawyer, painter, surgeon, engineer, journalist, architect, firefighter, nurse, veterinarian, and judge (Annex A) Additionally, the post-test was implemented three weeks after the intervention

On the other hand, the post-test was implemented after three weeks of the intervention to identify if the CCS influences positively in group "A". the post-test deployment time interval Sukkrong and Adisa (2010) comment that, the post-test is proper to apply after two weeks of an intervention since it is a considerable period to measure the range of vocabulary retention in the long-term memory. The post-test assesses if students remember or do not remember vocabulary after a certain period.

Moreover, the evaluation scale was taken from the Ministry of Education (2016), Foreign Language Curriculum (Table 4). With this evaluation criteria, it is defined whether students are developing knowledge satisfactory in the learning process. As the scale shows a score between 10 and 9 demonstrates a high level of knowledge of the topics learned. Scores between 8 and 7 show the student has good development of the topics learned in relation to the evaluation indicator. Scores between 6 and 4 show an acceptable development but with some shortcomings. Scores between 3 and 1 demonstrate a lot of shortcomings in the process and finally zero, which means that the students did not comply with the expected appropriation and development.

The grades that are considered in this study, to determine if the strategy works efficiently will start from 4, since according to the scale of the "Ministry of Education",

with these scores student's performance demonstrates appropriate and acceptable development, even though some shortcomings are evident.

Table 4

Student performance scale

| Scale | Gives account of |
|-----------------------------|--|
| <i>Very superior (10-9)</i> | The student's performance demonstrates appropriation and development of the topics studied in relation to the evaluation indicator in a way that is much higher than expected. |
| <i>High (9-7)</i> | The student's performance demonstrates appropriation and development of the study topics in their entirety in relation to the evaluation indicator |
| <i>Average (6-4)</i> | The student's performance shows an appropriation and acceptable development, although some shortcomings are evident in the study topics in relation to the evaluation indicator. |
| <i>Low (3-1)</i> | The student's performance shows shortcomings and gaps in the appropriation and development of the topics studied in relation to the evaluation indicator |
| <i>Do not develop (0)</i> | The student did not complete the project |

Note. Translation from Ministry of Education (2016), Curriculum Language Extranjera

3.4.4 Other instruments and techniques of educational research

Documentary research: It consists in the analysis and synthesis of various bibliographic studies. Thus, Rizo (2015) describes that, with this type of research, a comparison is established between different sources of information that seek an

interrelationship between different concepts but that are attached to an already defined problem. Furthermore, with this analysis greater depth is provided to the concepts related to the object of study.

Therefore, a review of different printed and virtual materials was carried out. Among them, the analysis of institutional and normative documents of the 16 de Abril School, such as the PCI and PCA are highlighted, which allow clarifying the context of the study. In addition, an analysis is made of the academic performance plans and reports that the English teacher makes for the 4th EGB, where it stands out the existence of many students with low performance, giving greater support and an interpretation of the problem.

The lessons plan. It is an instrument that supports and guides teachers while delivering a class since it describes the activities, materials, and strategies they will use in the class. It provides information as a guide to help reach the objective of learning (William, D 2011). In other words, lesson plans are a teacher's daily monitor for understanding what students need to know about the topic that will be taught and how to provide activities for the teaching-learning process. The lesson plan template used for this study is from the “Ministry of Education” of Ecuador, which is the institution responsible for the educational and pedagogical management in all educational institutions at different levels and modalities in Ecuador. This institution delivers templates of lesson plans to help teachers in their teaching procedures.

The lessons delivered for the purpose of this study are structured according to the most common lesson plan known, a PPP lesson plan. It is named due to its three stages: present, practice, and produce. A PPP lesson is one of the most straightforward

methodologies to manage since it helps to order the teacher's planning; in this way, students and educators can quickly know what they must do in each stage. In the present stage, the teacher presents the new language in a meaningful context; here, the teacher can enhance their presentation by using different materials such as PowerPoint presentations or books. In the second stage, practice stage, educators use numerous activities, dynamics, and strategies to practice as much as possible to domain and understand the topic taught (The TEFL Academy, 2022).

Lastly, in the product stage, the teacher provides a specific activity where learners need to demonstrate their learning by producing using their knowledge and skills. In this stage a teacher usually promotes the development of productive skills, like communicative and writing abilities, based on the goal of the class. Pupils have to produce the language and demonstrate their knowledge; it is also relevant to monitor the process to take note of students' mistakes and give effective feedback (Harmer, 2009).

In this study, a warm-up activity was considered essential to add in the development of each lesson. It was involved because it is indispensable to catch students' attention and motivate them to participate actively and dynamically in each intervention (Allwright, 1984).

Act of Commitment. This document allowed researchers of this study to use the data, evidence and results obtained in this process. It permitted us to use photos, videos, activities, and materials developed with the experimental and control group.

3.5 Intervention process

This section explains in detail the intervention process carried out at the 16 de Abril school with the 4th grade students. Group A received the intervention while group B at the same time with the same total teaching hours but in separate classrooms, meaning different classrooms for each group. Prior to the application of CCS, the pretest was carried out on group "A" (Annex A).

3.5.1 Theoretical and curricular establishments.

The CCS is carried out through two lesson plans (Annex C). The aimed of them was to develop the four English skills, listening, speaking, reading and writing (MINEDUC, 20) To carry out this implementation, the 4th grade students had a total of 4 class hours per week each one of 40 minutes.

Table 5

English Schedule for 4th EGB students on April 16.

| Hora | Lunes | Martes | Miércoles | Jueves | Viernes |
|--------------------|--------------|---------|-----------|--------|---------|
| 7:00 am - 7:40 am | | English | | | |
| 7:40 am - 8:20 am | | | English | | |
| 8:20 am - 9:00 am | English | | | | |
| 9:00 am - 9:40 am | | | | | |
| 9:40 am - 10:20 am | Break | | | | |

| | | | | | |
|--------------------|--|--|--|--|---------|
| 10:20 am - 11:00am | | | | | English |
| 11:00 am - 11:40am | | | | | |
| 11:40 am - 12:20am | | | | | |

This research study aims to show if the color-coding strategy is effective for the group of students with a low academic performance (groups A). In this case, in deep, the aim is not only to see how the strategy works but also to determine if this strategy assists students in retaining the vocabulary taught for a long-term period.

Blas (2013) manifest that the pre-experimental is a complex research method since in many occasions it is not effective because it does not help to develop the veracity of the data. However, if it is developed with caution, the research will have validity. In addition, Hernandez et al. (2010) say “on certain occasions the pre-experimental designs serve as exploratory studies, but their results must be observed with caution” (p. 137).

The selection of colors arises from the scientific arguments reviewed in chapter 2. Regarding the vocabulary of the professions, it is fair because it is transversal. That is, it is gradually revised at each educational level (MINEDUC, 2016). Consequently, the color setting will resume assigning a color to each word.

Also, the vocabulary considered to teach during the intervention is mainly about carriers. According to “16 de Abril ” institution and MINEDUC (2021), this was a topic that students from 4th grade had to learn in the second term (the time they received the intervention). This type of vocabulary was also selected since the students had not learned it yet. This gives greater validity to this study since there is less probability that prior

knowledge on the topic influences results. Supporting this, Erika Hoff (2009) mentions that the use of a new topic is better to develop an experimental design because it is an unknowing content that will not impact the control and experimental group activities and results.

3.5.2 First week intervention

At 10:30 am all the students entered the classroom and chose a desk to sit down, when they saw the popsicle, they started to ask what did they have to do? Immediately the teacher communicated that they had to write their first and last name in the popsicle because it is the tool that is going to help the teacher choose students randomly to participate in each activity. After two minutes, the teacher recollected all the popsicles and mixed them into a box. Subsequently, she started the class with a warm-up denominated emoji activity. Five emoji were on the wall around the classroom, each one with a different color. For instance, the sad emoji had blue color, the happy emoji had a yellow color, the depressed emoji had a brown color, the love emoji had a red color, and lastly, the green color was put in the exited emoji. The learners had to listen to a song a select one emoji according to their fillings. It was observed that this activity engaged students. The colors were a guide because the colors helped them to visualize better each emoji and choose one easily. The total of songs played was six and the colors mostly selected by students were yellow, green, and red. When this activity finished all the students claimed that they wanted to continue doing the game, and some students did not want to sit in their chairs. However, the teacher-controlled students' behavior by reminding them about the teacher vs students contest, which consisted in a competition of points. If the students participate in the activities, raise their hands, answer correctly, do not make noise, and work properly they

receive a point but if they do contrary the teacher receives a point, and at the end of the class the winner will have a reward.

For the second activity, the educator gave all the students seven small pieces of paper, each one with a different color; one blue paper, another red, green, black, yellow, pink, and orange. Following this, the professor used a PowerPoint presentation to show the content. She presented five words, each word had a specific color and was presented with a picture, its spelling, its meaning, example, and pronunciation. While the teacher was presenting the vocabulary students had to write each word in each piece of paper, based on the colors presented in the power-point presentation. The pieces of paper stimulate students' concentration because all students were focused on the activity, also it was observed that colors helped learners to categorize the vocabulary, have a better organization and visualization of the words and the material was easy to manipulate for them.

In addition, the process of pronunciation was done by repetition, the students listened to the teacher and repeated the word. Many students did not understand the sounds or recognize them, it produced an incorrect pronunciation, so the teacher decided to write under each word how it should be pronounced so that the students would have support.

Furthermore, to verify if students understand the information teacher asked questions such as what is the meaning of this word, what is this in Spanish, who can help me to pronounce this word, and what is the color that represents this word? To choose one student and avoid having the same students participate, the teacher used the color popsicles where students had written their names.

Following is the practice stage; the teacher provided reading material on a paper for each student. The reading told a story about a child and his dream in the future. It involved vocabulary taught, focused on level A1. In the back of the classroom there were four questions available based on the reading. While the students read, they had to highlight the main ideas and highlight the words in the color it was taught in class. For instance, if they read the word journalist, it must be highlighted in orange color. They could use pencil colors or color markers. It was observed that some learners did not have all the colors, and if they did, they did not have sharpeners. This event reduced concentration and created students' discussions of topics not related to the class. However, the teacher started taking away points, and when students looked at the board, they immediately paid attention and continued working. In addition, some students did not remember the colors to highlight the words, but they constantly used their pieces of paper as a guide. The purpose of reading was for students to connect the meaning of the vocabulary with the content to develop reading comprehension. Finally, the students passing their worksheet to their partner to check answers.

As a review and wrap-up, the teacher read the question and used the popsicle to request participation, but some students participated voluntarily. In the end, it is observed that everyone was able to answer the questions. Most of the students answered correctly, only four students had difficulties with the word firefighter and three other students had difficulties with the word journalist since they could not write it correctly. To reinforce students' vocabulary the teacher said the color, and students had to say loud words connected with the color.

As a third activity, posters were used to generate some sort of competition. The class was divided into two groups. There were two posters, one for a group and the other for another group, and each one had seven colors: blue, orange, pink, red, yellow, green, and black. One student from each group was selected to participate. They had to listen to the word and write it in the color that corresponds. With these activities, students had difficulties in spelling the words architect and firefighter.

3.5.3 Second week intervention: Reinforcement

In the second lesson, the teacher taught the next five words: veterinarian, lawyer, surgeon, engineer, and painter. It started with a warm-up activity to engage students. The activity is called “chained words”. Basically, the first student had to say a word (vocabulary about professions) that they learned before, and the following student had to say another word and repeat the word that the classmate had said before, and so on. After the warm-up activity, the teacher presented the vocabulary through a PowerPoint presentation, students were paying attention to all the information and wrote each word in the mini book which contained seven pieces of paper each one with a different color; one blue paper, another red, green, black, yellow, pink, and orange. For practice, the word wall game was implemented. It is a multiple-choice game where there were numerous definitions of the vocabulary taught in class and among two or three options which students had to choose the correct one.

For the third activity, students played a board game in groups of five. In this board game, students had to look at a picture and say the name of the career or say a short sentence using the career word. Finally, twister game, here students worked in groups of

six, the game. One student from each team moved the spinner and called out which limb to move and what color to place it on. For example, right hand in blue. All players followed the instructions and moved the limb to the indicated point. They never moved to the point that is already occupied while they moved their limbs, they answered questions related to vocabulary for example: if I touched a green color the question was related to the word veterinary and nurse so they had to delete the word, give an example or a definition.

4 Chapter: Results

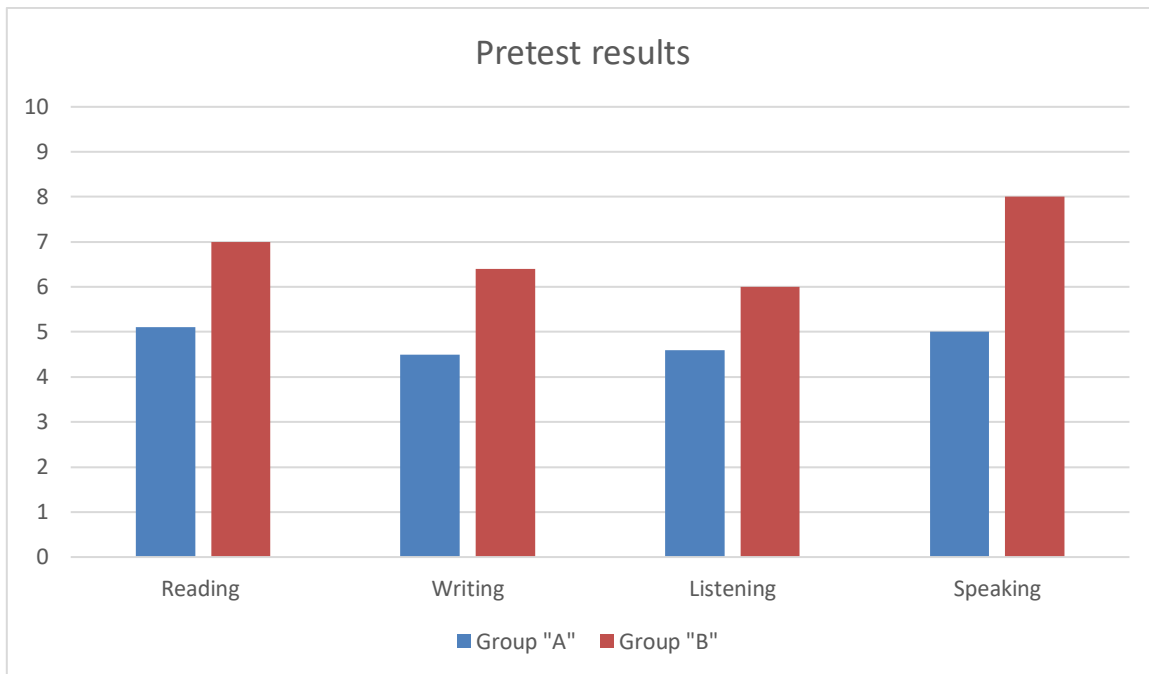
This section presents the results obtained of the implementation of CCS through graphs that are constructed using the values obtained from the pretest and posttest. They will help to make a comparison of results between group A and group B.

4.1 Pre-test results

This tool provides information about skills and vocabulary management in the professions.

Figure 2

Pres-test results



This graph shows the pretest results of group "A" and group "B". The colors to be represented in group "A" is blue while the red color represents group "B". The standard score to be considered ranges from 0 to 10. Then, it can be observed that group "A" has lower scores than group "B" in all four skills. Also, it can be observed that no group achieves a score higher than nine.

4.2 Post-test Results

Figure 3

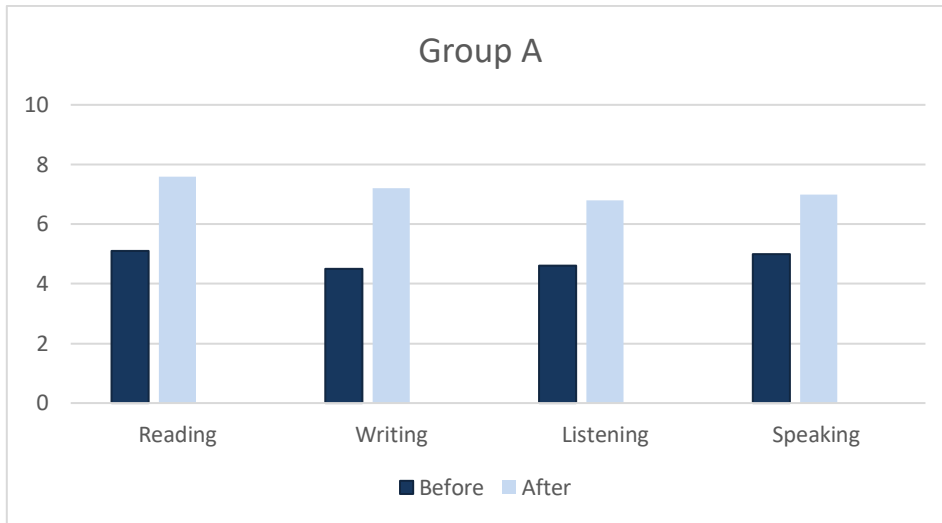
Post-test results control group



This figure shows the results of the post-test. Here, group A is represented by the color blue while group B is represented by the color red. The skills to be considered are four such as reading, listening, writing and speaking. The scoring standards have a range from 0 to 10. It can be observed that in the Reading skill group A achieves a percentage of 7.5 while group B achieves a score of approximately 8.5. Additionally, in the ability of writing and listening group A is in a range of 6.8 to 7.2.

Figure 4

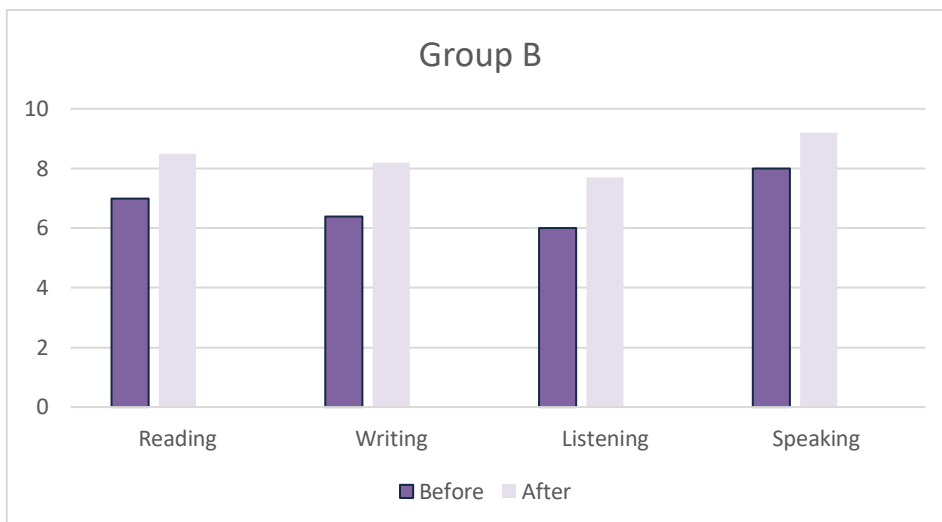
Group "A" result before and after the intervention



This graph shows the before and after results of the group A intervention. Here it can be seen that the results before the intervention are represented in dark blue while the results after the intervention are represented in light blue. Additionally, the graph depicts a marked improvement in group A after CCS. The most developed skill is Reading followed by writing. Although there is considerable improvement, no skill reaches a score greater than or equal to 8.

Figure 5

Group “B” result before and after the intervention



This graph shows the results before and after the intervention for group B. Here it can be seen that the results before the intervention are represented in dark blue while the results after the intervention are represented in light blue. Group B presents a slight improvement in the various English skills. Speaking being the most developed skill. However, the skill with the most improvement is writing with 1.2 percent. The skills that show improvement, but not on a large scale, are Reading and speaking.

5 Chapter: Discussion and Conclusion

In this section, the research contributions, limitations and conclusions of this investigation are presented. It means that here there some points are explained as answers to the objectives and research question stated at the beginning. Finally, some suggestions are presented to other researchers to take into consideration if they are going to apply or use this strategy in the teaching-learning process.

5.1 Research contributions

Color coding is a strategy useful for different educational level and even for different necessities because it is a strategy that can be adapted easily. In terms of English

language learning, this strategy helps to enhance and master the language and helps to activate the cognitive ability to retain information and make it more meaningful.

5.2 Limitations of the study

One of the main limitations was that both groups performed rather different. There were differences because in the experimental group students were paying attention to the teacher's instructions and the colors engaged them to the topic, while in the control group the students did not pay much attention. In addition, it could be observed that both groups had difficulties in terms of using materials because some students did not have enough materials, specifically pencil colors, to work on the activities. This reduces concentration, since students had to ask each other for color pencils.

Furthermore, the time although the pacifications were carefully created at the time of application the minutes for each activity did not coincide especially in the first lesson since many students wanted to continue with the warm up activity but due to time the teacher had to continue with the next activity and this caused a certain lack of control of the class.

Another drawback was that it was not possible to obtain images or videos of the interventions carried out, since when trying to photograph the students' work, they did not feel comfortable, so we avoided this process. Only some of the students' work was obtained as evidence.

Finally, this research had many modifications and schedule changes since the institution was always developing events and the students had no classes, which prevented

the application of certain activities, and they were postponed. For this reason, the researchers of this study had to reduce the number of interventions.

5.3 Discussion

The Color Coding Strategy facilitated the better organization of ideas for teacher as well because colors have no restrictions, and each researcher may select how to categorize those colors, this technique might be utilized for a variety of purposes. Furthermore, this helped to improve English skills specially writing and reading. It can also be stated that the experimental group showed better results due to an organized lesson style that permitted students receive, practice, and produce the content.

Vocabulary acquisition is indispensable for mastering the English language; however, students of 4th grade could acquire many words but could not retain them for long. They quickly forgot taught words, then they were vulnerable to broader linguistic flaws. To form a wide lexicon was important that they retain vocabulary. In this case the used of color-coding strategy helped to improve students' difficulties.

Concerning the color-coding strategy, in the group The color guided students in each activity and facilitated the vocabulary acquisition because the colors engage student visually and it helped them to understand the content and words. Then, when students reach understanding they were able to retain the word. Also, in the application of this strategy the definitions, pronunciation and numerous examples could be linked to the colors which helped stimulate students' memory. Based on this, this study agrees with Chavez (2019) in how color-coding strategy helps retain vocabulary for a longer time, since the colors stimulate memory and therefore increases information retention. Also, this study comes to

an agreement with Cayubit (2012) about how this strategy helps students develop high cognitive process that help them to interiorize the information and retain it for long period. The use of colors in classroom helped stimulate students' memory.

On the other hand, the control group faced some challenges while acquiring vocabulary, since the vocabulary was presented without any introduction or definition that help students understand the words. Moreover, they had to listen to every letter to construct the words. This was a meaningful strategy to practice spelling, however, many learners demonstrated struggles in sound recognition. Therefore, they were not able to write the word correctly.

Moreover, it was found that some students had difficulty in learning color coding quickly and needed guidance in each activity to remember and be able to link words with colors. This was a disadvantage in teaching-learning process because students did not only have to focus on learning the words, but also had to learn how to use and understand the color-coding strategy. Nonetheless, this did not have a highly negative effect because the colors motivated students to learn and while doing the activities, they unconsciously learned the connection of the colors with each word.

This strategy is effective however, it requires a lot of planning time because educators need to carefully prepare activities and material in accordance with students needs and context. Also, students need time, will, and patience to adapt a new strategy and carry it out accurately. This could take more time than planning and delivering other conventional classes, which can demotivate teachers or students. The color codification, or

assigning words to certain colors, also needs careful consideration. If the color is not used properly, this could affect the stimulation of the students and retention could be affected. The color-coding strategy is effective and improves memory retention, however it needs to be planned accurately and in accordance to the context and needs.

To sum up, this strategy motivates them and helps them to improve their concentration. Equals, the color coding influenced positively in the retention of vocabulary since after two weeks of the intervention, 4th-grade students at the April 16 school, remembered the meaning of the words that were taught to them.

5.4 Conclusion

- This study concludes that the Color Coding Strategy (CCS) helps to acquire English vocabulary about professions with students who have difficulty learning with traditional methodologies.
- The colors helped the students find or locate answers easily and quickly. So, they were able to understand key concepts and to encode and retain really important information.
- The CCS allows motivating students through the associations made to their context, bringing them closer to a whole and meaningful learning.

5.5 Suggestions for further research

A key recommendation is to be very careful with the implementation of colors and before implementing them make a study to know if students do not have visual issues or problem to identify la colors. Furthermore, la color coding codification need to be simple, teacher need to consider students' age because it could affect the effectiveness of the

implementation, this is a strategy that work for students of 4th level and up because they have developed more skills than little children then if teacher want to use this strategy with children from 4 to 7 they need to reduce the difficulty of the codification to them can understand and domain.

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7 Annexes

7.1 Annex A: Metrology instruments

7.1.1 Observation template

CLASS INFORMATION

Class topic:

Level:

Learning Objectives:

Teacher's Name:

Observer Name:

Number of Students Registered:

Date of Class Observed:

Number of Students Present in Class Observed:

BRIEF SUMMARY OF CLASS CONTENT:

CLASSROOM DEVELOPMENT:

STUDENT ENGAGEMENT:

STRENGTHS AND WEAKNESSES:

Adapted from: Hunter College. (2021). Peer Observation Template

7.1.2 Pretest & Posttest template

Name: _____ Date: _____ Grade: _____

1. Listen and write the missing letter to complete the words. 5 points (0.25 point for each letter)

1. E _ g _ n _ _ r

3. Fi _ e _ i _ h _ _ r

2. V _ t _ r _ n _ r _ a _

4. N _ _ s _

5. J _ d _ e

2. Write the correct word under the image. 1 point (half point each one)



She is a _____



He is a _____

3. Read and match each image with its career's name. 4 points (1 point each one)



She is a journalist

She is a nurse



He is a lawyer



He is an architect



4. Look and say who is she or he? 10 points (one point for each one)



1



2



3



4



5



6



7



8



9



10

7.1.3 Contextualization sheets

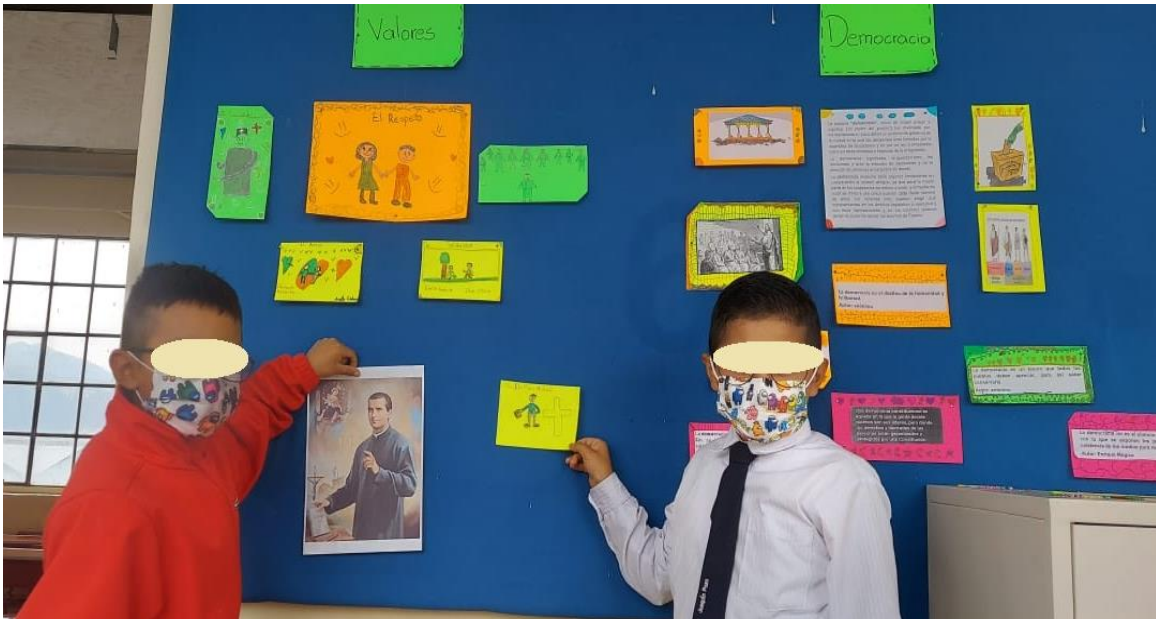
Link.

<https://drive.google.com/drive/folders/11lr1L2oApCe6qZVDKh3LugVQFynvDVYs?usp=s>
haring

7.2 Annex B: Photo gallery

Figure 6

Application of color coding strategy on week one



Nota. The relation between professions vocabulary and color.

Figure 7


Application of color coding strategy on week two.




Nota. The used of different color markets.

7.3 Annex C: Other supplies

7.3.1 Lesson Plan Template One

| Lesson plan 1 | COOPERATING SCHOOL "6 de Abril" school | |  | |
|---|--|---|---|--|
| | MICRO CURRICULAR PLANNING SKILLS WITH PERFORMANCE CRITERIA PLAN | | | |
| Informative data: | Teacher: Rocío Cervantes and Jessica Pacheco | | Date: April 18 th , 2022 | |
| OBJECTIVES (EXPECTED LEARNING OUTCOMES): OG. EFL4. Deploy a range of learning strategies, thereby increasing disposition and ability to independently access further (language) learning and practice opportunities. Respect themselves and others within the communication process, cultivating habits of honesty and integrity into responsible academic behavior. OG. EFL3. Access greater flexibility of mind, creativity, enhanced linguistic intelligence, and critical thinking skills through an appreciation of linguistic differences. Enjoy an enriched perspective of their own L1 and of language use for communication and learning. | | | | |
| ESSENTIAL ASSESSMENT INDICATORS: CE.EFL.2.7. Listening for Information: Follow short and simple spoken texts that include familiar vocabulary and are set in everyday contexts. Identify key items of information within the text, and record or act upon them. CE.EFL.2.8. Production - Pronunciation: Produce individual words and short phrases clearly enough that other people can usually understand them easily. CE.EFL.2.17. Write simple words, phrases, and sentences to demonstrate knowledge of spelling, punctuation, capitalization, and handwriting/typography, and identify their meanings. | | | | |
| TRANSVERSAL THREADS/AXIS: Oral communication & writing | | | | |
| Essential contents | Skills and performance criteria | Indicators for the performance criteria | Methodological strategies | |
| | | | Teacher proposal | |
| Vocabulary: Professions | <p>EFL.2.2.3. Recognize familiar names, words, and short phrases about simple everyday topics whether heard in isolation or within short, simple spoken texts describing people and objects. (Example: vocabulary about self, family, friends, and immediate surroundings at school and home, adjectives for color and size, etc.)</p> <p>EFL.2.2.4. Identify items of specific information within simple messages or from short and simple descriptions about familiar contexts, especially if visual support is provided. (Example: letters of the alphabet, numbers, prices and times, days, dates and months, etc.)</p> <p>EFL.2.2.8. Imitate individual English language sounds, especially those phonemes which do not exist in the student's own L1, both in isolation and within key vocabulary items. (Example: /ŋ/ /ð/ /ʌ/ /i:/ and in words like singing, these, up, sea, etc.)</p> <p>EFL.2.3.1. Demonstrate basic reading comprehension skills by identifying the meaning of individual words, phrases, and sentences, including simple written instructions.</p> <p>EFL.2.4.1 Know how to spell simple English words correctly, demonstrating awareness of sound-letter relationships. (Example: sea, mean, bee, etc.)</p> | <p>I.EFL.2.7.1. Learners can understand short and simple spoken texts well enough to be able to pick out key items of information and record them in writing or drawings, or physically act upon them. (I.3)</p> <p>I.EFL.2.8.1. Learners can pronounce most familiar vocabulary items accurately, and can therefore usually be easily understood. They can also produce some phrases and short sentences clearly and may approximate English rhythm and intonation in longer utterances. (I.3)</p> <p>I.EFL.2.11.1. Learners can understand familiar words, phrases, and short simple sentences and can successfully complete the simple accompanying task. (I.4)</p> <p>I.EFL.2.17.1. Learners can write words, phrases, and short simple sentences using the correct conventions (spelling, punctuation, capitalization, and handwriting or typography, etc.), for making simple learning resources. (I.3)</p> | <p>Warm-up songs and emojis</p> <p>Present Presentation of carrier vocabulary using PowerPoint presentation Mini books</p> <p>Practice Reading activity</p> <p>Produce Poster</p> | <p>Resources evaluation activities techniques and instruments</p> <p>Pencil colors Mini books Color paper Pictures Worksheets Lecture Posters Songs Emojis PowerPoint presentation</p> |
| ADAPTED CURRICULUM: | | Special learning need: | Adaptation to be applied, that is, the activities you will do with these student(s): | |
| PLANNED BY: | | REVIEWED BY: | APPROVED BY: | |

7.3.2 Lesson Plan Template Two

| | | | | | |
|--|---|---|--|---|-----------|
| Lesson plan 2 | | COOPERATING SCHOOL "6 de Abril" school | |  | |
| | | MICRO CURRICULAR PLANNING | | | |
| | | SKILLS WITH PERFORMANCE CRITERIA PLAN | | | |
| Informative data: | Teacher: Rocio Cervantes and Jessica Pacheco | | | Date: April 25 th , 2022 | |
| <p>OBJECTIVES (EXPECTED LEARNING OUTCOMES):</p> <p>OG. EFL4. Deploy a range of learning strategies, thereby increasing disposition and ability to independently access further (language) learning and practice opportunities. Respect themselves and others within the communication process, cultivating habits of honesty and integrity into responsible academic behavior.</p> <p>OG. EFL3. Access greater flexibility of mind, creativity, enhanced linguistic intelligence, and critical thinking skills through an appreciation of linguistic differences. Enjoy an enriched perspective of their own L1 and of language use for communication and learning.</p> | | | | | |
| <p>ESSENTIAL ASSESSMENT INDICATORS:</p> <p>CE.EFL.2.7. Listening for Information: Follow short and simple spoken texts that include familiar vocabulary and are set in everyday contexts. Identify key items of information within the text, and record or act upon them.</p> <p>CE.EFL.2.8. Production - Pronunciation: Produce individual words and short phrases clearly enough that other people can usually understand them easily.</p> <p>CE.EFL.2.17. Write simple words, phrases, and sentences to demonstrate knowledge of spelling, punctuation, capitalization, and handwriting/typography, and identify their meanings.</p> | | | | | |
| TRANSVERSAL THREADS/AXIS: Oral communication, communication through art, writing | | | | | |
| Essential contents | | Skills and performance criteria | | Indicators for the performance criteria | |
| Methodological strategies | | Teacher proposal | | Resources | |
| Vocabulary: Professions | <p>EFL.2.2.3. Recognize familiar names, words, and short phrases about simple everyday topics whether heard in isolation or within short, simple spoken texts describing people and objects. (Example: vocabulary about self, family, friends and immediate surroundings at school and home, adjectives for color and size, etc.)</p> <p>EFL.2.2.4. Identify items of specific information within simple messages or from short and simple descriptions about familiar contexts, especially if visual support is provided. (Example: letters of the alphabet, numbers, prices and times, days, dates and months, etc.)</p> <p>EFL.2.2.8. Imitate individual English language sounds, especially those phonemes which do not exist in the student's own L1, both in isolation and within key vocabulary items. (Example: /ŋ/ /ð/ /ʌ/ /i:/ and in words like singing, these, up, sea, etc.)</p> <p>EFL.2.3.1. Demonstrate basic reading comprehension skills by identifying the meaning of individual words, phrases, and sentences, including simple written instructions.</p> <p>EFL.2.4.1 Know how to spell simple English words correctly, demonstrating awareness of sound-letter relationships. (Example: sea, mean, bee, etc.)</p> | <p>IEFL.2.7.1. Learners can understand short and simple spoken texts well enough to be able to pick out key items of information and record them in writing or drawings, or physically act upon them. (I.3)</p> <p>IEFL.2.8.1. Learners can pronounce most familiar vocabulary items accurately, and can therefore usually be easily understood. They can also produce some phrases and short sentences clearly and may approximate English rhythm and intonation in longer utterances. (I.3)</p> <p>IEFL.2.11.1. Learners can understand familiar words, phrases, and short simple sentences and can successfully complete the simple accompanying task. (I.4)</p> <p>IEFL.2.17.1. Learners can write words, phrases, and short simple sentences using the correct conventions (spelling, punctuation, capitalization, and handwriting or typography, etc.), for making simple learning resources. (I.3)</p> | <p>Warm-up: Brainstorming activities</p> <p>Present: Present vocabulary Worksheet Color of the environment Videos Board game</p> <p>Produce: Collaborative work</p> | Pencil colors | Mini book |
| ADAPTED CURRICULUM: Special learning need: Adaptation to be applied, that is, student(s): | | | | | |
| PLANNED BY: | | REVIEWED BY: | | APPROVED BY: | |
| TEACHER: Jessica Pacheco & Rocio Cervantes | | NAME: | | NAME: | |

7.3.3 Validations template of instruments

The methodological instruments and the lesson plan were validated by the teachers of the English area of the 16 de abril school, in the following link you can find the respective information.

Link.

<https://drive.google.com/drive/folders/1Gi7rodFivmqIHYwTnFDvTAtpgCc8t91p?usp=sharing>

7.3.4 Informed consent

Link.

https://drive.google.com/drive/folders/1Lm9WrXv3_HYviSJapHLmnQgLUZMWIU-3?usp=sharing



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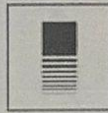
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Yo, Zulema Izamar Peña Alvarez, | tutora | del Trabajo de Integración Curricular de Carreras de Grado de Modalidad Presencial denominado | "Color coding as a teaching strategy to acquire vocabulary in the long-term memory of fourth-grade students at 16 de abril elementary middle school. " | perteneciente a los estudiantes: | Jessica Maribel Pacheco Saetama con C.I. 0106964810 y Rocio Jacqueline Cervantes Delgado con C.I. 0106762917 |. Doy fe de haber guiado y aprobado el Trabajo de Integración Curricular. También informo que el trabajo fue revisado con la herramienta de prevención de plagio donde reportó el | 6 % | de coincidencia en fuentes de internet, apegándose a la normativa académica vigente de la Universidad.

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ZULEMA IZAMAR
PEÑA ALVAREZ

(firma)

Nombres y apellidos completos

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