USING MIND MAPPING AS A METHOD TO HELP ESL/EFL STUDENTS CONNECT VOCABULARY AND CONCEPTS IN DIFFERENT CONTEXTS

Uso de mapas mentales como método para ayudar a estudiantes de ESL/EFL a conectar vocabulario y conceptos en diferentes contextos

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Fecha de recepción: 20 de febrero de 2014
Fecha de aceptación: 24 de abril de 2014

Cómo citar / How to cite
Gómez, M.I. y King, G. (2014). Using mind mapping as a method to help ESL/EFL students connect vocabulary and concepts in different contexts. *TRILOGÍA. Ciencia, Tecnología y Sociedad*, 10, 69-85.

Abstract: current knowledge about the ways in which the brain works shows that thinking is not linear. Individuals can better understand concepts when they have visual representations of those ideas. These pictorial diagrams are manifestations of Radiant Thinking. Understanding how the mind works to connect concepts, helps educators provide vocabulary strategies that support students' learning. Mind Mapping has proven to be a good technique for memorizing, creative thinking, and learning. This paper reflects on how mind mapping helps ESL/EFL students connect concepts in different contexts through the assistance of pictorial representations by hand and by the use of software that enables learners to create associations between words and images in order to better learn and memorize information in a second language.

Palabras clave: investigación del cerebro, adquisición de vocabulario, estrategias de vocabulario, estilos de aprendizaje, mapas mentales.

Keywords: brain research, vocabulary acquisition, vocabulary strategies, learning styles, mind mapping.

Resumen: el funcionamiento del cerebro muestra que el pensamiento no es lineal. Las personas pueden entender mejor los conceptos cuando tienen representaciones visuales de las ideas. Estas imágenes son personificaciones externas de «Pensamiento Irradiante». El comprender cómo funciona la mente para conectar conceptos, ayuda a los educadores a proporcionar estrategias de vocabulario que apoyen el aprendizaje de los estudiantes. El diseño de mapas mentales, a mano o mediante el uso de software, ha demostrado ser una buena técnica para el pensamiento creativo y el aprendizaje. Este estudio reflexiona sobre cómo los mapas mentales ayudan a los estudiantes ESL/EFL a conectar conceptos en diferentes contextos, permitiéndoles crear asociaciones entre palabras e imágenes para aprender mejor y memorizar la información en un segundo idioma.

INTRODUCTION

Learning a second language can be exciting and challenging at the same time. Today, second language learners need to acquire a significant amount of information in the target language in order to succeed in school. Most of the information is presented in the form of words and the relation of those words in different contexts. Furthermore, it is clear that the students and teachers' involvement inside the ESL/EFL classroom provides opportunities to reflect on learning and to encourage the brain to create relationships between words and ideas rather than demanding the memorization of lists of words.

However, for some students it is difficult to create connections between words and context. In addition, educators might misunderstand the different ways students practice, acquire, and retain information in their brains. According to Buzan (1993), "Research has shown that, during the learning process, the human brain primarily remembers any items associated with things or patterns already stored, or linked to other aspects of what is being learned" (p. 34). Hence, Buzan advocated the development of strategies that enable students to make connections and work with word associations that empower and improve specific functions of the brain such as to receive, hold, analyze, output and control information and concepts.

Brain research has impacted theory and studies about vocabulary acquisition in the ESL environment. Nagy and Hernan (1987) investigated the acquisition of ESL vocabulary in high school students. They estimated that, "by the last year of high school the typical student has learned 40,000 words, an average of around 3,000 words per year. A logical extrapolation is that an ESL student who is learning academic English would have to learn on average more words per year than this" (as cited in Brown & Perry, 1991, p. 655). Therefore, it is important to help students to increase their learning capability for new vocabulary. It is necessary to think about effective second language learning

strategies that support the learning process and facilitate vocabulary acquisition.

Working as a language teacher, first in Colombia and then in the United States, has given me the opportunity to observe Culturally and Linguistically Diverse (CLD) students' attitudes, backgrounds, learning styles, as well as the institution's support in the teaching process. I have been able to identify some of their difficulties retaining vocabulary concepts to make associations, take notes, and memorize. Most of the time, students work on lessons and topics that include complex concepts which students are not able to relate to other contexts or purposes. Therefore, learners' engagement in the ESL classroom is minimum, their participation is poor, and their proficiency is not the best.

This paper presents concepts and studies made by other authors interested in the study of how the brain learns, as well as the adaptation to a new technique like mind mapping in order to increase the learners' involvement. In addition, this paper presents suggestions to maximize the opportunities for students to participate, interact in the class, make connections, and change the passive role they can have in class to use the knowledge in their daily lives. Furthermore, this paper shows some samples of a handbook with activities that encourage instructors to use mind maps not just as a note-taking activity, but also as a vocabulary strategy that helps students to visually associate ideas with colors and pictures, to brainstorm, to comprehend readings through analysis, and to organize projects that support the learning of a second language. These samples can be visualized in the appendixes section from appendix A to C.

The purpose of this paper is to provide inquiry data about brain research, vocabulary acquisition, learning styles, and vocabulary strategies. As a result, this paper will outline mind-mapping strategies that enable the association of words with visual representations to help students with memorization and organization of ideas to assist them in understanding content through the use of different learning materials, resulting in them being better learners.

At the time of birth, the brain has produced millions of nerve cells that need to be continuously working in order to receive and associate sensory information that is required for comprehension and cognition. Therefore, from birth, individuals start to use different strategies and techniques to learn by first identifying pictures, then symbols, and finally condensing symbols into characters. Diverse researchers have thought that writing is the best way to record, acquire information, and learn. However, Buzan (1993) states, "If writing is indeed the best of taking in, analyzing and passing on information, why are so many people having problems in the fields of learning, thinking, creativity and memory?" (p. 38). Thus, Buzan started to formalize different mind-mapping concepts, which have been used since at least the 3rd century BC.

According to several researches about learning strategies, it is possible to say that mind mapping strategies are good examples of what Buzan (1993) called "Radiant Thinking", which "refers to associative thought processes that proceed from or connect to a central point" (p. 57). Consequently, the mind mapping strategy has become a very important part of teachers' and students' daily lives in the ESL classroom in order to empower memorization and language acquisition through pictorial organizers.

The mind mapping strategy has proven to be a good technique for memorizing, creative thinking, reading comprehension, and learning. Gideon King is a recognized expert in mind mapping and has been working with mind mapping applications for Apple for over fourteen years. According to King (2007a), "Mind Maps represent a task or idea in a pictorial form with a minimum of words" (p. 5). This means that the brain is used to relate images with concepts and specific vocabulary words and sentence constructs. Therefore, colors and images used in a mind map help the brain to make associations and create connections between

concepts studied in class and remember them for future purposes. These mind mapping concepts could lead to the differentiation of learning styles. As Gardner (1993) states, "It's not how smart you are but how you are smart" (as cited in King, 2007a, p. 8). People acquire knowledge in different ways. Thus, as human beings, individuals possess skills to solve different kind of problems using diverse learning styles or behaviors. Gardner (1993) describes three major learning styles as "visual, auditory and kinesthetic", but he also explained the possibility of differentiating intelligence into multiple specific modalities rather than seeing it as ruled by only one general ability (as cited in King, 2007a, p. 8). Hence, it is possible to say that the mind mapping strategy can greatly benefit visual learners, but it can also support auditory and kinesthetic learners' learning because it provides information in a simplified form in order to make students store and remember concepts and ideas in their brains.

BRAIN RESEARCH

Over the years, researchers and educators have asked questions about how people learn. According to Leslie (1987), Scholl and Leslie (2001), "There is an innate theory of mind mechanism that produces cognitive representations of a person's mental attitudes or states" (as cited in Andrews, Halford, Bunch, Bowden & Jones, 2003, p. 1476). Consequently, it is possible to identify the different processes the brain undergoes in order to indicate mood, interest, and attention to different aspects. In addition, Hardcastle and Stewart (2002) states, "Single cell recording, imaging studies, and the study of neurological deficits all feed into the Gallian view that different brain areas do different things and the things being done are confined to particular processing streams" (p. 72). Thus, the brain can be considered as a multitasking system ready to acquire and retain information from any source or origin.

Students acquire vocabulary when they use their cognitive skills and activate their memory in order to retain words for longer periods of time. As Anderson (1985) states, "Memory works by an activation, which spreads from word to associated word via these links" (as cited in Buzan, 1993 p. 80). Memory activation helps to stimulate billions of neurons in the brain that connect thoughts, words and surroundings in order to retain information. Here is where the concept of *radiant thinking* appears, which is carefully explained by Buzan (1993) as "associative thought processes that proceed from or connect to a central point" (p. 57). Therefore, the more an individual acquires and retains vocabulary and new data in an organized and hierarchical manner, the easier it is to learn it. In addition, Buzan (1993) points out that "each bit of information entering your brain – every sensation, memory or thought can be represented as a central sphere from which radiate tens, hundreds, thousands, millions of hooks" (p. 53). As a result, it is possible to incorporate every word, image, fragrance, color, and code in associations and from these associations create more links and connections in order to create new knowledge, use it, and save it in an individual's database or library inside his or her brain.

Moreover, Buzan (1993) defines mind mapping as one example of *radiant thinking* in which branches of ideas radiate from a central image or concept (p. 57). During the radiant thinking process, the individual takes an image as a central point, and from that image it is possible to obtain sub-centers of association in order to build various branches that include more concepts related to the common center. According to Buzan (1993), mind-mapping techniques might be considered as a radiant thinking representation because it is a multidimensional experience that incorporates and comprises space, time and color in order to support language acquisition and second language learning (p. 57). Here is where the concept of vocabulary acquisition appears in order to support the research about how individuals' brain functions, processes, and creates radiant thinking.

VOCABULARY ACQUISITION

The brain does not naturally work linearly or by simply remembering lists of words to acquire vocabulary.

Through the radiant thinking process students can develop vocabulary skills through association and extension. According to Hiebert and Kamil (2006), "Vocabulary is not a developmental skill or one that can ever be seen as fully mastered. The expansion and elaboration of vocabularies is something that extends across [a] lifetime" (p. 2). Consequently, vocabulary acquisition plays an important role among the four linguistic skills reading, writing, listening and speaking. Thus, it is not possible to separate vocabulary from comprehension. Since ancient societies, philosophers have been interested in how human beings understand and produce language. Today, researchers have pointed out the relevance of vocabulary acquisition for second language learners (L2). Researchers like Lawson and Hogben (1996) states, "The learner must undertake some analysis of the to-be-acquired word-meaning complex and must then establish a representation of this complex in memory" (p. 103). Lawson and Hogben have emphasized how learners need to reflect on the meaning of a word, imagining that word in their brain, and according to the quality of that mental representation. Thus, it might be easier to memorize concepts and retain definitions for a lifetime.

Words presented in different contexts are easier to remember and retain in the learners' brain for a longer period of time. Here is where the concept of vocabulary instruction arises. According to Mezynski (1983), as well as Stahl and Fairbanks (1986), "Instruction that incorporates both definitional information and contextual information is likely to be stronger than instruction incorporating only one sort of information" (as cited in Graves, 2006, p. 20). Teachers at every level are aware of how important it is to facilitate the meaning of words using contextual information. Students' vocabulary proficiency and new information acquisition increase and become stronger when learners acquire not just the definition of one word, but also the relevance of that word in different contexts.

A conception about word meanings is described by Hayes, Wolfer, and Wolfe (1996) who stated, "Words represent complex and, often, multiple meanings. Furthermore, these complex and multiple meanings of words need to be understood in the context of other words in the sentences and paragraphs of contexts" (as cited in Hiebert & Kamil, 2006, p. 1). Looking at present language education, most of the teachers have to face the challenge of looking for strategies and organizing their classroom activities in order to help students to obtain the complete definition of a word, and then motivate his or her students to connect that definition to other uses or concepts. Considering the previous idea about words meanings, Hiebert and Kamil (2006) states, "Not only are students expected to understand words in texts, but also texts can be expected to introduce them to many new words" (p.1). Thus, students can enrich and enlarge their vocabulary proficiency through the comprehension of concepts and connection of ideas to create new knowledge.

Crawford (2005) points out the relevance of word recognition strategies or activities in order to understand and comprehend the meaning of texts and readings. In addition, Crawford explains that when second language learners recognize a word and the meaning, they link that concept to different ideas in order to develop word recognition skills and improve language abilities in the L2 classroom. Furthermore, taking into account the importance of recognizing words' meaning and comprehending concepts to connect them with other ideas, Schindler (2006) explains it is necessary to have meaningful strategies that "make students feel competent and confident while learning English, provide a safe, entertaining, and educational environment [in order to] create life-long learners of English" (p. 8). Students need to comprehend to retain information in order to produce new knowledge.

In addition, the use of visuals and manipulatives such as flashcards help students to memorize meanings and to reinforce prior knowledge and the comprehension of complex concepts. There are several other vocabulary techniques and strategies that could be considered

according to the academic environment, teachers' expectations, students' needs, and the way students acquire knowledge or information, which is known as their learning styles.

LEARNING STYLES

When students are interacting during vocabulary activities, specific behaviors are revealed which help educators to be aware of the different intelligences or styles students use to learn a second language. According to Romanelli, Bird and Ryan (2009), a definition of learning styles is "characteristic cognitive, effective, and psychosocial behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (p. 1). Students do not learn in the same way. They process and acquire information through learning styles and these different styles could be a factor of the failure or the success in the ESL/EFL classroom.

There are several different models that describe stages and cycles of learning styles. King (2007a) described Fleming's model, which explains the last theory or model known about learning styles. This theory is based on early neuro-linguistic programming models and recognizes three major learning styles labeled as visual learners, auditory learners and kinesthetic learners (pp. 8-9).

According to King (2007a), "Visual learners prefer to have information described to them in diagram or pictorial form; auditory learners prefer to have information described to them by another person, and kinesthetic learners prefer to have information described to them in a physical form" (p. 8). Visual learners learn better when they can see the concept or idea. They prefer to use pictures, drawings, and maps to acquire knowledge. In addition, auditory learners learn better and easier through the use of discussions or debates. Finally, kinesthetic learners acquire information and knowledge through the exploration, interaction and touch of the world that surrounds them.

Students have different learning styles and different proficiency levels. Thus, students need a logical sequence of learning in the classroom. In other words, the instruction needs to follow steps in order to have a sense of coherence and flow. Gardner points out how, as human beings, individuals acquire knowledge using different skills or intelligences in order to solve problems, create mental images, and connect ideas (as cited in King, 2007a, p. 8). Thus, it is possible to enable students to use their different learning styles or multiple intelligences such as the spatial intelligence to design diagrams and images that are connected to concepts. It is important to note that one strategy that could support the use of both right and left sides of the brain to acquire concepts is called mind mapping. As Hofland (2007) states, "Mind mapping and multiple intelligences are both teaching techniques which try to identify with both right and left brain learning styles and they go together well" (p. 25). Learning styles depend not just on whether students are smart, but on if the educational experience can support those learning styles in order to provide learning for understanding.

MIND MAPPING

One of the most important skills teachers need to develop is the ability to build on the diversity that students bring into classrooms. This diversity can promote a positive classroom environment and drive teachers to seek new opportunities and ideas to help students to comprehend and retain what they are learning. According to Hutchins and Clausen (1998), "Learning for understanding is a dynamic, reciprocal and contextual activity, where cognition is propagated from mind to mind, from mind to tool, and from tool to mind in such a way that it creates representations within and between learners" (as cited in Naykki & Jarvela, 2008, p. 359). Thus, when students can visualize an image or a pictorial representation, they connect that image with different ideas processed in their mind in order to comprehend and learn. Canning-Wilson

(1999) says, "in a teaching environment, a visual makes the task or situation appear more authentic and prompts the learner to find direct or indirect ways to play with the language and its structures" (p. 1). It is important to analyze different visual strategies since learners and teachers benefit from these techniques to acquire a second language (L2). Herrera and Murry (2005) explains how these strategies provide students with a support system that helps to reduce language barriers, build vocabulary and provide key connections in order to retain new information (p. 236).

It has been proven that different intelligences and learning styles are independent from one and other. Visual aids support the enhancement of those intelligences. According to Canning-Wilson (1999), "Visual images allow us to predict, infer, and deduce information from a variety of sources" (p. 4). Therefore, the adaptation of the mind mapping strategy has provided options and alternatives to learners who look for high proficiency in vocabulary acquisition.

Because students get cues in order to make meaningful connections to the content, one way of enhancing CLD students' content understanding is through the use of visual support. This enables them to participate and interact in the classroom. According to King (2007a), "A Mind Map is a visual representation of what's going on in your head. It lets you see, in one picture, the thoughts, tangents and ideas your brain connects to a particular concept" (p. 5). Therefore, this strategy empowers active learning and assists students to use their learning styles to move beyond the passive role of just listening and taking notes in the ESL classroom. Budd (2004) states, "A Mind Map is an outline in which the major categories radiate from a central image and lesser categories are portrayed as branches of larger branches" (p. 35). As a result, this type of strategy can be used with small or large classes to work in an individual or a team environment in order to energize the lesson, support learning differentiation, and enhance vocabulary acquisition. Furthermore, King (2007a) states, "The use of colors helps you to visually associate ideas with colors - something our brains are very adept at doing, and this is further enhanced by the images. Where appropriate, including humor makes the Mind Map even more interesting so your brain really latches on to the concepts and remembers them" (p. 5). Consequently, students can visualize and organize ideas using simple expressions and their own thoughts through the use of different resources and tools in order to make it understandable for them and others.

As a result, researchers, educators, and students have started to design and adapt mind maps in the classroom, which reflect on internal processes and allow access to a vast world of information. To support the previous statement, Buzan (1993) points out "The mind map harnesses the full range of cortical skills - word, image, number, logic, rhythm, color and spatial awareness - in a single, uniquely powerful technique. In so doing, it gives you the freedom to roam the infinite expanse of your brain" (p. 84). It is easier to remember pictures, photographs or drawings rather than words or structures. Mind maps provide students with an active interaction allowing them to learn through the use of a central image that works outward in all directions resulting in a productive and organized structure of key concepts and images. By using mind maps, teachers have the opportunity to utilize multiple intelligences in the classroom so students have the possibility to match and stretch. Matching activities help to develop intelligences and stretching stimulates the less developed intelligences by using creative activities where students use colors and shapes to create associations. Mind mapping is a useful matching activity that supports the increase of spatial and personal intelligences giving them the opportunity to explore their thoughts and express their visions. It is necessary to take into account how students' brains work in order to help them to explore their insights and relate their understandings to different contexts.

Additionally, mind mapping has proven to be a useful strategy because it is reasonably easy to learn. However,

as any other skill, mind mapping needs to be practiced in order to be mastered. According to King (2007a), there are two ways to design or build mind maps. The first one is by hand, in which learners can use large pieces of paper, pens, pencils, markers, and pictures from magazines or books (King, 2007a, p. 87). The second one is via mind mapping software, in which simple or complex software packages are used to construct mind maps (King, 2007a, p. 94). Mind mapping software should be adapted according to specifications of time of use, operating system, features, price, necessity, and level of Information and Communications Technology skills (ICT) that the user has (King, 2007a, pp. 97-98). Mind mapping software has many benefits for teachers and students. This software might save time and provide different features to edit, share and link to other documents, hyperlinks or other resources. Pea and Maldonando (2006) states, "Due to fast-developing technology, possibilities for group learning are continuously expanding; ideas on mobile and ubiquitous technologies offer new possibilities for constructing and sharing ideas in multiple contexts and thus creating adaptive learning environment" (as cited in Naykki & Jarvela, 2008, p. 359). As a result, the use of these types of technologies can help students to search, organize, present and produce new information and knowledge. Educators need to be aware of the great role they play on the promotion of useful and meaningful technology to connect ideas and enhance language acquisition.

The mind mapping benefits are extensive. According to Findlay and Lumsden (1998), "Mind maps allow us to group the concepts, re-group again and compare the concepts. The movement of the concepts and synthesizing them together in new clusters, often reveal new ideas" (as cited in Seyihoglu & Kartial, 2010, p. 1639). The mind mapping strategy is a powerful graphic technique that allows the use of all their cognitive skills to enhance and activate creativity through the work of symbols and ideas connected to a main point or concept. Buzan (1991) pointed out that through the use of mind mapping strategies, it is possible to have an infinitive flow of ideas enabling students to reflect on and connect their thoughts taking into account a central topic or conception (as cited in Seyihoglu & Kartial, 2010, p. 1640). It is possible to say that mind mapping might become a technique for "project organization, writing, presentations, note-taking and personal development" that will support the constructivist approach because it helps to identify main concepts and organize ideas in a hierarchical order to contribute to students' learning (as cited in Seyihoglu & Kartial, 2010, p. 1640).

By relating mind mappings strategies with the way the brain learns, it is important to say that brain research has shown that the brain is more complex than researchers had previously thought. However, everyone has the ability and potential to structure, to differentiate, and to rework the whole frame of the mind. Considering the theories that support the use of mind mapping outside and inside the classroom and the significant benefits that mind mapping strategies provide for different purposes in academic and social fields, it is possible to say that the ESL/EFL field is enriched with one more strategy to assist ESL/EFL vocabulary acquisition. In addition, second language learners have the opportunity to put into practice their learning styles designing representations and manipulating the language to describe what is going on in their brains. Consequently, they can sort keywords and connect them with other concepts so that their understanding and memory are maximized.

Given the findings that mind mapping strategies help students to organize and structure their thoughts by designing a visual representation of an idea or a concept to create connection and understanding, it is possible to appreciate some examples by which ESL/EFL teachers in high school and upper levels can introduce the mind mapping technique to their ESL/EFL students. In addition, these activities mean more alternatives and possibilities to support the vocabulary and language acquisition in the ESL/EFL classroom. These examples describe practical activities that incorporate mind-mapping strategies in daily planning, explains the choice of format to present the

information, and outlines the type of activities according to learning styles and specific mind mapping strategies.

Recognizing the importance of identifying the specific needs of culturally and linguistically diverse learners is one of the main objectives of researchers and educators. We believe students learn more easily when they think in pictures. However, we also recognize that auditory learners will find that the simple design of a mind map is far preferable to the jumble of words on a page. In addition, through the assistance of software, they can add sound effects or videos to their mind maps. Furthermore, kinesthetic learners will be impressed by a mind map's sense of movement and flow. We consider that these three types of learners like colors, figures, and shapes; and this caters or serves as a means to help both sides of the brain to remember information. King (2011) explains how the left side of the brain works in a logical way linking concepts to related ideas, and the right side of the brain likes to recognize concepts taking into account the whole picture with colors and movement (as cited in NovaMind software, 2011). Analyzing students' backgrounds and needs in the ESL/EFL classroom, I believe it is important to start with an introduction for teachers and students about the use of mind maps and the relevance of using them in the classroom.

The mind mapping activities are designed according to the specific English language proficiency standards, which are based on the given level of English language proficiency. They guide English language learners to process, understand, produce, or use pictorial or graphic representation of the language in the required content areas.

Additionally, educators know that students come to classrooms from different ethnic and cultural backgrounds and from different education systems, programs and institutions. Therefore, these different learning processes and backgrounds require the incorporation of strategies and techniques that meet learners' needs and expectations in this technological era, in which students are receiving information from different means like Internet, television, radio, Ipods, Ipads, among others, in different ways. According to Romanelli, Bird, and Ryan (2009), "These changes and advances in technology have led many educators to reconsider traditional, uniform instruction methods and stress the importance of considering student learning styles in the design and delivery of course content" (p. 1). Thus, some of the activities introduce the mind mapping strategy through the use of different software programs such as Inspiration software created by Inspiration, Inc, NovaMind software by Gideon King, and iMindMap by ThinkBuzan, Ltd. These software programs provide a variety of different modalities to use the mind mapping strategy in order to deliver instruction. Hence, students can better record and memorize the information learned in class. Some of the examples illustrate the mind mapping strategy according to specific uses such as note taking, creative writing, organizing oral presentations, recording impressions about different topics, test preparation, summarizing, and condensing material into a concise and memorable format.

It is important modeling before giving independent work because this activity provides the opportunity to share ideas and have a cooperative learning while students gain enough experience and can master the mind mapping strategy. Moreover, while drawing their mind maps, students learn to develop their own personal style of mind mapping. This personal style and writing skills will help them to enjoy interactive mind maps through the assistance of software. Then, teachers can introduce the mind mapping software. Therefore, students can organize large amounts of information, combining a spatial organization. Additionally, through the use of mind mapping software, it is possible to avoid run off the edge of the paper. Learners can edit text easily, recolor, and add images without needing to be an artist, graft topics and subtopics. Moreover, during these interactive activities students map more than thoughts and ideas

with information on their computers and the Internet, such as documents, hyperlinks, and images.

CONCLUSION

We have certainly gained experience and knowledge about brain research and how the brain learns. Through the research and development of this paper, we changed our personal beliefs about how the brain works and processes information and we became active participants in the exploration of the proper stimulation of the brain neurons through the use of visual representations. Thus, it was possible to better understand the theory of *Radiant Thinking*. While writing, we had the opportunity to explore different theories about how *Radiant Thinking* occurs through the association and connection of concepts to a central point, and how mind maps could be an external manifestation of that radiant process.

We became acquainted with mind mapping activities for vocabulary acquisition that have proven to be effective for the different learning styles students bring into the classroom. We were very pleased to see the wide array of free software in the web that currently offers mind-mapping activities. During this technological era, educators should realize how useful Internet and technology tools are inside and outside the classroom. Teachers need to reconsider the traditional methods of instruction and start to stress the importance of considering the full multidimensional power of digital media in the acquisition of concepts and definitions.

In addition, we feel motivated to continue researching and enhancing our learning on the different vocabulary strategies focusing my attention on mind mapping. We have widely read about both sides of the brain produce knowledge; therefore, mind map design has become an interesting topic of study. We believe it is necessary to continue studying and practicing the different uses of mind maps in order to improve skills and abilities on the use of techniques that support the memorization and organization of concepts and ideas.

In conclusion, we believe that this paper will provide information and one more resource to vocabulary acquisition in the ESL/EFL classroom. It will be a useful tool when ESL/EFL educators are trying to teach complex and difficult concepts in their lessons. Therefore, we are sharing with our colleagues and the world the findings and production of this paper in order to expand the research of the mind mapping strategy and its great benefits in the acquisition and recall of information. In addition, teachers will better understand students' learning styles and assist them with different tools during the acquisition of concepts, definitions and meanings in the second language. By conducting this literature research, we hope we contribute to the improvement of second language proficiency promoting, adapting, and developing activities that stimulate students' brains to think in pictures and associate them with concepts in order to retain information. Thus, we hope this study provides educators a useful complement to their existing curriculum on the teaching of complex concepts and ideas in the ESL/EFL classroom.

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Appendix A: Mind mapping as a class

ACTIVITY ONE

Subject Area: Geography

Learning Style: Visual, auditory, kinesthetic

Level: 9-12 ESL class (High School)

Topic: Continents (Africa)

Mind Mapping Use: Creating mind maps by hand. As a class

Key Vocabulary: Africa, geography, climate, features, history, biodiversity, languages, culture, fauna, regions, demographics.

Supplementary Materials: Large piece of paper (preferably larger than A3), Colored pens, pencils or crayons, and pictures from magazines

Objective:

To create a mind map of their impressions of the continent of Africa
To participate in a class discussion of their impressions of Africa
To work in groups together as a class to create a mind map
To decide how they wish to display their ideas

Procedures:

1. Explain what a mind map is.
2. Project an example of a hand drawn mind map explaining the advantages of hand drawn mind mapping (see Appendix A, p. 57)
3. Break into groups of 5 or 6 and discuss what they think are the defining features of the continent
4. Have students present their findings and ideas to the class
5. Lead the class as they create a giant mind map around the word 'Africa'
6. Place a drawing or picture of the main topic in the middle of the large blank sheet of paper that is landscape style (wider than it is tall). Students can draw or glue a picture of Africa in the center of the large page taking up roughly 3 inches or 8 cm.
7. Instruct students to make branches coming away from the central topic. Advise students to start with four and use a different color for each branch. Students write about main features for the word 'Africa'. Ask students to brainstorm main ideas around the topic. Advise them to draw or put keywords above the branches. Instruct students to print key words using upper and lower case letters. Students might write or draw representations of regions, fauna, history, biodiversity, languages, culture, and climate, among others they can use.
8. Instruct students to make smaller branches coming from the large branches. Advise them to color the small tributaries the same as their main branch.
9. Make students think of smaller sub-topics that relate to the branch keywords. An example of smaller topics around the sub-topic fauna might be birds, fish, amphibians, reptiles, and mammals. Advise students to add the drawings and words to the mind map. Then all together in one diagram the facts or ideas about Africa are presented.
10. Advise students to use multiple colors throughout to stimulate the brain. In addition, advise students to use emphasis and show connections between items. Finally, ask students to keep the mind map clear by using order of items by importance, time, size, etc.

11. Guide the students until all the ideas are represented on the mind map.
12. Assess the mind map using the sample rubrics on page 24.

How to display students' work:

There are several different ways to display students' work

1. Create or redo the students' mind map in a Mind Mapping program.
2. Display the work on the classroom and then scan it with the students
3. Use an interactive whiteboard to display the large mind map.

Extension Activities:

The class may illustrate the ideas on their mind map by placing photographs, illustrations, and links to relevant web sites

1. Advise students to take photographs to illustrate their ideas using digital cameras and upload them.
2. Students might scan photographs and pictures out of books and magazines.
3. Students might copy quotes from literature, magazines or newspapers, which are good representations of their views.
4. Students write up quotes from the class discussion
5. Write their own one-line statements
6. Write short opinion pieces.
7. Write short poems.

Appendix B: Mind mapping to take notes (NovaMind Software)

ACTIVITY TWO

Subject Area: Language Arts
Learning Style: Visual, auditory, kinesthetic
Level: 9-12 ESL class (High School)
Topic: Vincent Willem van Gogh

Mind Mapping Use: Taking Notes by hand. As a class (Spoken)

Key Vocabulary: Work, career, influence, life, mental health, family, artist

Supplementary Materials: printed handout, Colored pens, pencils or crayons, and pictures from magazines
Objective: To take notes from a lecture using a mind map handout.
To process and understand concepts and information about Vincent Willem van Gogh.
To produce a mind map in order to record and memorize information about an artist.
To use pictorial or graphic representation to fill in the spaces with information about Vincent Willem van Gogh.

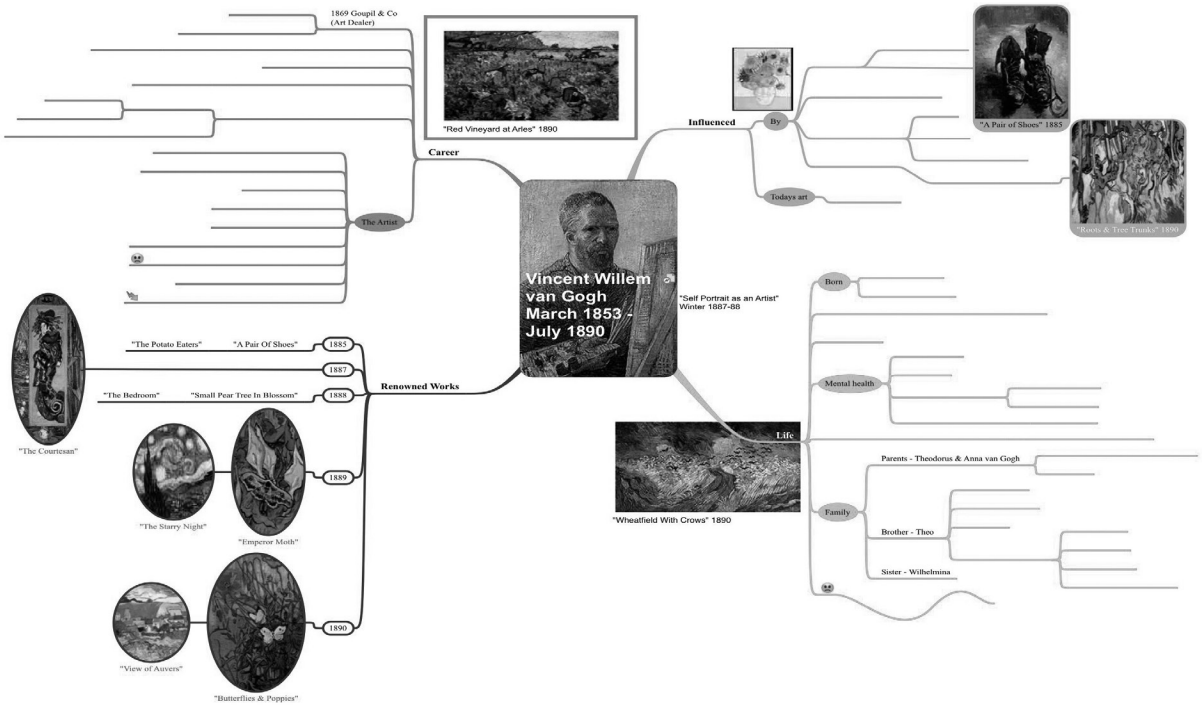
Procedures:

1. Explain what a mind map is.
2. Study teacher's transcript in order to get used to the main topics and subtopics of the lecture. In addition, it will help to guide students while the lecture is conducted. (see Appendix B, p. 58)
3. If it is the first time working with the mind mapping strategy, provide a printed handout with the central topic and with spaces of the branches already on it to help them see how a mind map should be laid out. (See appendix C, p. 59)
4. Have students record their impressions, hypothesis and thoughts about Vincent Willem van Gogh on the map.
5. Advise students that this is not a regular note taking exercise. Recommend them to choose key words or pictures to represent their understanding of what is being said about Vincent Willem van Gogh.
6. Lead the class as they finish with the exercise. Students should spend some time going over their maps with the teacher' guidance.
7. Clarify any doubts or points students have missed. In addition, clarify any information that they are unsure how to interpret.
8. Encourage students to use multiple colors throughout their mind maps to stimulate the brain. In addition, propose students to use photographs to illustrate their ideas using digital cameras and upload them. Students can draw or glue a picture of Vincent Willem van Gogh life, career, works, and influence.
9. Advise students to use emphasis and show connections between items. Finally, ask students to keep the mind map clear by using order of items by importance, time, size, etc.
10. Instruct students to review their mind maps and return them at a later date (perhaps a week later). Students should spend some time looking at their maps and seeing how much of the information they can recall without prompting.
11. Ask students to report their findings and the information they remember from their mind maps without using it.
12. Guide the students until all the ideas are presented.
13. Have students practice outside of class so that they become more comfortable with the process of taking notes with mind mapping strategies.

Extension Activities:

Students can practice the note taking use of mind maps:

1. Mind mapping the news on the newspaper while read it.
2. Students could work with someone else, so that while one person is mind mapping the lecture, the other person is taking normal notes. (These can then be compared after class).
3. If students are still uncomfortable with their ability to get all of the relevant information down during the lecture, they may wish to record it so that they can replay and fill in anything they have missed at a later date.



Appendix C: Mind mapping to visualize vocabulary

ACTIVITY THREE

Subject Area: All subject areas
Learning Style: Visual, auditory, kinesthetic
Level: 9-12 level (High School)
Topic: The Power of Words

Mind Mapping Use: Creating mind maps to visualize vocabulary using the Inspiration software, Inc.

Key Vocabulary: synonyms, antonyms, derivations, sentences

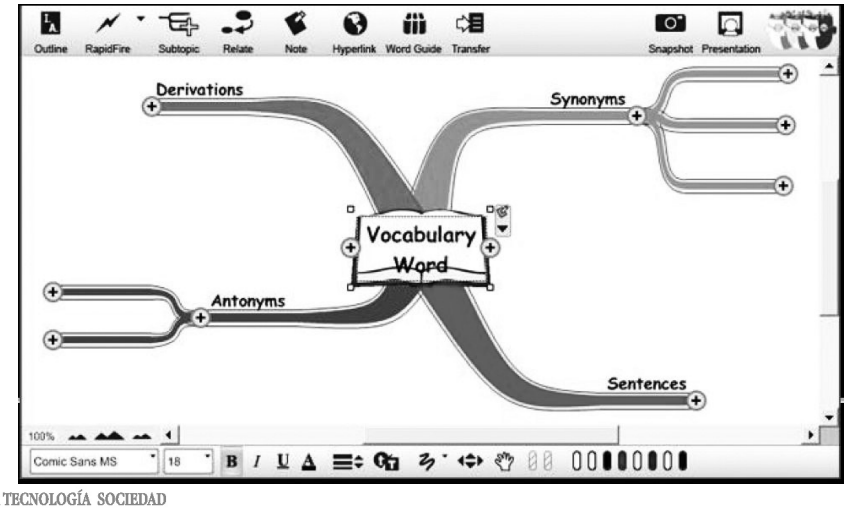
Supplementary Materials: The Inspiration software application published by Inspiration Software, Inc, vocabulary word template, access to library resources and/or the Internet would also be helpful for student research.

Objective: To understand and recall a vocabulary word.

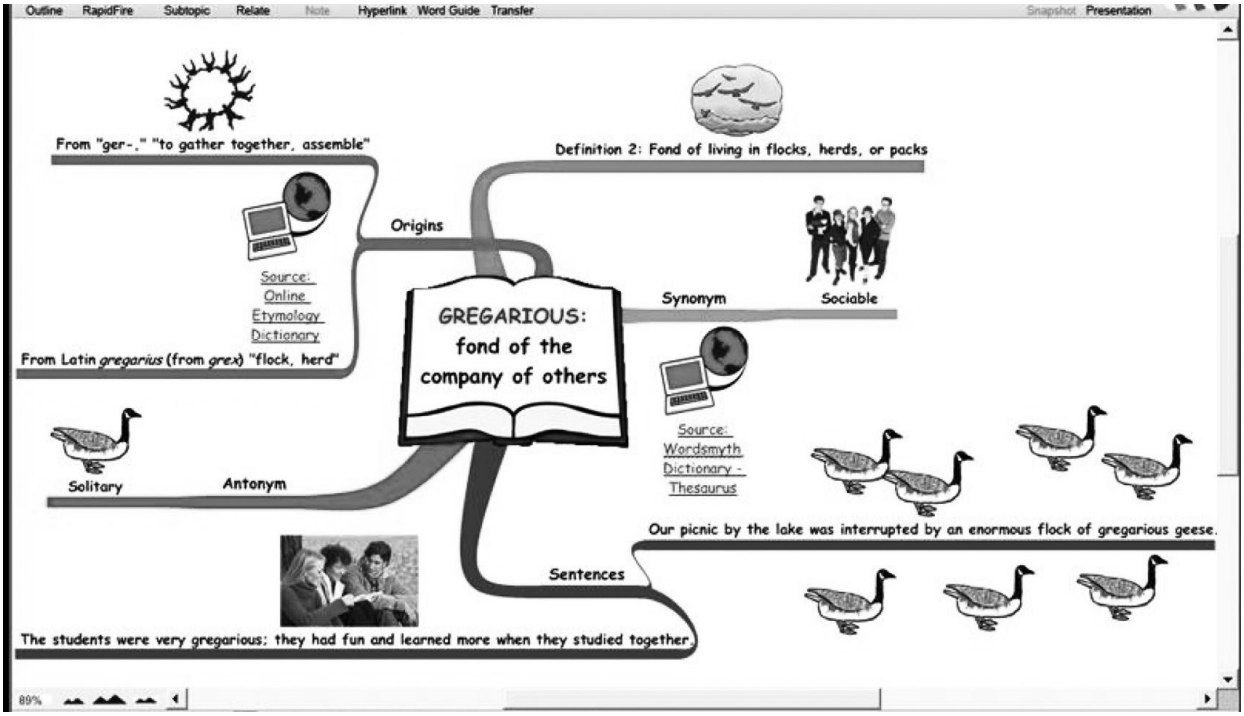
To process and understand concepts and information.
To make students interested in the use of technology and mind maps.
To use pictorial or graphic representation to record and memorize information about a word.
To enable students to create mind maps.

Procedures:

1. Explain how to work with the Inspiration software from Inspiration software, Inc. It is possible to use videos and samples from the website in order to show procedures and features of this software.
2. Pass out the handout with the vocabulary word list they are going to study during that lesson (see Appendix I). Advise students to use it in order to study vocabulary. This vocabulary word list is to have a record of the words students need to mind map.
3. Explain to students that with Inspiration software, they can mind map a vocabulary word by adding text and symbols to represent words and ideas visually. Advise students to open the *vocabulary word* template and show them the different areas of the template.



4. Provide clear directions about the sentences. For example, require one vocabulary sentence to be quoted from a common class text and one to be the students' original creation to demonstrate that they know how to use the word in context.
5. Instruct students to open the *vocabulary mind map example* in this software so students have an idea of a finished diagram. Advise them to use symbols, which add visual meaning and make information easier to remember. Be sure that students know how to use the *symbol libraries* and the *hyperlink* tool for definitions.



6. Lead students while they complete their own mind maps or diagrams for vocabulary words.
7. Advise them to use the symbol libraries to replace the central image with a symbol that provides a visual cue for the vocabulary word. They can use the links provided on the mind map to research synonyms, antonyms and the origins of the word, and use notes and/or switch to outline view to add details.

Adaptations and Extensions:

8. Advise students to create mind maps of different words. Then, students can publish their work making brief presentations to the class about their words. To create a presentation including visual talking points and elements of their mind maps, students can use the integrated presentation manager in the Inspiration software Inc.
9. Instruct students to print out their mind maps for home study of the vocabulary words. Alternatively, flashcards could be prepared by printing just the words and central visual cues on one side of a piece of paper and the complete mind map on the other.
10. Advise teachers that this activity can be used in any content area that requires students learn new vocabulary.