UNIVERSIDAD COMPLUTENSE DE MADRID
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TESIS DOCTORAL

Activación del conocimiento metafórico para la comprensión de lectura especializada a nivel universitario

Raising metaphorical awareness of specialised reading discourse in university settings

MEMORIA PARA OPTAR AL GRADO DE DOCTOR

PRESENTADA POR

Silvia Inés Pereira Rojas

Directoras

Emma Dafouz Milne
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Madrid, 2018

UNIVERSIDAD COMPLUTENSE DE MADRID

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Doctoral Thesis

Raising metaphorical awareness of specialised reading discourse in university settings

Submited by

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Madrid, 2017

To the memory of my beloved parents Aurita and Miguel

RESUMEN

En los últimos años, los estudios inspirados en la aplicación de la lingüística cognitiva (LC) han centrado su atención en la pedagogía de segundas lenguas (L2) y lenguas extranjera (LE) (MacArthur, 2016). Las investigaciones sugieren que los estudiantes de una L2 o LE pueden beneficiarse de actividades que activen su conocimiento metafórico (Boers 2000a, 2004; Kövecses, 2010; Low 2008). Estas actividades permiten el debate ideas y conceptos abstractos, y ayudan a reconocer y a recordar expresiones figuradas en la lengua meta (Boers, 2000b). En este sentido, diversos estudios sustentan la importancia de fomentar la competencia metafórica en el aula de enseñanza de una LE desde las etapas más tempranas hasta las más avanzadas en el proceso de aprendizaje (Boers y Lindstromberg, 2006; Lazar, 1996; Littlemore, 2001a, 2001b, 2012; Littlemore y Low, 2006b; Low, 1988; MacArthur, 2010).

En el ámbito de la enseñanza del inglés para propósitos específicos (IPE), el dominio de la comprensión de lectura se ha convertido en un elemento fundamental en el mundo educativo (Hirvela, 2013) y muchas universidades e institutos de educación superior alrededor del mundo ponen énfasis en el componente de la comprensión lectora. Empero, la lectura especializada por lo general hace uso de expresiones metafóricas que en ocasiones podrían ser difíciles de entender por el aprendiz de una lengua extranjera (Littlemore, 2001b; Littlemore et al., 2010). El uso frecuente del lenguaje metafórico en el discurso especializado pone en duda la posibilidad de que los estudiantes sean capaces de identificar y comprender de una manera incidental este tipo de expresiones. Lo anterior podría generar una variedad de dificultades de comprensión de las

que los estudiantes no están siempre conscientes (Littlemore y Juchem Grundman, 2010). Por tal motivo, la comprensión del lenguaje figurado podría presentar un reto para el estudiante (MacArthur, 2016) ya que en ocasiones podría ser un obstáculo y no un facilitador del proceso comprensión lectora (Boers y Lindstromberg, 2006); por lo tanto, se hace necesario llevar a cabo más investigaciones y recoger evidencias empíricas al respecto.

El objetivo del presente estudio fue elucidar sobre las necesidades de los estudiantes en lo que respecta a la influencia del lenguaje metafórico en la comprensión de lectura especializada. Desde un punto de vista de la IPE, nos interesaba conocer el papel que juega el conocimiento metafórico en la comprensión de la lectura con el objeto de sustentar la hipótesis de que la activación del conocimiento del lenguaje metafórico mejora la comprensión lectora. En el estudio participó un grupo de estudiantes universitarios hispanohablantes a nivel de licenciatura, ingeniería y ciencias básicas, inscritos en un programa de lectura en inglés para ciencia y tecnología (ICT) en una universidad venezolana. También participó a un grupo de profesores de lengua extranjera, expertos en el área de la pedagogía lingüística, que están familiarizados con el programa de lectura en ICT.

La investigación adoptó un enfoque mixto, utilizando cuestionarios y tareas de lectura como herramientas de recolección de datos. La información recolectada de los cuestionarios demostró que tanto los estudiantes universitarios y como los profesores parecen estar de acuerdo con los beneficios que conlleva la activación del conocimiento metafórico para mejorar la comprensión lectora. Por su parte, los resultados obtenidos de las tareas de lectura indican que los estudiantes presentan dificultades al momento de afrontar

de forma crítica el lenguaje figurado en el discurso especializado. Estos resultados favorecen el hecho de que en algunos casos, no es siempre fácil para los estudiantes de inglés como lengua extranjera a nivel universitario hacer frente a las connotaciones metafóricas (Littlemore, 2001b; Littlemore et al, 2010), ya que el lenguaje metafórico puede generar dificultades de comprensión. En tal sentido, todo parece indicar que los estudiantes podrían necesitar algún tipo de instrucción específica y preparación previa que facilite su comprensión lectora.

Como consecuencia, se diseñó una unidad didáctica hecha a la medida (*tailor-made*) de los estudiantes. La metodología de enseñanza incluyó actividades variadas que ayudaron a los alumnos a reconocer e interpretar el significado del lenguaje figurado, a activar el conocimiento metafórico y la metacognición, y a mejorar la comprensión lectora en ICT. Los resultados de este estudio constituyen una contribución invaluable al campo de la lingüística cognitiva aplicada ya que presentan datos de primera mano relativos a la naturaleza de los problemas que los lectores de una LE pueden experimentar cuando se enfrentan al lenguaje metafórico en la comprensión de lectura especializada en un contexto determinado.

Este estudio se llevó a cabo con la intención de hacer un aporte a la investigación de la metáfora en la lingüística cognitiva aplicada, específicamente a la pujante área en el campo de la instrucción en L2 y LE (MacArthur, 2016). Con nuestro aporte, esperamos favorecer los métodos de enseñanza y los diseños curriculares que existen en esta importante área de la pedagogía lingüística. En particular, el estudio es un intento para contribuir con el desarrollo de materiales didácticos específicos del área de LC (Piquer-Píriz y Alejo, 2016) que se nutren con la ayuda de la lingüística aplicada (Boers, 2011).

Se recomienda que el concepto de lenguaje metafórico sea incluido en los programas de instrucción en IPE. Es pertinente el llevar a cabo investigaciones adicionales relacionadas con estos asuntos, centradas en estudios de mayor escala que incluyan diferentes métodos y técnicas de enseñanza en conjunto con el desarrollo de materiales didácticos innovadores. Las prácticas podrían enfocarse en áreas relacionadas con el estudio de los géneros discursivos especializados y en la activación de la competencia estratégica mediante el diseño e implementación de programas de instrucción coherente basados en las necesidades específicas estudiantiles.

También se recomienda prestar más atención al adiestramiento docente facilitando la formación particular en base a las características lingüísticas, socioculturales y metodológicas relativas al desarrollo de la competencia metafórica. Las actividades de mejoramiento profesional son esenciales para la implementación exitosa de cualquier programa educativo, por tanto, los docentes en el área de IPE deben estar preparados para utilizar las herramientas sociolingüísticas necesarias para la enseñanza del lenguaje metafórico en el ámbito académico. Merecería la pena reflexionar y evaluar cómo todos estos aspectos relacionados con el desarrollo curricular y la planificación lingüística se conjugan en contextos pedagógicos a nivel universitario para los futuros procesos de toma de decisiones en favor de la educación a nivel global.

SUMMARY

In recent years, studies inspired in applied Cognitive Linguistic (CL) have focused their attention on applications to second (L2) and foreign language (FL) pedagogy (MacArthur, 2016). Several investigations suggest that L2 and FL learners can benefit from activities that raise their awareness of metaphor understanding (Boers 2000a, 2004; Kövecses, 2010; Low, 2008).These activities allow to deal with abstract ideas and concepts, and aid to recognize and remember figurative expressions in the target language (Boers, 2000b). In this vein, other studies underlie the importance of fostering metaphoric competence in the FL classroom from the earliest to the most advance stages of the learning process (Boers and Lindstromberg, 2006; Lazar, 1996; Littlemore, 2001a, 2001b, 2012; Littlemore and Low, 2006b; Low, 1988; MacArthur, 2010).

Within the realm of English for Specific Purposes (ESP), reading proficiency has become fundamental in the educational world (Hirvela, 2013) and many universities and institutes of higher education around the world place emphasis on the reading comprehension component. However, specialised reading generally uses metaphorical expressions that could be sometimes difficult to understand by the foreign language learner (Littlemore, 2001b; Littlemore et al, 2010). The high frequency of occurrence of metaphorical language in a specific discourse sheds doubt on the possibility that learners might be able to identify and comprehend it in an incidental way. This can generate a variety of comprehension difficulties “that the students are not always aware of” (Littlemore and Juchem-Grundman, 2010, p.189). For that reason, it appears that the role of figurative language as a facilitator rather as an obstacle in the reading

comprehension process (Boers and Lindstromberg, 2006) can be a challenge for the learner (MacArthur, 2016) and therefore, further investigation and empirical evidence is still needed.

The aim of the present study was to shed light on students' needs regarding the influence of metaphorical language in specialised reading comprehension. From an ESP viewpoint, we were interested in the role that metaphorical awareness plays in reading comprehension to support the hypothesis that the raising of metaphorical awareness enhances reading comprehension. The study involved native Spanish-speaking freshmen students at the undergraduate level, pursuing bachelor's degrees, engineering and science majors, who were enrolled in an English for Science and Technology (EST) reading program in a Venezuelan university. It also involved a group of foreign language professors, experts in the area of linguistics pedagogy that were familiar with the EST reading program.

The research adopted a mixed method approach, using questionnaires and reading assessment tasks as data collection tools .The information collected from the self-reported instruments show that both university students and teachers seemed to agree with the benefits of increasing metaphorical awareness to enhance reading comprehension. Moreover, the results from the performance of the students in the reading tasks indicate difficulties when they have to deal critically with figurative language in specialised discourse. These findings support the fact that in some cases it is not always easy for EFL university students to deal with metaphorical connotations (Littlemore, 2001b; Littlemore et al, 2010), considering that metaphorical language can generate comprehension

difficulties. To that effect, it appears that students may need some kind of specific instruction and previous preparation that facilitates their reading comprehension.

As a result, a tailor-made didactic unit was designed. The teaching methodology included a variety of activities that helped students to recognise and interpret the meaning of figurative language and activate metacognition. The results indicate that the instruction students received fulfilled the objectives of the study in other words, to raise metaphorical awareness and to enhance reading comprehension in EST. The findings of this study constitute an invaluable contribution to the field of applied cognitive linguistics because they present original data related to the nature of the problems L2 readers experience when dealing with metaphorical language in specialised reading.

This study was undertaken in an attempt to contribute to metaphorical research in applied cognitive linguistics, specifically to the productive area in the field of L2 and FL instruction (MacArthur, 2016). With our input, we hope to favour the existing instructional methods and syllabus design in this important area of language pedagogy. Particularly, the study is an attempt to contribute to the development of CL-oriented specific materials (Piquer-Píriz and Alejo, 2016) that are nourished with the help of applied linguistics instruction (Boers, 2011).

It is recommended that the concept of metaphorical language be included in ESP instructional programmes. It is pertinent to conduct further research in this area based on larger-scale studies that include different teaching methods and techniques together with the development of innovative didactic materials. This could probably be achieved by looking more particularly at discourse-related

areas and strategic competence through the design and implementation of a sound curriculum based on students' specific needs.

It is also recommended to pay more attention to teacher training by providing them with the specific preparation in the linguistic, sociocultural and methodological features regarding metaphoric competence. Teacher professional development is essential for successful education at any particular level and ESP teachers should be prepared to use the specific sociolinguistic and generic tools of academic language settings. It would be worth to reflect and evaluate how all these aspects of curriculum development and language planning come together in any specific tertiary educational setting for future decision-making processes in favour of education on the global level.

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LIST OF ABBREVIATIONS AND ACRONYMS

AG	Agree
AW	Aware
CA	Category
CAW	Content awareness
CL	Cognitive Linguistics
CLIL	Content and language integrated learnig
CM	Conceptual Metaphor
CMT	Conceptual Metaphor Theory
CUAW	Content unawareness
CVM	Contemporary view of metaphor
DA	Did not answer
DAG	Disagree
DRAE	Diccionario de la lengua de la Real Academia Española
EFL	English as a Foreign Language
ELF	English as a Lingua Franca
ERC	English Reading Comprehension
ESP	English for Specific Purposes
EST	English for Science and Technology
ESTP	English for Science and Technology Program
FL	Foreign Language

FYEP	First year English program
HAW	Help awareness
HUAW	Help unawareness
ICT	Inglés científico y técnico
IPE	Inglés para propósitos específicos
L1	First language
L2	Second language
LC	Lingüística Cognitiva
LE	Lengua extranjera
LSP	Language for Specific Purposes
MA	Meta Aware
MAW	Metaphorical Awareness
MIP	Metaphor Identification procedure
MCUAW	Metacognitive unaware
MPAW	Metaphrase awareness
MRW	Metaphor related word
NNSs	Non-native speakers
NP	Noun phrase
NS	Nominal scale
OPM	Other position of metaphor
T	Type of comment

TVM	Traditional view of metaphor
UAW	Unaware
UCM	Universidad Complutense de Madrid
USB	Universidad Simón Bolívar

CHAPTER 1: INTRODUCTION

1.1 Basis of the study

In recent years, scholars in the discipline of applied Cognitive Linguistics (CL) have become increasingly interested in the role of metaphor in educational discourse (Cameron, 2003) and in the study of awareness in metaphor understanding (Stöver, 2011). Results from previous investigations, some of them devoted to vocabulary acquisition (Boers 2000a, 2004; Kalyuga and Kalyuga, 2008; Kövecses, 2010), show that second and foreign language learners can benefit substantially from activities that raise their metaphorical awareness. In this vein, numerous studies inspired in applied CL research have focused their attention on applications to second and foreign language pedagogy[1].

In addition, many other studies underlie the importance of fostering metaphoric competence in the foreign language classroom from the earliest to the most advance stages of learning (Boers and Lindstromberg, 2006; Lazar, 1996; Littlemore, 2001a, 2001b, 2012; Littlemore and Low, 2006b; Low, 1988; MacArthur, 2010). The instruction of such activities could help students to deal with abstract ideas and concepts in specialised discourse and aid them to recognise and remember figurative expressions in the language learning process (Boers, 2000b).

More specifically, within the realm of English for Specific Purposes (ESP), many universities and institutes of higher education around the world place emphasis on the reading comprehension component. Reading proficiency has become fundamental in the educational world (Hirvela, 2013), as reading skills and

[1] For an overview of metaphor research in second and foreign language learning, see MacArthur (2016).

abilities play an important role in academic learning (Carrell and Grabe, 2002; Grabe, 2009).

Reading comprehension is a complex strategic interactive process that combines lower-level as well as higher-levels information processing (Alderson, 2000; Hellekjær, 2008; Rumelhart, 1985). When the intention is to improve understanding, the reader, in order to decipher meaning, has to deal with ´micro-cognitive´ processes together with ´macro-associated´ processes to be able to self-monitor across the text by means of a set of strategies. However, to cultivate in-depth reading comprehension, teaching methods should include both, the use of traditional reading strategies such as skimming and scanning, as well as the development of metacognitive awareness and critical thinking skills that ideally, should be under the conscious control of the reader (Hirvela, 2013).

Specialised discourse in ESP in university settings commonly contains abundant figurative language that could be sometimes hard to understand by the foreign language learner (Littlemore, 2001b; Littlemore et al, 2010). This can generate a variety of comprehension difficulties “that the students are not always aware of” (Littlemore and Juchem-Grundman, 2010, p.189). The high frequency of occurrence of metaphoric expressions in a specific genre sheds doubt on the possibility that learners might identify and comprehend them in an incidental way. As a result, it appears that the role of figurative language as a facilitator rather as an obstacle in the reading comprehension process (Boers and Lindstromberg, 2006) is not completely understood and therefore, further investigation and empirical evidence is still needed.

In terms of reading comprehension, enhancing metaphoric awareness could be a beneficial pedagogical device. One possible way of growing learners' awareness is to draw their attention to the origin of figurative expressions in their specialised reading. Helping students identify and recognise "alternative metaphorical perspectives may foster a questioning attitude" (Boers, 2000b, p. 140), especially when these expressions are used as an argumentative discourse tool. When applied systematically, a strategy of enhanced metaphoric awareness may provide students with a new critical perspective on academic models and a new line of defence against argumentative discourse in general.

In this respect Stöver (2011) argues that while novel metaphors tend to rate high on awareness, conventional metaphors tend to go much more unnoticed. Steen (2008) likewise incorporates metaphor awareness into his three-fold model of metaphor in relation to language, thought and communication. In communication, the distinction between deliberate and non-deliberate uses of metaphor relate directly to metaphor awareness (in speaker and hearer alike). As a result, it seems that "learning to use conventional metaphors in the target language can pose a considerable challenge for the learner" (MacArthur, 2016, p. 414).

For the most part, before the development or evaluation of a particular teaching pedagogy it is advisable to carry out needs analysis (Dudley-Evans and St. John, 1998; Flowerdew, 2013; Hutchinson and Waters, 1987) to gain deeper insights into students' requirements and learning needs. In authentic language teaching settings intended to enhance comprehension, retention and sociocultural awareness it would be of interest to conduct controlled experiments to explore to what extent learners are able to identify and interpret metaphors in specialised genre.

The collection of this kind of information is essential when there is an understanding of the target situation needs in terms of language use and language learning (Hutchinson and Waters, 1987). These implications should be transformed into practical applications focused on the design and implementation of a coherent language curriculum to achieve teaching and learning specific goals (Grabe, 2009), and to provide descriptive data about what happens in the learning classroom. Indeed, the communicative event where individuals learn and use language (Tomasello, 2000) should be taken into account because the observation of language in use and acts of linguistic communication are of paramount importance for further improvement in second and foreign language teaching and learning (Littlemore and Juchem-Grundmann, 2010).

1.2 Purpose and significance of the study

Metaphorical language plays a significant role “in scientific knowledge formation and reasoning” (Pramling, 2008, p. 535) and many of the reading texts included in ESP courses rely on (but fail to explicitly address) the communicative power of metaphor. According to Lakoff and Johnson (1980) “our conventional ways of talking about arguments presuppose a metaphor we are hardly ever conscious of” (p. 5). Consequently, students' scarce knowledge of the existence of these metaphorical instances in ESP texts, many of them culturally based (Littlemore, 2003), might play against them.

In fact, one of the problems faced by metaphor researchers interested in pedagogical applications is that the concepts of metaphor and metaphorical competence are not explicitly reflected in any of the existing models that guide syllabus design in language teaching and assessment (MacArthur, 2016, Littlemore

and Low, 2006b). Likewise, “very few attempts have been made to develop CL-oriented specific materials” (Piquer-Píriz and Alejo, 2016, p. 4).

For that reason, the explicit teaching of figurative language as part of the learning objectives of any ESP reading comprehension program is highly recommended. As a result, activating students’ metaphorical awareness of ESP discourse is of relevance, particularly when it refers to the sub-technical terminology used by native speakers within a specific genre (Littlemore and Low, 2006 a; MacArthur, 2010).

In our particular case, attention should be paid to the role figurative language plays in the English for Science and Technology (EST) reading program in the Simon Bolivar University, in Caracas, Venezuela. In general, the program is intended to ensure both the development of metacognitive awareness in reading comprehension of technical and scientific texts in English as well as the development of a critical and reflective perspective when reading argumentative discourse.

The present dissertation aims to throw light on students’ needs regarding the way conceptual metaphors are used in classrooms, how students understand and interpret the metaphors they encounter in a particular reading discourse and how metaphors can contribute to reading comprehension in a specific educational context and situation (Cameron, 2003). More precisely, it is intended to explore to what extent students are aware of the presence of the metaphorical language within the specific genre they have to manage, and to what extent can they identify and interpret metaphorical discourse autonomously in this particular genre.

The main hypothesis of this study is that the raising of metaphorical awareness enhances reading comprehension. From this hypothesis, we derive the following research questions:

1. Are students aware of the presence of metaphorical language within the specific genre they have to manage[2]?
2. Are they are able to interpret metaphorical language in this particular genre?
3. Do language teachers perceive the role of metaphorical language in specialised reading in positive manners?
4. How do teachers interpret metaphorical language?
5. Do teachers deal with metaphorical instances in the language-learning classroom effectively?

The results obtained from this study intent to contribute to the growing interest in applied Cognitive Linguistics-inspired research regarding the problems figurative language can cause to foreign language learners[3]. In terms of pedagogical implications, we predict that the dissertation may contribute to foster understanding of the influence of metaphors in ESP reading comprehension; particularly, in university students when engaged in EST reading. These pedagogical implications need to be translated directly into practical classroom-based research (Gass and Mackey, 2007) and curriculum design. Concurrently, such research needs to be supported by language theories and provide effective insights into how metaphors can be taught effectively, to achieve learning goals and to "demonstrate successful outcomes in the classroom" (Grabe, 2009; p. 18).

[2] Students have to manage the genre of science and technology when reading in English for Specific Purposes (ESP).
[3] For a recent account of some practical applications of CL in foreign language pedagogy, see Piquer-Píriz and Alejo (2016).

1.3 Structure of the thesis

The thesis is structured into seven chapters. Chapter 1 introduces the study, presents its rationale, and spells out its purpose and significance.

Chapter 2 explores the main theoretical research that supports the objectives of the investigation. It surveys the study of metaphor over time, introduces the notion of Conceptual Metaphor Theory (CMT), and discusses some consequences of CMT concerning methods of interpretation and analysis. The chapter also examines the function of metaphor in different areas such as scientific discourse, EFL and ESP. As a final point, the chapter describes the process of reading comprehension in EFL and EST, and considers the influence of metaphor in foreign language (FL) reading.

Chapter 3 presents a research study that analyses the needs of the target group involved in an EST reading program at a Venezuelan institution of higher education, namely the Simon Bolivar University in Caracas. In doing so we adopt three different perspectives. First, it surveys students' awareness and opinion of metaphorical language in EST reading comprehension. Second, it investigates teachers' views on the teaching of metaphorical language in EST. Finally, it examines how students autonomously deal with metaphorical meaning in authentic language usage. The chapter describes the context of the study, the research methods, the sample and the research design in general. This includes a description of the data collection and analysis procedures.

Chapter 4 reports on the results obtained from the needs analysis study through the examination of the data in the three different stages: students' perception, teachers' perception, and students' performance. Initially, the results are

presented and discussed separately and finally a holistic interpretation of the findings is provided.

Chapter 5 presents a materials development for classroom-action research carried out with the purpose of raising students' awareness of metaphorical language in reading comprehension. The focus was on an action research pedagogical intervention by means of the development of teaching materials and the implementation of a didactic unit based on a teaching methodology that explicitly promotes metaphorical awareness. The emphasis was placed on the identification of metaphorical instances in EST reading as a metalinguistic and metacognitive activity through the setting of practical teaching and learning goals.

Chapter 6 reports on the results yielded from the descriptive data obtained from the classroom-action research. It also presents a discussion of the data analysis, a summary of the main findings and of the research objective reached.

Chapter 7 summarises the study aims and objectives. It presents the major findings and discusses them in terms of their pedagogical implication for FL education, metaphor studies and reading. It concludes with a number of recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter first explores the main theoretical research that precedes the objectives of the present investigation. It begins with a summary of the study of metaphor over time that shows how the interpretation of metaphor has changed throughout history. From this point, the notion of Conceptual Metaphor Theory (CMT) is introduced, followed by a brief discussion about some of the pitfalls of CMT regarding the methods available for the interpretation and analysis of metaphor in discourse.

Next, it discusses the function of metaphor across scientific discourse and its influence in the explanation of scientific issues. After that, it considers the role of metaphor not only in the learning of English as a Foreign Language (EFL), but also in the area of English for Specific Purposes (ESP) from a cognitive linguistic perspective. Finally, the chapter describes the process of reading comprehension in EFL, its role in the area of English for Science and Technology (EST), and examines the influence of metaphor in FL reading.

2.2 Metaphor over time

Along history, a variety of interpretations of metaphor has been proposed. In classical theories, metaphor is seen as a matter of language not thought (Lakoff and Johnson, 1980). In these traditional views, metaphor represents a novel phenomenon, or a stylistic figure of speech, used ornamentally in the language of poetry to trigger our imagination. In this respect, metaphor is distinguished as a poetic linguistic expression in which one or more concepts are used outside of its

normal conventional meaning to express a similar concept (Cameron, 2003; Lakoff, 1993).

The word metaphor comes from the Greek word *meta* which means ´change´ and *pherein* which means ´to carry´. Accordingly, metaphor involves the transfer of meaning from one object to another (Lazar, 2003). It is believed that the Greek philosopher Aristotle (384 – 332 BC) was one of the first thinkers to introduce the concept of metaphor in his studies of Poetics and Rhetoric. For centuries, Aristotelian ideas of metaphor simply involved renaming one term by another for rhetorical and decorative purposes (Gibbs, 1994; Ricoeur, 1977). Nonetheless, apparently, his view of metaphor was broader than that and his ideas have thus often been misinterpreted (Cameron, 2003; Mahon, 1999).

Aristotle did seem to perceive the cognitive function of metaphor (Cameron, 2003; Kittay, 1987) and to recognise the ubiquity of metaphor in everyday language, its sematic value in the creation of new ideas, and its cultural and pragmatic role. He also acknowledged the relation between metaphor and similes and emphasised the important function of metaphor in analogy. In addition, Aristotle recognised that in the context of political discourse, the cultural and background knowledge of the participants was essential to fully comprehend the meaning of a metaphor. What is more, he recognised the intentionality of the use of metaphors in the context of discourse. It is furthermore worthwhile to emphasise that Aristoteles is accredited as the academic founder in the study of metaphor and that many of his ideas are fundamental to the contemporary view of metaphor as a phenomenon of human thought processes and conceptualisation (Cameron, 2003).

Ever since, others ancient philosophers and rhetoricians such as Cicero, Quintilian, Tesauro, Vico, Rousseau and Nietzsche continued to focus on the study of metaphor as decorative language for poetic effects in different directions. Traditional theories of metaphor developed in three different directions: the substitution view, the comparison view, and the interactive view (Cameron, 2003).

First, for the substitution view, a metaphor involves the renaming of literal words with metaphoric words. A metaphoric expression is a substitute for a literal expression that has the same meaning for decorative purposes; for example, in the expression *Richard is a lion* the image of a lion is used to describe Richard as a courageous person. Second, for the comparison view, metaphorical expressions imply a comparison or a statement of similarity between two or more objects like in the sentences "Juliet is the sun" or "Juliet is like the sun" (Cameron, 2003, p. 16). For both, the comparison and the substitution views, a metaphor (or a simile[4]) is a surface ornamentation of language or matter of words for purposes of linguistic decoration.

Later, in 1936, I.A Richards proposed the interaction theory of metaphor claiming that a metaphor is more than a comparison and stating that "when we use a metaphor we have two thoughts of different things active together and supported by a single word or phrase whose meaning is a resultant of their interaction" (p. 93). The interaction theory, further developed by Black (1962), also acknowledges the cognitive nature involved in the interaction between two conceptual domains or semantic fields, one where the expression is used metaphorically, and one that is surrounded by the literal context. The interaction view of metaphor has been

[4] For a detailed distinction between the functions of metaphors and similes, cf. Cuenca, M. J. (2015). Beyond compare: Similes in interaction. *Review of Cognitive Linguistics, 13* (1), 140-166.

recognised by philosophers of language, science, and cognitive psychology such as Forceville (1994), Kittay (1987), and Searle (1979) through arguments and evidence collected in posterior descriptions of metaphor.

In summary, the conception of metaphor has experienced a variety of changes as time went by. From a traditional or classical point of view, a metaphor is an attribute of language to be used as a poetic ornament and rhetorical devise. However, contemporary views see metaphor not as a decorative linguistic artefact, but fundamentally as a matter of language and thought that is "pervasive in everyday life" (Lakoff and Johnson 1980, p.3).

The following section discusses this contemporary interpretation of metaphor from a cognitive linguistic point of view.

2.3 The Contemporary Theory of Metaphor

As argued above, the idea of metaphor has experienced significant changes over the centuries. Classical views conceive metaphor as a linguistic phenomenon in the realm of poetic and figurative language, which implies a comparison between a metaphorical and a literal expression based on analogy or similarity. Conversely, the contemporary view believes that metaphor is not only a figure of language, but also works as a cognitive tool in human mind and thought (Cameron, 2003; Lakoff, 1993; Lakoff and Johnson, 1980; 2003; Low, 1988).

In their seminal work *Metaphors We Live By*, Lakoff and Johnson (1980) introduced the notion of Conceptual Metaphor Theory (CMT) arguing that: "Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature. The way we think, what we experience and

what we do is very much a matter of metaphor" (p. 3), "the essence of metaphor is in understanding and experiencing one kind of thing in terms of another" (p.5) through mental operations or mapping of domains.

The two main claims propose by Lakoff and Johnson (1980) are thus that: a) metaphor is ubiquitous in everyday language and b) metaphors consist of ontological mappings between different but similar domains. The pervasive of metaphor not only happens in the form of "novel" or "live" mappings, but also through frequent usage of "conventional" or "dead" metaphors. The primary locus of such mappings being the mind, not language, therefore the label CMT. Conceptual Metaphor Theory suggests that once a given mapping has become entrenched in the mind, not one, but numerous instantiations of linguistic expressions may become generated stemming from the same combination of a source and a target.

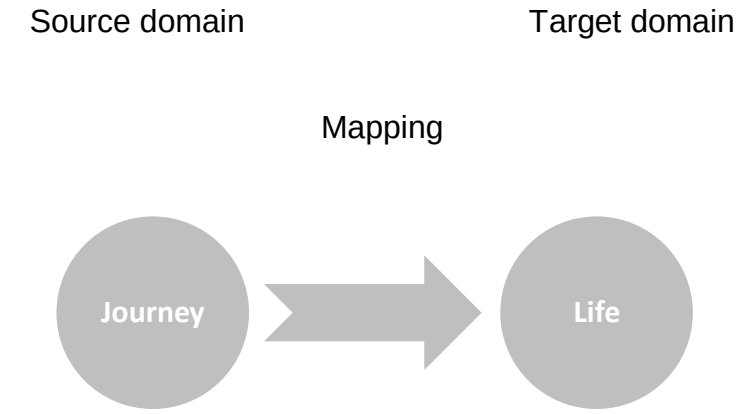
This Cognitive Linguistic (CL) approach has revolutionised the study of metaphors (Steen, 2009), since it understands metaphor not only as a linguistic feature or rhetorical devise which is "the property of poets" (Cameron, 2003, p. 1), but also as a cognitive "phenomenon of human thought processes" (p. 2) that is part of language use and conceptualisation (Gibbs, 1994). Conceptual metaphors represent ways of thinking in which people typically interpret abstract concepts such as time, emotions, and feelings in terms of more easily understood and perceived concrete entities, such as places, substances and containers (Lakoff, 2006).

As stated above, conceptual metaphors are "systematic sets of correspondences, or ´mappings´, across conceptual domains, whereby a target domain (e.g. our knowledge about arguments) is partly structured in terms of a different source domain (e.g. our knowledge about war)" (Semino, 2008, p. 5).

Accordingly, metaphors concern our ability to see one thing in terms of another; they are used to understand new phenomena based on our previous knowledge by describing abstract concepts based on more concrete, tangible events. Metaphoric thinking could be seen as “an online dynamic cognitive process” (Littlemore and Juchem-Grundmann, 2010, p.4), which characterises languages in terms of historic or cultural factors. Since metaphor plays a central role in human linguistic and non-linguistic behaviour, an understanding of the way metaphor is used could help us in the understanding of how people think, act and communicate.

According to Kövecses (2010), a conceptual metaphor is perceived as any coherent organisation of experience in which “CONCEPTUAL DOMAIN A IS CONCEPTUAL DOMAIN B” (p. 4), it implies the construction of one abstract idea (i.e., LIFE) in terms of another more concrete idea (i.e., JOURNEY). Typically, an abstract concept is conceptualised for purposes of understanding through a more familiar, often more specific conceptual domain. The more concrete conceptual domain is the source domain whereas the relatively abstract conceptual domain is the target domain. For example, in the cross-domain mapping LIFE IS A JOURNEY, the target domain is LIFE and the source domain is JOURNEY. In this view, a metaphorical expression implies a systematic mechanism of analogy in which a concept that belongs to a certain conceptual domain is understood in terms of another. It works as a set of systematic conceptual correspondences between source and target domains. In these cross-domain ontological mappings, specific features of one semantic field are conceptualised in terms of another different one in order to transfer meaning (see Figure 1).

Figure 1. Metaphors, conceptual domains and mapping



Such conceptual mappings draw on previous experience and world knowledge (the so-called epistemic correspondences) and on features from physical, bodily and cultural source domains that are transferred onto abstract target domains (Gibbs, 1994; Kövecses, 2010; Lakoff, 1993; Lakoff and Johnson, 1980, Roldán and Molina, 2013). The examples below, taken from Kövecses (2010, p. 3), illustrate a number of expressions that show how native speakers of English refer to the notion of life as a journey based on experience and knowledge of both source and target domains (the similarity thus lies in the scenarios):

He's without direction in life

I'm at a crossroads in my life

She's gone through a lot in life

In addition, Lakoff and Johnson (1980) illustrate their viewpoint by presenting three categories of conceptual metaphors based on their cognitive function: structural, orientational, and ontological. Primary, structural metaphors allow us to understand the target domain through the structure of the source domain. The ARGUMENT IS WAR conceptual metaphor is an example of a structural metaphor

considering that in everyday life many of the aspects enclosed in an argument are literally conceive in terms of war. The source domain offers information about the target concept and even though there is not a physical battle, there is a verbal battle as in the following example:

I´ve never won an argument with him.

Additionally, orientational metaphors allow us to organise our conceptual system of thought through a set of target concepts. It involves special bodily oriented relationships such as *up-down*, *in-out*, *on-off*, and *front-back* based on physical and cultural experiences. Orientational metaphors organise “a whole system of concepts with respect to one another”, they “give a concept a spatial orientation” and “make large groups of metaphors coherent with each other” (Kövecses, 2010; p. 46). Upward orientation usually go together with positive beliefs, while downward orientation with negative ones as in the classical examples that follow:

MORE IS UP / LESS IS DOWN	HAPPY IS UP / SAD IS DOWN
Speak up, please	I´m felling up today
Keep your voice down, please	He´s really down these days

Furthermore, ontological metaphors allow us to understand our experiences in terms of physical objects or concrete entities and substances. They give ontological status to abstract concepts and allow us to identify diffuse aspects of our human experiences. Ontological metaphors can serve many purposes such as referring, quantifying, identifying aspects and causes, setting goals and motivating action, etc. Table 1 shows some examples of ontological metaphors taken from Lakoff and Johnson (2003, p. 26-27) based on their specific purpose.

Table 1. Ontological metaphors and purpose

Ontological metaphor	Purpose
My fear of insects is driving my wife crazy	Referring
It will take a lot of patient to finish this book	Quantifying
His emotional health has deteriorated recently	Identifying aspects
The pressure of his responsibilities caused his breakdown	Identifying causes
I´m changing my way of life so that I can find true happiness	Setting goals and motivating actions

Another form of ontological metaphor is personification where nonhuman objects are given qualities of human beings, in line with the anthropomorphic viewpoint of human conceptualisers. According to Kövecses (2010): “In personifying nonhumans as humans, we can begin to understand them a little better" (p. 38). “Personification makes use of one of the best source domains we have – ourselves” (p. 39). The following are some examples of personification taken from Lakoff and Johnson (2003, p. 33):

His theory explained to me the behavior of chickens raised in factories

Life has cheated me

Inflation is eating up our profits

The Michelson-Morley experiment gave birth to a new physical theory

It is important to notice that in the Afterword of *Metaphors We Live By*, Lakoff and Johnson (2003) recognised that separating metaphors into three different types

of cognitive functions –structural, orientation and ontological –was unreal. In their opinion: “All metaphors are structural (they map structures to structures); all are ontological (they create target domain entities); and many are orientational (they map orientational image schemas)” (p. 264).

2.3.1 Analysis of metaphor in discourse: Critical overview

The notion of Conceptual Metaphor Theory introduced by Lakoff and Johnson (1980) has demonstrated to be an important aspect “of human experience in many different ways” (Steen et al, 2010, p. 1), and “has provided the basis for describing everyday cognitive structures using linguistic models” (Schmitt, 2005, p. 358).

Since the publication of Cameron and Low (1999), the need of a sound methodology “for carrying out qualitative research” (Schmitt, 2005, p. 358) for the analysis of metaphorical instances in discourse context and use have been recognised, and some proposals have been presented.

The notion of conceptual metaphor has inspired the growth of different processes to operationalise “metaphor-based discourse analysis” (Kimmel, 2012, p. 3). It has motivated the creation of various qualitative research approaches to the analysis of metaphor in areas such as psycholinguistics, cognitive linguistics and other social sciences (Cameron, 2003; Cameron and Low, 1999; Pragglejaz Group, 2007; Schmitt, 2005; Steen, 2007; Steen et al, 2010).

Nevertheless, the early versions of the cognitive linguistic views of metaphor have been criticised (Kövecses, 2010) and the identification processes of metaphor in linguistic discourse and usage have been filled with difficulties (Steen, 2007) due

to a lack of empirical evidence that supports the way conceptual metaphors are used in real life (Steen, 2009; Zanotto et al, 2008).

Metaphors are both product and creators of discourse; therefore, the study of metaphor should be contextualised (Gibbs and Lonergan, 2009). The context of discourse both creates and limits what is done with language, it helps to decide whether an utterance should be interpreted as a metaphor. Based on the situational context, the linguistic context, the textual context, and the socio-cultural context, the study of metaphor in discourse requires the development of specific identification procedures and analytic methods to operationalise the data (Cameron, 1996; Cameron and Low, 1999). “What is ´found´ in the data depends on the researcher´s decisions about what is categorized as ´metaphor´” (Cameron, 2003, p. 58).

One of the most remarkable projects that has been proposed for the identification of metaphor in discourse is the manual Metaphor Identification Procedure (MIP) developed by the Pragglejaz Group (2007). MIP has been built “on the assumption that metaphor in discourse can be identified by looking for indirectly used words which then have to be interpreted by comparison to a more basic sense” (Steen et al, 2010, p. 15). The MIP manual method is valuable as it takes into account the context of discourse in a comprehensive way and focuses on the identification of metaphor in discourse throughout the following process:

1. Read the entire text or discourse to establish the general understanding of the meaning
2. Determine the lexical units in the discourse
3. Determine the contextual meaning of each word
4. Determine the basic meaning of the word

5. Decide whether the basic meaning of the word is sufficiently distinct from the contextual meaning
6. Decide whether the contextual meaning of the word contrasts with the basic meaning but can be understood in comparison with it
7. If yes, mark the lexical unit as metaphorical

Nonetheless, in spite of many advances and debates, some of these methodological processes have been also criticised due to limitations concerning "comprehensive procedural standards for qualitative metaphor research" (Kimmel, 2012, p. 4). The causes of these pitfalls may involve the lack of accurate measurement procedures, reliability, and validity such as the sampling method, the elicitation process, the generation and codification procedures, the classification and grouping of metaphorical instances, and the measurement of data, among others.

Kimmel (2012) argues that to reach the standard of the best qualitative research, metaphor scholars need to follow a systematic approach in which the procedures and the data generation processes are transparently clear and supported by a solid theoretical background. Kimmel also suggests that the analysis of metaphor in discourse should follow some general steps that include:

1. The delimitation of the target domain of interest
2. The identification of metaphor units
3. The grouping of metaphors into coherent sets
4. The analysis of discourse functions
5. The counting of metaphor incidence (quantitative overview)
6. The reconstruction of textual metaphor cohesion

For Kimmel, all empirical research should at least involve the first three steps and, depending on the research purpose, the optional steps 4, 5, and 6 may be followed. Moreover, although the author recognises the value of manual qualitative procedures of metaphor identification, he makes us aware of the existence of qualitative annotation software to facilitate the study of metaphor in discourse. Above all, the author recommends ATLAS.ti. as an instrument to both, systematise the process of analysis and enhance "the interpretative skills of the scholars" (p.38).

In sum, soundly and reliable methods of metaphor identification can legitimate and enhance any resulting analysis whether empirical or interpretative. Even though the availability of corpus sophisticated software with the annotation tools needed for applying a qualitative approach for the analysis of metaphor in discourse, depending on the goal of the research manual coding still provides a valuable and reliable approach of analysis.

2.4 Metaphor in scientific discourse

The scientific community has its own linguistic register and cultural basis that concern approaches and genres in different disciplines and sub-disciplines (Halliday, 2004). The language of science is constantly exploring for new discoveries and giving these discoveries new names as they arise. To this effect, metaphor is one of the main linguistic resources employ by scientists to reflect on scientific phenomena and to communicate and describe them (Fahnestock, 1999).

Metaphor has been central to scientific thought and practice (Koteyco and Atanasova, 2016) and scientific discourse is a particular rich source of figurative language. According to Ungerer and Schmid (1996), metaphors are ubiquitous in science and many of them have an explanatory function. Metaphors in science have

been used for a long time to build theories and to construct meaning in order to explain scientific and technical concepts (Boyd, 1993, Koteyco and Atanasova, 2016, Rovisco and Cuadrado, 2013). Metaphors are often used to introduce vocabulary and basic models into scientific areas, to describe an innovation, to interpret existing theories, and to explain consequences and new phenomena (Hoffman, 1985).

In a theory-constitutive sense, the purpose of metaphorical expressions is to function as “lexical gap filling” (Goatly, 1997, p. 149) “to introduce theoretical terminology where none previously existed” (Boyd, 1993, p. 482). Those metaphors that scientists have used to construct their theories, are the same as those they use to try to explain theories and scientific concepts to none specialists. Therefore, metaphors in science are used to describe complex concepts among experts’ scientists, and to facilitate the dissemination of scientific knowledge among nonprofessional people (Koteyco and Atanasova, 2016). Examples of scientific writing for the public in general include institutional writings such as specialist articles, scientific abstracts and textbooks, and popular science articles in print and online media.

The prevalence of metaphors in scientific texts has been wide-ranging studied in different “specialised knowledge domains from biomedicine to mining” (Tercedor et al, 2012, p. 65). For example, in specialised genre, a very common cognitive phenomenon is a word formation morphological process called metaphorical blending. In this process, a word is produced by combining parts of other words to create a new word such as in the word **smog** from the combination of smoke and fog, the word **sonar** for sound navigation and raging, or the term **quasar** for quasi-stellar and star.

Likewise, the purpose of a metaphoric term such as **wormhole** is to function as an alternative terminology to refer to a particular phenomenon, given that scientist also have a non-metaphorical way to refer to the same phenomenon. We can also recall examples in the planetary system such as the solar system metaphor of the atom, or the wave and particle metaphors when referring to the theories of light in physics. Yet, we can see plenty of examples in which metaphorical expressions are used to define scientific phenomena such as the Big bang theory, the greenhouse effect, a black hole, artificial intelligence, or the genetic code (Semino, 2008).

In the same vein, the role of metaphor in Darwin's theory of evolution has been considered (Pramling, 2008; Reeves, 2005), and in the area of genetics, we can see the use of metaphorical expressions such as **code-script** to explain the DNA phenomena studied by geneticists (Keller, 1995; Semino, 2008). Apart from that, in the language of climate change communication, environmental sciences and ecosystems, the use of metaphors is abundant (Nerlich et al, 2010, Nerlich and Jaspal, 2012, Tercedor et al, 2012). Similarly, in the science of biology, metaphors play a significant role in explaining marine biological conceptions of the natural world (Ureña and Tercedor, 2011).

Colburn and Shute (2008) also argue that in computer science metaphorical language offers "a conceptual framework in which to situate constantly emerging new ontologies in computational environments" (p. 526). In fact, the metaphorical relationship between the BRAIN domain and the COMPUTER domain has been the source of inspiration for the development of the computer as a device for processing information. For example, in the area of information technology, it is very common to find metaphorically inspired terms such as software, desktop, e-mail, internet,

superhighway, worldwide web, websites, etc. What is more, metaphors in computers science have an explanatory function in a variety of categories such as OFFICE when referring to computer folders, animals such as computer mouse; and illness such as computer virus, among others.

In his classical paper, Boyd (1993) argues that metaphor in science not only plays a theory-constitutive role in the development and formulation of theories, but also a pedagogical role in the teaching and explanation of those theories. In fact, the pedagogical role of metaphors as an educational tool when teaching, explaining or formulating theories has been recognised (Cameron, 2003; Reeves, 2005, Semino, 2008) and many educational materials have been adapted and developed based on original scientific articles (Semino, 2011).

To this point it could be said that the non-literal use of metaphor in science play a specific utilitarian purpose which enable non expert people to get familiar and enhance their understanding of how a devise functions or how a theory works. Both, the pedagogical function as well as the theory-constitutive function of metaphor in scientific discourse "can co-exist with other functions such as argumentation, persuasion, vividness, humour and so on" (Semino, 2008, p. 134). In short, metaphors have a fundamental function in the development of models and theories, and facilitates scientist clarify and communicate complex ideas and arguments "to non-scientists and science students" (Reeves, 2005, p.23).

Reeves (2005) summarises the role of metaphor in science as follows:

> Just like the rest of us, scientists cannot escape metaphor. Either they employ metaphors intentionally, to explain and illustrate natural phenomena or they use them unconsciously

> because some metaphors are so firmly entrenched that they go unnoticed. Whether they are used consciously or unconsciously, metaphors affect all of us by subtly shaping and limiting our view of the world (p. 36).

2.5 Metaphor in foreign language learning

Recent developments in applied cognitive linguistics have emphasised the importance of fostering metaphoric competence in the foreign language classroom (Boers, 2000 a, b; Littlemore and Low, 2006 a, b; MacArthur, 2010, 2016). Metaphoric competence is the ability to understand and use metaphors. It is the ability of a learner "to perceive and create metaphoric relationships between different concepts" (Littlemore, 2008, p. 201). The ability to use and understand metaphor has an important role to play in every area of communicative competence: grammatical competence, textual competence, sociolinguistic competence, and strategic competence. In consequence, the development of metaphoric competence from the earliest to the most advanced stages of learning is relevant.

Since the late 1990s and from the time of the publication of Low´s (1998) article *On Teaching Metaphor*, many applied linguistics have been interested in exploring the pedagogical implications of Cognitive Linguistics (CL) in second (L2) and foreign language (FL) teaching (Kövecses, 2010; Pütz, 2007). In fact, the application of Cognitive Linguistics pedagogy into classroom activities has been nourished with the help of applied linguistics instruction in areas such as research methodology, pedagogical implementation, and curricular integration (Boers, 2011).

The central role of metaphor in foreign language has been acknowledged and a large body of work has been investigated and documented (Boers, 2000a; Boers, 2000b; Hoang, 2014; Lazar, 1996; Littlemore, 2000; 2001; 2004; 2008; 2009;

Littlemore et al, 2010; Littlemore and Juchem-Grundmann, 2010; Littlemore and Low, 2006 a, b; Low, 1998; MacArthur, 2010; Piquer-Píriz, 2008). Many of these studies have shown that FL leaners of English need to engage with metaphor and that they can take advantage of activities that foster their metaphorical awareness.

Metaphorical awareness is the ability to recognise the linguistic foundation of metaphorical expressions such as ubiquity, cross-cultural differences and cross-linguistic varieties (Boers, 2004). Developing awareness of metaphor in EFL can raise students´ understanding of the meaning of words and phrases that are used figuratively in specific contexts. Furthermore, raising students' metaphorical awareness may accelerate vocabulary acquisition in foreign language instruction. For example, awareness-raising activities such as presenting vocabulary in metaphorical chunks together with the activation of students prior knowledge can facilitate vocabulary learning and retention (Boers, 2000 a).

For that reason, considering that incidental vocabulary learning through independent reading is a slow process, students have to engage in a deeper level of processing to improve vocabulary learning which include the elaboration "of mental operations that a learner may perform in connection with a lexical item and that involve more cognitive effort" (Kövecses, 2010, p. 239). These metacognitive operations may encompass the use of metaphoric extension strategies such as associative thinking, analogical reasoning and image formation (Littlemore, 2008). Another important aspect of the role of metaphor in FL learning is the raising of encyclopaedic knowledge (Littlemore, 2009).The teaching of encyclopaedic knowledge includes an open debate of the connotation of words making students aware of cultural references of vocabulary learning since it is associated to deeper L2 vocabulary understanding.

Discussing and comparing metaphors using the first and target language may also improve learners' metaphor comprehension (Kalyuga and Kalyuga, 2008). Moreover, pedagogical activities based on a cognitive linguistic methodology, may facilitate and motivate the teaching and learning of polysemy and idioms (Boers and Stengers, 2008; Kövecses and Szabó, 1996) or idiomatic expressions used by native speakers and may help to develop learners metaphoric competence (Littlemore and Low, 2006 a; Littlemore, 2008) in EFL. As a result, it may be necessary to include the metacognitive instruction of the underlying conceptualisation of metaphorical items as a pedagogical tool (Hoang, 2014).

In spite of this, many of the figurative words or expressions that a foreign language learner have to deal with, constitute a *dead* or *conventional* metaphor that involves little metaphorical processing for a native speaker but a novel metaphor for a language learner (Littlemore, 2008). On the one hand, dead metaphors (Black, 1979) are conventional or idiomatic expressions commonly used in everyday language that at some point, the metaphorical essence or the distinction between what is literal or metaphorical is unnoticed for native speakers, like in the expression *falling in love*. On the other hand, novel metaphors are those ideas that are combined in new or unusual ways by native speakers in everyday language.

For that reason, a metaphor that is usually conventional for a native speaker may seem novel or very difficult to grasp by an L2 learner when he or she meets it for the first time. In addition, foreign language learners may find that there are many possible meanings of a conventional metaphor or an idiomatic expression; or they may not be able to find a meaning at all due to the lack of semantic knowledge, social influences, individual differences, or cross-culturally specific knowledge (Boers, 2003; Cameron and Low, 1999; Kövecses, 2005; Littlemore, 2001). In these

cases, the focus of attention should be on how to help foreign language learners to comprehend figurative language that is used by native speakers (MacArthur, 2010) and to engage them in metaphoric thinking by means of salient explicit instructions (Littlemore and Low, 2006 b). As Littlemore and Low (2006 a) indicate: “Foreign language learners probably need to understand metaphor more often than they need to produce it” (p. 46).

To that effect, the role of foreign language teachers is to show foreign language students that metaphor is not only a poetic form of language, but also the result of a cognitive process and linguistic product used in real communicative situations. According to Littlemore (2004), an inductive practice-based approach is the best way to introduce foreign language students in the instruction of metaphor awareness. The process encompasses simple direct questions that refer to the basic meaning of words, followed by answers that can guide students toward a deeper understanding to aid information processing. This approach should be integrated with other approaches in foreign language teaching so that better results can be achieved (Boers, 2000a).

The very nature of foreign language pedagogy states a slow-pace of progress of learning since certain language patterns need to be taught in a variety of manners and forms. In the case of metaphors, foreign language learners need time to understand the psychological processes involved in the comprehension of metaphor to internalise the meaning of metaphorical expressions (Littlemore, 2012).

According to Littlemore and Juchem-Grundmann (2010), the main concern of CL on the subject of language learning is that knowledge is acquired using language in “authentic communicative contexts” (p. 1). Bearing in mind that the

conceptualisation of metaphorical meaning “is an intrinsic feature of discourse” (Kövecses, 2010, p. 238), cognitive linguistics approaches to language teaching have to take into consideration the broad-spectrum of learning in general, as well as the socio-pedagogical context in which learning takes place.

As stated by Lazar (2003), metaphorical language can take a variety of forms. It is found in many different areas such as poems and fables, advertising and publicity, and in analogies to clarify an argument or to provide an explanation. In addition, there are words that have both literal and metaphorical meaning, and there are proverbs and expressions that are only understood metaphorically. For that reason, introducing metaphorical language activities to foreign language classroom can improve students´ awareness of the use of language and can make learning more meaningful and memorable. These activities can be an effective way to help them to increase their vocabulary knowledge, to distinguish both the literal and metaphorical meaning of words, to organise new vocabulary through ´metaphorical sets´, and to make students aware of the cultural terms that influence the way particular groups use metaphors.

Even though the role of metaphor as an important part of everyday language use has been widely recognised, attention to metaphor as an integral part of second and foreign language curriculum is not frequently found (MacArthur, 2016). Regarding further research, Hoang (2014) argues that, “despite its vigorous growth, research on metaphor and L2 education remains scarce” and “language teaching materials make little reference to metaphor” (p. 13). Even though, there are suggestions for classroom activities in many studies that have been carried out, many of these results are not display in a teacher-friendly way to be adopted.

Moreover, before the implementation of a metaphor-based teaching methodology, “teachers need awareness raising and hands-on workshops” (p.14).

Concerning pedagogical implications, some of the benefits that metaphoric awareness might bring to the learning language process is that it could facilitate comprehension of metaphoric expressions that in turn will contribute with the improvement of communicative competence in general. In the same way as in usage-based models of first language acquisition (Tomasello, 2000), foreign language learning involves the real communicative events in which people learn and use language. The central concern has to do with the observation of language in use and acts of linguistic communication. The development of some of this knowledge should be reinterpreted through the design of instructional programs, teaching materials and well-structured syllabus in terms of skills, goals and objectives (Low, 1988).

Subsequently, part of the role of school instruction is to introduce learners to the specialist discourse of different subject areas. This would be especially relevant to the learning of Language for Specific Purposes (LSP) in which the way technical expert groups use metaphor should be part of the teaching curriculum.

2.5.1 Metaphor in English for Specific Purposes

English for Specific Purposes (ESP) concerns the teaching and learning of English as a second or foreign language in a specialised area to favour the particular needs of the learners. ESP courses focus on the language skills and genres appropriate to the specific activities the learners need to perform in English (Belcher, 2009; Hyland, 2011). Good descriptions of how metaphor is used in the real-world contexts in which learners need to operate is beginning to form the foundation for supporting

the teaching and learning of metaphorical stance and figurative language in general as a strategic tool in professional discourse (Littlemore and Low, 2006 a).

The use of metaphor in ESP discourse is highly frequent and has inspired a large amount of research interest in areas such as economics[5] (Alejo, 2010; Boers, 2000a; Steward, 2014; Velasco, 2005), aeronautics (Robisco, 2011), architecture (Caballero, 2014), engineering (Roldán, 2013; Roldán and Mansilla, 2013; Roldán and Úbeda 2006, 2013), or geology (Cuadrado and Durán, 2013), among others. The majority of these studies acknowledge that metaphor is a central aspect in ESP teaching and that the explicit use of metaphor in ESP seems to enhance the communicative skills of learners (Caballero, 2014; Roldán and Úbeda, 2006; Úbeda, 2003, 2005; Velasco, 2005). Using metaphor in ESP teaching may also help to create and design teaching materials in order to encourage students to employ metaphoric extension strategies to accelerate their learning process (Robisco and Cuadrado, 2013).

Metaphorical language occurs in specific contexts to convey new conceptual meanings through written texts and existing concepts. Considering that discourse is language in use, the study of metaphor in ESP settings should take into account both the use of language and the specific educational context in which language is produced (Cameron 1996, 2003). In particular, ESP tertiary education researchers and teachers need to be aware of an array of cognitive, sociolinguistic, pragmatic, and sematic aspect of language use in academic and professional settings. This involves the understanding of how specialised knowledge is represented in different

[5] For an account on the historical evolution of metaphorical mappings in economic thought, cf. Mouton, N. (2012). Metaphor and economic thought: A historical perspective. In H. Herrera-Soler & M. White (Eds.), *Metaphor and mills, figurative language in business and economics* (pp. 49-76). Applications of Cognitive Linguistics 19. Berlin/New York: Mouton de Gruyter.

disciplines and contexts and becoming familiar with the strategies needed for organising texts that influence linguistic communication (Durán and Roldán, 2008).

Moreover, metaphors play an important role in focusing attention and fostering retention of linguistic expressions in the long-term memory (Rovisco and Cuadrado, 2013). However, in view of Faber (2012), “metaphor in specialised language has not received the same amount of attention as metaphor in general language” (p.7). In fact, metaphors are part of academic and professional discourse and sometimes “they create a range of comprehension problems that the students are not always aware of” (Littlemore et al, 2010, p. 189).

This kind of words require attention as they “can cause ambiguity” (Kennedy and Bolitho, 1984, p. 84) to the foreign language learner. It may be the case that a learner knows the more prototypical meaning of a word, but can get confused when the word is shown in a particular context with a different meaning (Roldán, 1999). Therefore, in an ESP classroom, “the explicit teaching of metaphor is essential” (Robisco and Cuadrado, 2013, p.218) and “should be included in specific learning programmes” (Velasco, 2005, p.117).

The language of specialists groups often makes use of metaphor to create technical discourse and to simplify ideas that generate a kind of sub-technical language that is used for long periods. Learning the technical language is part of becoming a member of the specialised discourse and learners need to become aware and understand the technical metaphors to become mature members of that discipline (Cameron, 2003). For example, some key aspects that characterise scientific discourse are the use of both, the passive voice and complex nominal forms (Faber, 2012).

The application of a cognitive approach is particularly useful to teach vocabulary in ESP. Although much of the specialised terminology found in ESP discourse consist of high-technical languages, a great deal of terms could be part of more general repertoire of everyday vocabulary or sub-technical words which meanings have been expanded taking into consideration the socio-cultural context in which the terms are used (Roldán, 1999).

Each language has a particular way of mapping depending on historical and cultural aspects as well as on the physical environments. The meaning of a word may varied depending on the company it keeps and on the linguistic and socio-cultural specific context where it appears. In other words, a same term can activate different image schemas and its understanding will depend on the specific domain where it is found at one particular situation.

From a pedagogical point of view, it would be advisable to concentrate on metaphor as a learning feature in ESP by considering three main dimensions: conceptual, linguistic and visual (Roldán and Úbeda, 2013). ESP courses should promote the teaching of metaphorical competence and need to be explicitly taught with the aid of images and action-based activities (Caballero, 2014).

In accordance to Roldán (1999), there are many didactic implications of highlighting the use of metaphors in technical terminology:

1. It could make easier the teaching of vocabulary. The metaphor mechanism provides a certain unity to the otherwise isolated terms, directly fostering their attention in long-term memory.

2. The study of sub-technical vocabulary can be better appreciate if structured in terms of meaning extensions or meaning chains through the study of metaphor and polysemy.

Other possibilities of using metaphor in ESP teaching include the use of specialised reading and texts translation (Velasco, 2005). An enhanced metaphorical awareness on the part of the learners could be beneficial to their understanding of specialised reading (Boers, 2000a) considering that learning to read is a metalinguistic process that involves an awareness of how language systems work to help to perform linguistic learning tasks (Nagy and Anderson, 1995; Nagy, 2007).

2.6 Reading in English as a Foreign Language

The final purpose of reading is to construct text meaning based on visually encoded information. Reading implicates the translation of print into language and then to the message that the author wants to communicate. As a result, the central task of learning to read it to make links between a language and its writing system (Koda, 2007).

From a pedagogical point of view, reading is contemplated as the most significant skill because textbooks and journals are written in English (Hirvela, 2013). With respect to the assessment of content comprehension in academic settings, reading is also considered as one of the most important learning tools (Coyle, Hood, and March, 2010).

Reading in a foreign language is a construct that requires the development of a number of linguistic subskills that includes the two languages. It is a dual-

language and cross-linguistic process that involves both, the first language (L1) and the second language (L2) of the reader. For this reason, reading in a foreign language could be more complex than L1 reading (Koda, 2007).

Cognitive theories of language learning conceive reading acquisition as a complex strategic process of internalising particular patterns of mappings involving the interaction of linguistic elements and graphic symbols. The interactive reading model establishes that every component in the reading process interacts with any other component in a holistic way (Rumelhart, 1985). Reading is conceived not only as a perceptual process, but also as a cognitive one in which the reader has to interact with the information presented in the text in order to construct meaning.

Consequently, reading comprehension combines lower-level (bottom–up) processing and higher-levels (top-down) information processing. Bottom-up processes, which tend to concentrate on specific details and basic structures, as well as top-down processes, based on the assumption of acquired background knowledge, work together simultaneously throughout the reading activity . The reader, in order to decipher meaning, has to deal with ´micro cognitive processes´ (declarative knowledge), together with ´macro associated processes´ (procedural knowledge) to develop automaticity or autonomous learning (Alderson, 2000; Anderson 1982; Grabe, 2009; Hellekjær, 2008).

The reading process includes the interaction and management of a number of components with a particular linguistic knowledge. First, in the decoding phase, the reader has to extract linguistic information directly from the print. In this stage, the reader has to deal with orthographic knowledge, phonological knowledge, vocabulary knowledge, and morphological knowledge. Then, in the text-information

building phase, the reader has to integrate the extracted information into phrases, sentences and paragraphs. In this stage, the reader has to deal with syntactic, discursive, and text-structure knowledge. Finally, in the reader-model building phase, the reader has to synthesise the decoding of text information with prior knowledge. It is the process of detecting, abstracting and internalising information based on experience (Koda, 2007).

In this sense, the final product of the reading process is influenced by the pragmatic features of the input and the amount of experience of the reader. This result can be facilitated by the activation of metalinguistic awareness (Nagy and Anderson, 1995; Nagy, 2007), a construct that will be discussed later in another section.

2.6.1 A genre approach in foreign language reading

The process and product of reading assessment from a metacognitive point of view can also be influenced by variables such as the readers´ background knowledge of the topic, their cultural knowledge and their linguistic knowledge of the target language. This linguistic knowledge is based on discourse-level knowledge which includes text type, content and genre (Alderson, 2000; Grabe, 2009). When learners are exposed to the content of any school subject, they are simultaneously learning the language of that particular discipline. As a result, learners' awareness of the nature of the genres they need to be able to manage should be developed in order to help them to deconstruct and construct this specialised knowledge.

One of the main objectives of a genre approach is to understand and to account for the realities of the world of texts (Swales, 1990). It can be considered as a multi-disciplinary activity which attracts the attention not only from applied

linguists, discourse analyst and communication experts, but also from sociologists, cognitive scientists, translators and advertisers. A genre approach may offer effective solutions to pedagogical problems as it can be used as an effective and suitable tool for the design of language teaching programmes, within simulated contexts of classroom activities (Bathia, 2002).

The teaching of academic subjects deals in large part with teaching the language of those subjects. For that reason, in a university academic context the emphasis should be placed on the acquisition of the knowledge of the specific specialised language that students are expected to use in professional settings (Dafouz and Nuñez, 2009). A genre approach framework, in which the analysis of specialised texts is seen as key to students' learning, highlights the social functions and forms of the use of language. It provides information, not only at the level of grammar and vocabulary, but also at the level of the key text types that students need to recognise and produce (Morton, 2009; Swales, 1990).

Genres shape the structure of the discourse and, in professional settings, it is important to take into account the relationship of the text under investigation to other related written and spoken texts (Bhatia, 1993, 2002). As a result, taking into account the discourse–level, the teaching of L2 or FL reading should take place in the context of a content-centred integrated skills curriculum, given that content offers motivation and integration supports learning (Grabe,1999). Therefore, applying a functional approach to language to assess the linguistic demands of the curriculum involves a change in the linguistic resources that the students need to manage, with an increase in generalisation, abstraction and the use of subject specific lexis (Morton, 2009). This process is the cornerstone for understanding the needs of academic educational settings since academic knowledge cannot be developed if

learners are not exposed to the pragmatic usage of the specialised language they have to deal with.

Different approaches to teaching define discourses along disciplinary subject areas that influence the modes of communication among disciplines, and the rhetorical characteristics of the genres students are supposed to learn. Exploring pedagogical practices in the context of task and materials development make analytical findings relevant to specific context of application and help to integrate those analytical findings with language learning procedures (Bhatia, 2002).

2.6.2 Metalinguistic awareness and foreign language reading

The facilitative role of awareness on foreign language behaviour and learning is not without debate (Leow, 2001; 2006). Awareness is a state of mind in which an individual goes through a particular cognitive experience or external stimulus (Tomlin and Villa, 1994). It is “the ability to identify, analyse, and manipulate language forms” (Koda, 2007, p. 2).

Metalinguistic awareness or knowledge involves “the ability to focus on linguistic form and to switch focus between form and meaning (Jessner, 2008, p. 275) through a set of skills that the learner develops with the use of metacognitive knowledge. Extensive research has shown the link between metalinguistic awareness at a metacognitive level and FL reading performance (Anderson, 2003; Alderson, 2000; Carrell, 1989; Carrell and Grabe, 2002; Grabe, 2009; Mokhtari and Reichard, 2002, 2004; Mokhtari and Sheorey, 2002; Sheorey and Mokhtari, 2001; Singhal, 2001; Zhang, 2001; Zhang and Wu, 2009). It deals with the readers’ consciousness of the strategic reading processes, the reading-strategy repertoires, and their real use of the strategies to take full advantage of the understanding of a

text. Therefore, metalinguistic awareness contributes with the development reading comprehension at a metacognitive level (Grabe, 2009).

The reader should use metalinguistic knowledge in order to easily relate textual information with previous knowledge, make inferences, and give meaning to textual information (Carrell and Grabe, 2002; Irwin, 1986; Griffith and Ruan, 2005). The process and product of reading assessment can also be influenced by variables such as the readers´ background knowledge of the topic, their cultural knowledge and their linguistic knowledge of the target language.

This linguistic knowledge is based on discourse-level knowledge that includes text type, content, and genre (Alderson, 2000; Grabe, 2009). Taking into account the discourse–level, the teaching of FL reading should take place in the context of a content-centred integrated skills curriculum, given that content offers motivation and integration supports learning (Grabe, 1999).

Consequently, to improve reading comprehension, it is important that reading instructions would facilitate the development of metalinguistic awareness (Mattingly, 1984; Jimenez and Ortiz, 2000). From a cognitive linguistic point of view, pedagogical activities must be designed based not only on students demands but also on cognitive processes that guarantee both deeper thinking processes and efficient learning of content (Perez-Vidal, 2009).

Applying a functional approach to language to assess the linguistic demands of the curriculum involves a change in the linguistic resources that the students need to manage, with an increase in generalisation, abstraction and the use of subject specific lexis (Morton, 2009). This process is the cornerstone for understanding the needs of academic educational settings since academic knowledge cannot be

developed if learners are not exposed to the pragmatic usage of the kind of specialised language they have to deal with in academic and professional sceneries.

2.6.3 Reading in English for science and technology

As we have already mentioned, reading in a foreign language is a complex cognitive process with a high degree of difficulty. Given that the majority of technical and scientific literature is published nowadays in English (Tardy, 2004), being able to read in this language has become essential in academic settings. (Ramírez, 2004).

English for science and technology (EST) was the source for the development of ESP reading instruction and research, and still continuous to influence recent pedagogical perspectives. For example, the seminal book *English for science and technology: A discourse approach* Trimble (1985), developed a discourse analysis approach to teach reading to non-native speakers of English focused on a rhetorical approach. This approach contemplates three central issues: 1) the nature of the EST paragraph; 2) the rhetorical techniques used in EST; and 3) the rhetorical functions found in EST texts.

For second language readers it is difficult to comprehend a L2 text if they lack linguistic, pragmatic and cultural knowledge (Clarke, 1978). Thus, the emphasis is on the use of authentic materials to link the reading comprehension process with the specific needs of the learner. In other words, in EST reading pedagogy, the text is seen as a vehicle of information to carry out situational activities based on the specific genre the student need to recognise and produce in a particular discourse community (Morton, 2009; Swales, 1990).

In this sense, with the use of genre in EST reading, students can be taught to recognise the schematic structure of texts in their specific disciplines. Likewise, activities that raise foreign learners´ awareness of the literal origins of figurative lexis could be beneficial for some aspect of reading comprehension (Boers and Lindstromberg, 2006).

2.6.4 Metaphorical awareness and foreign language reading

The impact that Cognitive Linguistics (CL) can bring to the area of reading comprehension is associated to the role of figurative language that is encounter in a text. Some studies such as those developed by Boers (2000b), Carter and McCarthy (1988), and Holme (2004) have shown that "metaphor can aid the development of reading skills" (Hoang, p.4). In fact, good descriptions of how metaphor is used in the real-world contexts in which learners need to operate is beginning to form the foundation for supporting the teaching and learning of metaphorical stance and figurative language in general as a strategic tool in professional discourse (Littlemore and Low, 2006 a).

According to Boers (2000a), enhancing metaphorical awareness of specialised register in academic and professional reading discourse seems to be a fundamental pedagogical tool in the learning process that helps reading comprehension. Raising learners' awareness of the motivated nature of language could help them to learn it more effectively in a cognitively and pragmatically way (Boers and Lindstromberg, 2006). A simple way of raising learners' metaphorical awareness for in-depth reading (instead of skimming and scanning activities) is by drawing their attention to the source domain or to the origin of unfamiliar figurative expressions they come across in their specialised reading. Another way to improve

in deep processing is to encourage them to analyse the connexion between language form and meaning. It has also been demonstrated that if teachers systematically draw the attention of language learners to the source domains of linguistic metaphors and of vocabulary involving metaphor, then the learners' depth of knowledge for that language, and their ability to retain it could improve significantly (Boers, 2000 a).

Activities that help learners to establish the relationship between metaphorical language and its concrete senses can improve vocabulary retention (Boers, 2000a, 2000b). This framework in turn may facilitate text comprehension in a critical way, fostering and encouraging the adoption of a questioning attitude. (Boers and Lindstromberg, 2006). It may provide students with a new critical perspective on academic models and argumentative discourse in general. Results look like to indicate that students who had received explicit instruction were much more likely than their peers to question the validity of the metaphors used by an author, to expose the impartial author stance and to recognise the author´s opinion (Boers, 2000 a; Littlemore, 2004).

As we have pointed out, metaphorical awareness is a cognitive ability that allows students to deal with abstract concepts and phenomena. When applied systematically, a strategy for enhancing metaphorical awareness may also offer an additional or alternative framework for the organisation of figurative lexis themes. Therefore, it is definitively of value to take into account the activation of metaphorical awareness when reading comprehension of specialised discourse, particularly when it refers to the sub-technical terminology used by native speakers within a specific genre (Littlemore and Low, 2006 a; MacArthur, 2010).

Specialised language often makes use of metaphors to create technical discourse, and part of the teaching role is to introduce students to that specialised language to explain technical and sub-technical ideas (Cameron, 2003). For example, polysemy and metaphor abound in technical and scientific discourse in English. A polysemy word shares a common core meaning that can be used in two or more different domains. The meaning of the polysemy word may vary depending on the different domains associated with the term such as the case of the term “resistance” that can be found in the medical, political, mechanical, and electrical domains.

Consequently, although the presence of an overarching metaphor can facilitate readers´ receptive recollection of words or phrases they come across in a given text, educational discourse in English contains abundant figurative language that is sometimes quite hard to understand by the foreign language learner. In this framework, figurative language could behave as a potential facilitator or by contrast an obstacle, in the reading comprehension process of academic and professional texts (Littlemore, 2004).

According to Nuttall (1996) when teaching reading skills metaphors and similar kinds of transferred meaning such as idioms, may cause significant problems “as they do not mean what a first glance they seem to mean” (p. 67). These difficulties can be faced not only in literature writings, but also in specialised areas such as zoology, botany and accounting.

For Cameron (2003), students need to learn to recognise when a metaphorical interpretation is not appropriate. For example, in the sentence: *The atmosphere is a blanket of gasses that surrounds the earth*, the interpretation of the

word blanket could be seen odd as a blanket belongs to a bed, no to space. In this case, the ´double semantic content´ (Kittay, 1987) seems to indicate the presence of a metaphor.

Subsequently, activities that raise learners´ awareness could be beneficial to the reading comprehension process because their attention is focused on the metaphoric nature of language (Boers, 2000a). Moreover, the presence of an overarching metaphor seems to facilitate readers´ receptive recollection of words or phrases they come across in a given text (Boers, 200b). In this vein, the structured of a number of references materials could be improved if some of these theoretical points are considered.

Therefore, when reading a text in a second or foreign language, the only prerequisite appears to be that the language learners need to be able to recognise the cognitive or conceptual metaphor (CM), and to do so they need to be aware of at least a couple of its linguistics instantiations in the text. With a conceptual metaphor, what is important is the abstract underlying relationship(s) between two concepts or entities (Lakoff, 2006). The context of discourse both creates and limits what is done with language. The context of metaphorical discourse is seen as a cognitive process of thinking and learning that “might offer metacognitive opportunities” (Cameron, 2003, p. 261) and can work as a facilitator for the development of critical reading skills (Alderson, 2000). As Littlemore and Juchem-Grundmann (2010) point out: “Metaphoric thinking can be viewed as an online dynamic cognitive process, which leaves its traces in language. Languages vary in terms of the metaphors that have become conventional” (page 4).

2.7 Summary

This chapter has reviewed some theoretical basis that describe how the conception of metaphor has evolved over time, from the traditional view that sees metaphor as a poetic rhetorical devise, to the contemporary view that sees metaphor as a matter of language and thought that is part of our everyday life and conceptualisation. It has also acknowledged the need for soundly and reliable methods for the analyses of metaphor in discourse from a cognitive linguistic point of view. Moreover, the important trait of metaphor in scientific thought and practice has been recognised, and the role of metaphor in EFL and ESP education has also been considered. At the same time, chapter has described the complex process of reading in EFL and EST, and has shown how metaphor influences reading comprehension to non-native speakers in educational contexts and different genre.

In the following chapter, we provide a description of the study that was carried out in order to survey students' awareness and performance of metaphorical language in EST reading comprehension and to explore teachers' views and practices related to the teaching of metaphorical language in EST reading comprehension. The chapter exposes the method and design of this research study.

CHAPTER 3: METHOD OF RESEARCH STUDY

3.1 Introduction

This chapter offers an account of some of the issues involved in an EST reading comprehension program in a Venezuelan university with respect to the use of metaphor in foreign language learning. On the one hand, it surveys students' awareness of metaphorical language in EST reading comprehension. On the other hand, it surveys teachers' opinions and attitudes towards the teaching of metaphorical language in EST reading comprehension. As a final point, it examines how students deal autonomously with metaphorical language in authentic language usage.

The aim is to carry out a diagnostic evaluation to gain deeper insights into students' difficulties and needs, to examine how metaphorical awareness could contribute to reading comprehension in specific educational contexts and situations, and to find out more about the way students interpret the metaphors used in classrooms (Cameron, 2003),

3.2 Research study

In this dissertation, we test the assumption that the raising of metaphorical awareness enhances reading comprehension. In this diagnostic stage, we have formulated the following five research questions to test our hypothesis:

1. Are university students aware of the presence of metaphorical language within the specific genre they have to manage?
2. Are they are able to interpret metaphorical language in this particular genre?

3. Do language teachers perceive the role of metaphorical language in specialised reading in positive manners?
4. How do teachers interpret metaphorical language?
5. Do teachers deal with metaphorical instances in the language-learning classroom effectively?

Indeed, the study surveys university students' awareness of the presence of metaphorical language within the specific EST register they have to manage as part of their learning objectives. One of our aims is to investigate to what extent they are able to interpret metaphors in this particular genre. Simultaneously, the study aims to survey language teachers' perceptions of the role metaphorical language plays in specialised reading discourse, their interpretation of metaphorical language, and the way they deal with metaphorical instances in the learning classroom.

In practical terms, the study took place during the third trimester of the English for Science and Technology (EST) reading program at University Simón Bolívar (USB), located in Caracas, Venezuela. The USB reading program expects to ensure both the development of metacognition in reading comprehension of technical and scientific texts in English, and the development of a critical and reflective perspective when reading argumentative discourse as stated in the syllabus.

As we saw in chapter 2, it is definitively of value to take into account the activation of metaphorical awareness when reading comprehension of specialised discourse, particularly when it refers to the sub-technical terminology used by native speakers within a specific genre (Littlemore and Low, 2006 a; MacArthur, 2010). Another important issue is that metaphor understanding "might offer metacognitive opportunities" (Cameron, 2003, p. 261) and can work as a facilitator for the

development of critical reading skills (Alderson, 2000). However, the raising of metaphorical awareness is not explicitly included as part of the learning objectives of the EST reading program. This situation coincides with the argument that attention to metaphor as an integral part of second and foreign language curriculum is not frequently found (MacArthur, 2016).

The completely study is divided into three different MOMENTUMS: MOMENTUM A, MOMENTUM B and MOMENTUM C. In MOMENTUM A data was collected and analysed from the answers obtained from students' responses to a questionnaire that included an open question and a number of closed questions (yes-no items) that were followed by a clarification question. In MOMENTUM B data was collected and analysed by the answers obtained from teachers' responses to a questionnaire that also included an open question and a number of yes-no items that were followed by a clarification question. In MOMENTUM C data was collected and analysed by drawing on language data samples elicited from students' responses to two different reading assessment tasks.

By combining self-report data (students and teachers answers to the questionnaires) with more objective assessment instruments of analysis, we aim to provide solid evidence to compare different points of view of language awareness of metaphorical instances with students´ actual interpretation and immediate performance of metaphorical language in reading comprehension tasks.

The sampling procedures for each particular MOMENTUM were thus based on a selection method common in second or foreign language (L2) research that what Dörnyei (2003) refers to as "convenience or opportunity sampling" (p. 72). This kind of sampling method is considered `purposive´ because the participants have to

comply with certain characteristics and specific conditions related to the purpose of the investigation “such as geographical proximity, availability at a certain time, or easy accessibility” (p.72).

Therefore, due to the nature of the study, the group of participants was not randomly assigned, but its performance was naturally observed (Brown, 1988; Brown and Rodgers, 2002). Moreover, the study is characterised for being context-specific, oriented to providing new insights into the teaching and learning process in particular settings and situations and to generate knowledge to further our understanding in order to improve the quality of education (Dörnyei, 2007; Gass and Mackey, 2007).

This study can provide valuable first-hand data on students’ and teachers’ opinions and attitudes toward metaphorical language that is usually not available. In fact, the collection of this kind of evidence is necessary if the intention is to stimulate the implementation of a teaching methodology that could develop metaphorical awareness of reading comprehension in EST. This information is also useful to evaluate the reading program, update and design new teaching-learning materials and formulate new teaching goals and methodologies that would help to minimise students’ difficulties and improve their reading comprehension of technical and scientific texts in English for Specific Purposes (ESP).

3.3 The study context: Universidad Simón Bolívar

The study was conducted in the Universidad Simón Bolívar (USB) located in Caracas, Venezuela, a state-run institution that started its academic activities in 1970 specialised in engineering, pure and applied sciences (mathematics, physics, chemistry and biology), architecture and urban planning. Native Spanish-speaking

freshmen students pursuing engineering and science majors at the USB are required to take the English for Science and Technology Program (ESTP).

The program is part of the Study Plan for the compulsory subjects of the first academic year of instruction. The central purpose of the reading program "is to develop skills and strategies for reading comprehension texts in English for Science and Technology (EST)" (Pereira and Guido, 2009, p. 129), as students will require these skills once they begin to take courses in their majors in their second year. Nowadays, English plays a very important role in the scientific world (St Louis and Pereira, 2003) and the vast majority of technical and scientific literature is published today in English (Tardy, 2004). Because of the widespread use of English as a lingua franca (ELF) (Nickerson, 2013), and "the rapid expansion of EST in the last 50 years" (Parkinson, 2013, p. 155), the acquisition of reading comprehension skills on topics in science and technology is vital.

The objectives of the program are based on the notions of the interactive reading model that establishes that every component in the reading process interacts with any other component in a holistic way (Rumelhart, 1985). Reading is conceived not only as a perceptual process, but also as a cognitive one in which the reader has to interact with the information presented in the text in order to construct meaning. As a result, both bottom-up processes, which tend to concentrate on specific details and basic structures, as well as top-down processes, based on the assumption of acquired background knowledge, work together simultaneously throughout the reading activity (Alderson, 2000; Grabe, 2009; Hellekjær, 2008).

The ESTP has been implemented since 1992 and was revised and updated in 2010. The program consists of three 48-hour compulsory courses which are

offered quarterly (four hours per week during 12 weeks) and which are interrelated. The first two courses are skill-oriented and the last one is more topic-oriented. At the beginning of the academic year, the Language Department administers a Placement Tests to the new students to assess their proficiency in reading comprehension. According to their English proficiency level, students are placed directly into a course of the program or are exempted from the whole program if their scores in the placement test are very high.

3.3.1 Program Syllabus

The first course of the program of study intends to develop learners´ strategic and linguistic repertoires to enable them to decipher the information contained in authentic texts in EST (Appendix A shows the complete syllabus of this first course). The emphasis is placed on an intensive reading approach in which learners practice and learn specific micro-skills using short texts or fragments of texts. It includes activities such as those used for predicting, activating prior knowledge, scanning and skimming, finding the main idea and details, detecting inferences and the use of mental maps. Emphasis is also placed on recognising and understanding the coherence and cohesion patterns found in the text and on the practice of reading strategies that support comprehension (Grabe, 2009).

At the end of the course, students should be able to achieve the following **specific objectives:**

1. Understand the most frequent lexical units found in EST texts

2. Develop automatic word-recognition skills in order to acquire the minimal level of high frequency sight words

3. Apply the most appropriate technique in a given situation based on the purpose of reading

4. Develop metacognitive knowledge and skills monitoring

5. Decipher the meaning of unknown lexical units from the reading context

6. Deduce the relationship among sentences, and among parts of the same text, by using cohesive elements

7. Understand explicit and/or implicit information presented in the text

8. Distinguish between the main ideas and secondary ideas

9. Identify the author purpose when writing the text

10. Understand textual organisation

11. Integrate information in order to reach to a conclusion

12. Interpret information shown in a chart or a graphic

13. Become familiar with the expressions of measurement and magnitude to quantify the different units used in EST

14. Apply the information learned throughout the course to new learning situations

The second course of the program of study is aimed to develop learners' awareness of the information contained in EST expository and explanatory texts using the reading strategy that best suits the purpose of the reader (Appendix B

shows the study program of the second course). Reading materials include texts that emphasise the rhetorical patterns found in technical and scientific discourse. Therefore, students are instructed in the identification of rhetorical functions such as definition and description, classification, comparison and contrast, chronological order, description of a process and, cause and effect.

Students are also taught to recognise the discourse markers and the grammatical structures that indicate the above-mentioned rhetorical functions as well as the use of the passive voice, comparatives and superlatives, conditional sentences and graphic organisers. Once more, the emphasis is placed on an intensive reading approach in which learners practice and learn specific reading skills and strategies based on the predominant rhetorical function associated with technical writing.

At the end of the course, students should be able to use the following **skills**:

1. Understand the lexical and grammatical indicators of expository and explanatory texts such as definition, description, classification, comparison, chronological order and cause-effect relationships

2. Organise in a graphical form the information contained in the text

3. Distinguish the relationships among the parts of the sentence through the identification of syntactic patterns often used in the text

4. Distinguish the position of the author

5. Identify the attitude of the author

6. Summarise the information presented in a text

The third and last course of the program[6] places emphasis on argumentation as a rhetorical structure for the development of critical reading skills. It prepares the student to access information contained in argumentative texts in EST, keeping a critical stance and using the reading strategy that best suits the reading purpose. In this last course, the contents are organised according to four thematic units: the universe, evolution, artificial intelligence and sustainable development.

Each thematic unit has several texts on the same topic that show different points of view. The reading instruction adopts a character of narrow reading; i.e., reading about a single topic of interest (Carrell and Eisterhold, 1983; Krashen, 2004) and includes authentic texts with the components of argumentative discourse. At the end of the course, the student should be able to:

1. Identify lexical and grammatical forms in argumentative discourse
2. Distinguish facts from hypotheses
3. Distinguish facts from opinions
4. Summarise information from different texts related to the same topic
5. Evaluate texts based on criteria such as the sequence of ideas, coherence and persuasiveness
6. Make judgments about the reliability of the information contained in a text based on internal criteria, such as logical sequence, coherence and relevance of the examples used

[6] Appendix C displays the study program of the third course.

7. Make judgments about the reliability of the information contained in a text based on external criteria, such as the opinions of experts or any other source that verify, contrast or complement such information

8. Re-evaluate a particular text based on new information about the same topic

9. Manage the scientific text using different sources of information and research tools

10. Explore alternative genres, additionally to the scientific and technological discourse, in order to cultivate a taste for reading

3.3.2 Teaching Materials

In the EST course, in-house materials are provided. Most commercial materials are geared for students that come from different linguistic and cultural backgrounds and do not meet all the needs of the learners (Mishan and Chambers, 2010; St. Louis et al, 2010). The fact that students in this program are all native Spanish speakers provides a pedagogical competitive advantage, which allows material developers to design reading comprehension exercises to address their particular needs, i.e. taking advantage of L1- L2, shared lexical knowledge, as in the case of cognates. Moreover, students in the program belong to similar fields of studies, i.e. engineering and basic sciences.

As a result, the required materials used in the first two courses of the program is a reading strategies handbook entitled *Focus on Reading* and a selection of short texts on varied topics from the science section of newspapers and magazines, as well as from the Internet entitled *Reading Selections*. Moreover, the required

material used for the third course of the program is a reading handbook entitled *Focus on argumentation*, given that in this course emphasis is placed on argumentation as a rhetorical structure for the development of critical reading skills. All these books[7] are edited and authored by the members of the Material Development Commission of the USB Language Department and are constantly being revised and updated. The material is intended for academic use in the courses of the EST reading program and commercialisation outside the USB is prohibited.

The selection of the texts used considers factors such as the topic area, the length of the text (fragments of articles, or complete articles of around 3,500 words), the authenticity of the texts, and the documentary sources. Most of the readings are accompanied by activities designed by the teachers of the Language Department at the USB, which are typically exercises designed to activate students´ prior knowledge on the topic of texts, to develop and practice strategies and skills, and to promote the comprehension of the text in general.

3.3.3 Teaching Methodology

The teaching methodology consist of classroom activities aimed to develop cognitive processing that facilitates students to become critical and independent readers; that is to say, it is expected that students would be able to compare, analyse, summarise, investigate, make decisions, reflect, review and solve problems from their interaction with texts. The language of instruction is English but Spanish is allowed during class activities.

[7] More details about the sources of these teaching materials are included in the program syllabus displayed in appendices A, B, and C, respectively. In addition, the next link MI LIBRO DE TEXTO PARA ID1111 (http://www.id.usb.ve/sites/default/files/Examen_Inglesl/FOR%20ID1111%202016.pdf) takes you to the 9th version of *Focus on Reading* (April – July 2016) which is the more recent one.

The lessons include pre-reading, while-reading and post-reading activities aimed at practicing different reading strategies. These activities are completed in group or individually and guided by questions or exercises planned by the teacher.

Pre-reading activities focused on encourage students to use strategies such as brain storming, predicting, activating prior knowledge, etc. While-reading activities are aimed at reinforcing some other strategies such as scanning and skimming, finding the main idea and details, guessing meaning from context, vocabulary practises and exercises dealing with referent markers. Students are exposed to instruction on dictionary use, word analysis and word formation, cognate and false cognate identification, synonyms and antonyms, linking words and signal words, putting information in the correct order, detecting inferences and the use of mental maps. Emphasis is also placed on recognising and understanding the coherence and cohesion patterns found in the text. After-reading activities are always aimed at encouraging student to apply the new information learned to a specific problem or learning situation guided by reflective general comprehension questions (St Louis and Pereira, 2003).

3.3.4 Students' Evaluation

Students enrolled in the program are evaluated by means of two compulsory departmental exams, which are achievement tests designed to measure the development of reading skills throughout the term. The exams are administered to the entire student population at the same time. The first departmental exam is taken around the middle of the term and the second one towards the end.

The USB Language Department's policy regarding the use of dictionaries during departmental exams is to allow students to use only English monolingual

dictionaries. Depending on the course, each exam has either 25 or 20 discrete items worth one point each. For the first two courses, the departmental exams have 25-items, and for the last course, the departmental exam has 20-items. The questions, which have been statistically and qualitatively validated, are selected by the Exam Commission of the USB Language Department, and comprise 50 % and 40% of the term grade respectively, with the remaining percentages being divided among quizzes, and class and homework assignments (Pereira and Guido, 2009).

The texts used focused on topics such as electronics, materials engineering, zoology, climatology, agronomy, nutrition, chemistry, among others. The questions asked concern the use of reading skills and strategies and the identification and understanding of several rhetorical patterns used in the texts (definition, description, classification, comparison, contrast, chronological order, process, cause-effect, hypothesis and argumentation). The text ranges in length from a sentence to several short paragraphs, which consist of a number of texts of about 50 to 200 words in length followed each by one multiple-choice question.

It should be noticed that even though the teaching and assessment materials used in the ESTP have been developed taking into account the particular needs of these university learners, they do not explicitly include in its learning objectives the instruction of metaphorical awareness.

Figure 2 shows an example of the type of item used in the departmental exam.

Figure 2. Fragment of an exam item

Thin layer chromatography is a technique for separating dissolved chemical substances through the use of glass plates or plastic sheets coated with a thin layer or a finely ground absorbent. The technique which has become a standard analytical tool is especially useful for separating the components of naturally occurring substances, notably those found in animal and vegetable tissues called lipids and the volatile and fragrant components of plants and flowers known as terpenes.

This technique would be useful in _____.

A. chemical plastic production

B. pharmaceutical laboratories

C. synthetic gem manufacturing

3.4 MOMENTUM A of the study: Students' perception

The key objective of MOMENTUM A was to survey what university students understand by metaphorical language, students´ perception of the presence and ability to interpret linguistic metaphors within the specific register they have to manage in the EST reading courses, and to evaluate students' opinion about the way the understanding of metaphorical language could benefit their reading comprehension in EST.

3.4.1 MOMENTUM A: Questionnaire design

In scientific research, the most important issue is trying to find answers to questions in a systematic way and in experimental survey research in the social sciences the questionnaire has become one of the most popular research instrument applied (Dörnyei, 2003). Brown (2001) defines questionnaires as "any written instruments that present respondents with a series of questions or statements to which they

react either by writing out their answers or selecting from among existing answers" (p. 6).

According to Dörnyei (2003) "the popularity of questionnaires" as one of the most common methods of data collection in second language (L2) research is because "they are easy to construct, extremely versatile, and uniquely capable of gathering a large amount of information quickly in a form that is readily processable" (p.1). However, as with any data elicitation procedure, the design and analysis of questionnaire data may sometimes be difficult to achieve. In this respect, pilot trial is important since it permits researchers examine whether the questions included are appropriate for the particular group that is being investigated (Gass and Mackey, 2007).

In view of that, to try to uncover any problems with the data collection instrument, a colleague of the Language Department was invited to review the questionnaire. Moreover, the survey was piloted on a sample of five students with similar characteristics to those of the target sample of the present study. Based on both the expert feedback and the results of the pilot study, some minor changes were made in the format and wording of the questions to the final version of the instrument.

The questionnaire (Appendix D displays the students' questionnaire) included four types of questions: one open-ended question (question number 1) and three yes-no items that were followed up with a clarification question where students had the opportunity to develop their answer (questions number 2, 3 and 4). Furthermore, although the questionnaire was anonymous, it contained a

demographic section to elicit background information about participants' age, sex and area of specialisation.

The questions were the following:

1. What do you understand by metaphorical language?
2. Have you ever found any metaphorical words, phrases or expressions in the texts you read in the EST reading program? Yes ___ No ___. Briefly explain your answer.
3. Are you able to identify and interpret this kind of metaphorical language? Yes___ No ___. Briefly explain your answer.
4. Would it be beneficial for you to understand metaphorical language when reading EST text? Yes ___ No ___. Briefly explain your answer.

Question number 1 was specifically designed to examine what university students understand by metaphorical language. Question number 2 was aimed to learn whether participants were aware of the presence of metaphorical instances in their reading material. Question number 3 was created to observe how students interpret the metaphors they encounter in their reading material. Finally, question number 4 was an open invitation to hear about students' opinion regarding the benefits of metaphorical awareness as one of the teaching and learning objectives in the EST reading program.

3.4.2 MOMENTUM A: Participants

In total, 38 students aged between 17 to 20 years old, 20 males and 18 females, from different specialised areas of engineering, pure, and applied sciences took part in this part of the research study. The participants were all Spanish native speakers,

first-year students, enrolled in the third and last 3-month English Reading Comprehension (ERC) course at the USB in the academic year April – July 2014. Table 2 shows students' distribution with respect to their area of study.

Table 2. Sample distribution by degree area (n = 38)

Mayor degree	n	%
Computer engineering	6	15%
Mathematics	6	15%
Mechanical engineering	6	15%
Geophysics engineering	4	12%
Chemistry engineering	3	8%
Electronic engineering	3	8%
Material engineering	3	8%
Physics	2	5%
Telecommunication engineering	2	5%
Chemistry	1	3%
Electrical engineering	1	3%
Production engineering	1	3%
TOTAL	38	100%

3.4.3 MOMENTUM A: Data collection procedures

At the end of the third term of the academic year, three teachers in charge of each one of the EST sections were invited to participate in this part of the research. Once they agreed, the researcher made appointments to visit their classrooms to administer the questionnaires. The questionnaire was anonymously completed in class and students worked on an individual basis for approximately fifteen minutes.

Both, the researcher and the class teacher were presented in order to deal with any possible queries. The procedures were as follows: first, students were informed of the purpose and the time they should take answering the questions (no more than 15 minutes); then they were also requested to provide honest responses.

3.4.4 MOMENTUM A: Data analysis procedures

In order to analyse data, students' responses were textually transcribed and categorised in terms of the answers reported. Based on that information, nominal scales (NS) were created and computer data files were prepared. For the first three questions (1, 2 and 3), three categories were created: aware (AW), – unaware (UAW), – and did not answer (DN). For question number 4, three categories were also used: agree (AG), – disagree (DAG), – and did not answer (DN).

To operationalise the answers for question number 1, the following definitions taken from the second edition of the *MacMillan English Dictionary for Advanced Learners* (Rundell, 2007, p. 944) were considered:

> metaphor /ˈmetəfə(r)/ /ˈmetəfɔː(r)/ (noun)
>
> 1 [countable] a word or phrase that means one thing and is used for referring to another thing in order to emphasise their similar qualities. 2 [countable] something that is intended to represent another situation or idea.
>
> metaphorical /ˌmetəˈfɒrɪk (ə) l/ (adjective) a metaphorical word, phrase, image, etc., is intended to represent or emphasise particular aspects of something else ≠ LITERAL.

Additionally, for proofreading, the definitions that appear in the *MacMillan Online Dictionary* [8] were compared with the hard copy of the dictionary. It was verified that both, the hard copy and the online dictionaries contain exactly the same information. Also, following the advice of the *MacMillan* dictionaries, the definition of the word `simile´ (p. 1331) was looked up and registered:

> **simile**/ˈsɪməli/ noun [countable] a phrase that describes something by comparing it to something else using the word 'like' or 'as', for example 'He eats like a pig`.

Moreover, because 31 of the students' responses were answered in Spanish, the following definitions taken from the online version of the 22.ª edition (2012) of *El Diccionario de la lengua española (DRAE)* were consulted:

> metáfora. (Del lat. *metaphŏra*, y este del gr. *μεταφορά*, traslación). **1**. f. Ret. Tropo que consiste en trasladar el sentido recto de las voces a otro figurado, en virtud de una comparación tácita; p. ej., Las perlas del rocío. La primavera de la vida. Refrenar las pasiones. **2**. f. Aplicación de una palabra o de una expresión a un objeto o a un concepto, al cual no denota literalmente, con el fin de sugerir una comparación (con otro objeto o concepto) y facilitar su comprensión; p. ej., el átomo es un sistema solar en miniatura.

[8] Macmillan Dictionary | Free English Dictionary and Thesaurus Online http://www.macmillandictionary.com/

Therefore, if the participant´s answer was associated with any of the operationalised dictionary definitions, it was categorised as aware (AW); as shown in the following example:

- *Tipo de lenguaje no directo donde predominan las imágenes literarias para expresar una idea.*

On the contrary, if the answer showed some kind of misunderstanding with respect to the definitions consulted, it was categorised as unaware (UAW) as in the next example:

- *Palabras parecidas al español de significado similar.*

In relation to questions 2 and 3 if the answer was `yes´ it was coded as AW. On the contrary, if the answer was `no´ it was coded as UAW. Also, regarding question 4, if the answer was `yes´, it was classified as agree (AG) and if the answer was `no´, as disagree (DAG). In any case, if a student did not answer any of the questions the abbreviation DA was written.

In addition, four types of categories were created to classify the clarification answers given to questions 2, 3 and 4:

- **Type i**: The information was found in the **general content** of any reading text, e.g.: *En algunos textos que he leido.*
- **Type ii**: The information was provided in the reading class and the **learning setting** was involved, for example: *La profesora explicó el significado.*
- **Type iii**: There was a lack of awareness regarding both the general content and the learning setting; e.g.: *No recuerdo si leí tales palabras.*

- **Type iv**: The answer showed the perception of the value of metaphorical awareness to enhance reading comprehension; e.g.: *Para comprender mejor el mensaje del texto.*
- **Type v**: The student did not answer.

3.5 MOMENTUM B of the study: Teachers' perception

The objective of MOMENTUM B was to explore teachers' perception of the role of metaphorical language in EST reading comprehension. This part of the study was been designed to address the following research questions:

1. What do teachers understand by metaphorical language?
2. Are they aware of the presence of metaphorical language in EST texts?
3. Do they believe students are able to interpret metaphorical language when reading EST texts?
4. Do they facilitate students` understanding of metaphorical language in their teaching practices?
5. Do they believe in the benefits of raising students' metaphorical awareness in EST reading?

3.5.1 MOMENTUM B: Questionnaire design

To explore teachers' perception about the role of metaphorical language in EST reading comprehension an online questionnaire was created using the application *Google* forms. Once more, a faculty member of the Language Department of the Universidad Simón Bolívar, authority expert in the area of Applied Linguistics was invited to revise the online questionnaire. As a final point, the new version of the

survey was piloted on one other colleague with similar characteristics to those of the target sample of the present study. Based on this information the final version of the instrument was fine-tuned.

The questionnaire (see Appendix E for details of the teachers' questionnaire) consisted of five specific questions related to the research questions specified above. These questions were very similar to those included in the students' questionnaire: one open-ended question (question number 1) and four (4) yes-no items that were followed up with a clarification question (questions number 2, 3, 4 and 5). The questions were the following:

1. What do you understand by metaphorical language?
2. Have you ever found any metaphorical words, phrases or expressions in the texts we use in our EST reading program? Yes ___ No ___. Briefly explain.
3. Do you think our students are you able to identify and interpret this kind of figurative language? Yes___ No ___. Briefly explain.
4. Do you help students understand metaphorical language when reading EST texts? Yes___ No ___. Briefly explain.
5. Do you think it would be beneficial to make students aware of the presence of metaphorical instances when reading EST text? Yes ___ No ___. Why?

Question 1 of the questionnaire was designed to explore teachers' understanding of the meaning of metaphorical language. Question 2 was designed to learn about professors´ awareness of the presence of metaphorical instances in the EST reading material. Question 3 was created to know the participants' opinion of the way the students deal with metaphorical language while reading EST texts in

the reading comprehension program. Question 4 was aimed to find out about the way professors actually deal with metaphorical instances in the language-learning classroom. Finally, Question 5 was aimed to find out about professors' beliefs regarding the benefits of raising student awareness of the existence of metaphorical language in the EST reading program.

Although the questionnaire was anonymous, it included a section of factual questions to cover personal information data such as participants' age, sex, graduate and postgraduate degree areas, etc. The questionnaire was administered via electronic mail (e-mail) to allow participants more time and flexibility in the data collection procedure (Gass and Mackey, 2007).[9]

3.5.2 MOMENTUM B: Participants

A sample of 26 professors, members of the Language Department of the Universidad Simón Bolívar, took part in MOMENTUM B of the study. All the participants were experts in the area of linguistics pedagogy and were related to the EST reading program. Participants´ ages ranged between 20 to 69 years old, 6 males (23%) and 20 females (77%), from different specialised areas of Education, Linguistics, Social Science, Humanities, and Applied Linguistics. From the whole sample, 20 subjects (77 %) are active teachers and a minority of six teachers (23%) is already retired. It was also found that the majority of the teachers (65 %) hold a master´s degree, followed by 27% who hold a PhD degree. Table 3 shows the sample distribution with respect to their degree area[10].

[9] The following link takes you to the teachers' questionnaire: http://gsoo.gl/forms/CTOunMe3ZV.
[10] See appendix M for the complete demographic data of the teachers involved.

Table 3. Professor´s distribution by degree area (n = 25)

n	Degree (s)	Degree area (s)
1	Degree	Law
2	Degree	English teaching
3	Master´s degree	Applied Linguistics
4	Master´s degree	Speech and Drama, Curriculum and Instruction
5	Master´s degree	Translation
6	Master´s degree	Education
7	Master´s degree	English as a foreign language
8	Master´s degree	Applied Linguistics
9	Master´s degree	Applied Linguistics
10	Master´s degree	Latin-American Literature
11	Master´s degree	Applied Linguistics
12	Master´s degree	Applied Linguistics
13	Master´s degree	English as a foreign language
14	Master´s degree	Applied Linguistics
15	Master´s degree	Psychology
16	Master´s degree	English as a second language
17	Master´s degree	Applied Linguistics
18	Master´s degree	Applied Linguistics
19	Master´s degree	Applied Linguistics
20	PhD degree	Education
21	PhD degree	Social Sciences and Humanities
22	PhD degree	Linguistics

23	PhD degree	Linguistics, Applied Linguistics
24	PhD degree	Applied Linguistics / Interculturality/Translation
25	PhD degree	French language and literature
26	PhD degree	English as a second language

3.5.3 MOMENTUM B: Data collection procedures

Two weeks before the end of the third term (April – July 2014) of the academic year, 39 professors were invited to complete the online questionnaire. The link that gave access to the instrument was sent by e-mail to the selected sample. The message included a brief explanation of the purpose of the study and of the relevance of the recipients' opinion for the success of the investigation. The tentative date by which the completed questionnaires should be returned (around 10 days), a closing sentence thanking them for their cooperation, and the researcher's signature were also added.

Two weeks after the questionnaire was sent, only 15 questionnaires (38%) were received. Therefore, a second e-mail was sent out in an attempt to increase the respondents' feedback rate. After ten days, 10 more questionnaires (another 26%) were received. The final return rate was 65%, which is a percentage that could be contemplated as satisfactory (Dörnyei, 2003). Although the questionnaire was anonymous, the great majority of the teachers who participated in the investigation either identified themselves when sending the e-mail with the answers to the

questionnaire or verbally informed the researcher. Therefore, a thanking memorandum[11] was sent to those professors who participated in the study.

3.5.4 MOMENTUM B: Data analysis procedures

In order to analyse data, teachers' responses were textually transcribed and categorised in terms of the answers reported. Based on that information, nominal scales (NS) were created and computer data files were prepared.

To operationalise the answers to the first question, the definitions taken from the *MacMillan English Dictionary for Advanced Learners* (Rundell, 2007) were considered. Additionally, the position of Lakoff and Johnson (1980/ 2003) with respect to the Contemporary Theory of Metaphor was taken into consideration; as a result, three categories were created:

- **Traditional view of metaphor (TVM):** the answer shows an understanding of metaphor as an ornamental figure of speech. Words for a concept are used outside their normal everyday conventional meaning to express a similar concept, for instance: *It is when the speaker refers to things with words that are not literally what they mean, for example saying that a person is sweet as a chocolate, does not mean literally that a person is chocolate or made of it.*
- **Contemporary view of metaphor (CVM):** the answer shows some degree of awareness which suggests that metaphors are not merely stylistic, but that they are also cognitively important in relation to both, language and thought, as in the following example: *Language used to represent reality through*

[11] See Appendix F for proof of the thanking memorandum.

metaphors, that is, associations between meanings and symbolic signs different from socially accepted semantic meanings. For example, in psychology, a common metaphor is the brain as a computer or the mind represented as a "processor".

- **Other position of metaphor (OPM):** the information given is insufficient or unclear to classify the answer as either TVM or CVM; for example: *I think that metaphorical language is the form, kind of language that uses metaphors.*

Next, for the analysis of question number 2, the categories used were:

- **Aware (AW):** the participants declared they were aware of the presence of metaphorical language in the learning material.
- **Unaware (UAW):** the answer showed a lack of awareness of the presence of metaphorical language in the learning material.

After that, for the analysis of question number 3, the two categories used were the following:

- **Agree (AG):** the participants believed that the students were able to identify and interpret metaphorical language.
- **Disagree (DAG):** the participants did not believe that the students were able to identify and interpret metaphorical language.

Following, for question number 4, two new categories were created:

- **Help awareness (HAW):** the teacher declared to help students understand metaphorical language in the language-learning context.
- **Help unawareness (HUAW):** the teacher did not state to help students understand metaphorical language in the language-learning context.

Finally, to analyse the answers to question number 5 two categories were used:

- **Agree (AG):** the participants believed that it would be beneficial to include metaphorical awareness as a learning objective in the reading program.
- **Disagree (DAG):** the participants did not believe that it would be advantageous to include metaphorical awareness as a learning objective in the reading program.

Furthermore, six types of categories were also created to classify the clarification answers to questions 2, 3, 4 and 5:

- **Type i**: Those related to the classical belief that metaphorical instances are mostly use in literature and poetry contents, for instance: *The use of metaphors is used in all contexts although is more common in fiction.*
- **Type ii**: Those related to the belief that metaphorical instances frequently appear in the EST reading content in which the learning setting is involved, for example: *Recuerdo en un texto llamado Biometheorology en el que había la siguiente expresión 'Roll up their sleeves´ para referirse a iniciar un trabajo.*
- **Type iii**: Those that showed a lack of awareness of the presence of this kind of figurative language in either situation; for example, *I do not remember seeing that on the reading guides.*
- **Type iv**: Those in which the participants expressed that the students did not have the linguistic threshold to understand metaphorical language: *Sí, si el proceso mental de la metáfora no es demasiado abstracto, en caso contrario no creo que sea tan obvio para los estudiantes.*

- **Type v**: Those in which the participants expressed an opinion as the value of raising metaphorical awareness for the learning process as in the following example: *Definitely. One should not take anything for granted. Exercises with samples taken from actual technical texts should be included in the workbooks and make students aware of these forms*.
- **Type vi**: Those in which he subject did not reply.

3.6 MOMENTUM C of the study: Students' performance

The aim of this part of the study was to observe students' performance in response to two reading tasks distributed during the period. This momentum focused on how the university students enrolled in the third and last course of the reading program actually dealt with "metaphorical words, or lexical units, in discourse" (Steen, 2010, p.5).

This part was aimed to support students' answers in MOMENTUM A with their actual performance based on the interpretation of metaphorical language in EST reading. The collection of this type of information would be of value in order to investigate how learners deal with abstract critical thinking as part of their reading objectives. The research was designed to address the following questions:

- How do students actually make sense of metaphorical instances?
- Is there a relationship between students' perception of metaphorical awareness and their actual interpretation of the linguistic expression?

3.6.1 MOMENTUM C: Participants

Eight English Reading Comprehension (ERC) classes, totalling 209 students, participated in MOMENTUM C of the study. The participants belonged to the same

group of students who took part in MOMENTUM A. These were all Spanish native speakers first-year students enrolled in the third and last 3-month ERC course at the USB. The ERC classes were divided into two selected groups of four classes each: the first group consisted of 94 students and the second one consisted of 135 students.

The contents used corresponded to two of the four thematic units included in the syllabus of the third course. In the first case, the focus was on the interpretation of a metaphorical expression on the topic of **the universe**. In the second case, the focus was on the interpretation of a metaphorical expression on the topic of **evolution**. The difference between the performance of students who completed the first task and the performance of those who completed the second task was documented.

3.6.2 MOMENTUM C: Data collection procedures

Data were collected through two tailor-made reading assessment tasks specially planned to elicit language samples of the metaphorical expressions. Participants were encouraged to respond to open ended questions developed to assess students' interpretation of the contextual meaning of the metaphorical words that appear naturally in authentic discourse.

In these types of implicit questions, the focus is on meaning rather than on form, the correct answer could not be textually found in the text itself, and the readers might need to integrate text information with their background knowledge to activate analytical and critical thinking in order to answer them.

3.6.3 Task 1

The first evaluation task, distributed to 94 students, was part of a 45 minute summative assessment task with the purpose of examining students' performance of an end of unit test in a formal setting (Coyle, Hood and Marsh, 2010) on the topic of the universe. To complete the reading task, the use of monolingual English dictionary was allowed. The question selected for this task was based on an article taken from the British Broadcasting Corporation (BBC) news called "Alien life 'seed' theory claimed"[12]. In this case, students were asked on their interpretation of the metaphorical expression INTERSTELLAR CLOUDS ARE THE GRAVEYARD OF LIFE used to illustrate one of the theories proposed for the creation and evolution of the universe – **Panspermia theory**. In this case, the news article argues that interstellar clouds do not promote life since organic molecules are destroyed in them.

It should be noted that this metaphorical expression is an example of a special form of metaphor referred by Turner (1991) as the xyz form. According to Turner, in this structure, "x" "y" and "z" are noun phrases; "y" and "z" are connected using the prepositions "of" or "to" which indicate a relationship between both concepts: "y" and "z". In our case, the expression takes the form "x is the y of z". The noun phrase (NP) Interstellar clouds (x) is the target domain, the NP graveyard (y) is the source domain, and the NP life (z) is related to graveyard (the source domain). As a result, the expression "Interstellar cloud is graveyard life" is equivalent in meaning to the expression "Interstellar cloud is the graveyard of life" because both suggest that interstellar clouds promote the death of life.

[12] Appendix G includes the complete article.

In our case, the specific question addressed to the students was the following:

Based on the information provided in the text, answer the following question in your own words. Do not transcribe from the text. You may answer in Spanish.

- What does Wickramasinghe mean when he says: "Interstellar clouds appear to be the graveyard of life, not its cradle."?

3.6.4 Task 2

The second assessment task, distributed to 135 students, was part of a formative assessment to obtain an immediate diagnosis of the learners' behaviour when facing a new way of evaluation (Coyle, Hood and Marsh, 2010).

The activity was based on a selected fragment of a reading text called "Biology: Evolution" [13] taken from a book called *Reading by all means* (Dubin and Olshtain, 1990). In this occasion, the students were given 10 minutes to finish the task and the use of dictionaries was not allowed. The students were asked on their interpretation of the meaning of the metaphorical expression "struggle for existence"[14]; a natural history metaphor used as the title of the third chapter of the book *The Origin of Species* written by Charles Darwin in 1859. This phrase has been used to illustrate the competition between organisms of a population to explain the phenomenon of natural selection in which the theory of evolution was based. According to Al-Zahrani (2008), the metaphor "struggle for existence" is the most significant metaphor used by Darwin to shape his theory of natural selection.

[13] See Appendix H to see the complete reading.
[14] For a detailed account of the role of metaphors in Darwin's book *On the Origin of Species,* cf. Al-Zahrani, A. (2008). Darwin's Metaphors Revisited: Conceptual Metaphors, Conceptual Blends, and Idealized Cognitive Models in the Theory of Evolution. *Metaphor and Symbol, 23*, 50–82.

The specific question addressed to the students was the following:

Read the text, and briefly answer the question. Use your own words. Your answer may be written in English or in Spanish.

- What does the expression "struggle for existence" mean?

3.6.5 MOMENTUM C: Analysis of metaphorical meaning

In order to explore further the metaphorical meaning in context of expressions used, a lexical analysis was conducted. The lexical analysis and the searching of the text for recurring words, was carried out respecting the procedures of qualitative content analysis[15] (Patton, 2002). As stated in the theoretical chapter, we are aware of the presence of more sophisticated tools and qualitative software for the analysis of metaphors in discourse (Kimmel, 2012) such as ATLAS.ti. Nonetheless, in our case, the analysis was based on the manual process proposed by the Pragglejaz Group (2007) for identifying "metaphor-related words in usage" (Steen, 2010, p. 25). In our work, ATLAS.ti was only used as an analysis tool for frequency word counting. Therefore, inspired by the Pragglejaz Group the next steps were followed:

1. The lexical units were first prearranged in alphabetical order, then examined on a word-by-word basis and finally tagged based on the part of speech.

   Tables 4 and 5 show the results of this search.

[15] Appendix S displays the transcription of sources used to carry out the lexical analysis.

Table 4. Tag of lexical units based on part of speech – Assessment 1

Lexical Units	Part of speech 1	Part of speech 2
appear	verb	X
cloud	noun	X
cradle	noun	verb
graveyard	noun	X
interstellar	adjective	X
life	noun	X

Table 5. Tag of lexical units based on part of speech – Assessment 2

Lexical Units	Part of speech 1	Part of speech 2
existence	noun	x
struggle	verb	noun

2. The contextual meanings for each lexical unit were determined and annotated.
3. The more prototypical (basic) meanings for each lexical unit were determined and annotated.
4. The contextual meanings were contrasted and compared with the basic meanings.
5. The lexical units were marked as a metaphor-related word (MRW) when the contextual meanings could be understood in comparison with their basic meanings.

The *MacMillan English Dictionary for Advanced Learners* (Rundell, 2007) was the main tool used to decide about the meaning of the lexical units in the situation in which they were used (contextual meanings), the meaning of the lexical

units as a more specific sense in contemporary language use (prototypical meanings), and the relationship between both, contextual and prototypical meanings. When the contextual meaning of the word could be understood in comparison with its prototypical meaning, the lexical unit was marked as a metaphor-related word (MRW).

The *MacMillan English Dictionary* was used because it is up to date and corpus-based (Pragglejaz Group, 2007; Steen, 2010). In addition, in the event of specific problems or doubts, the *Longman Dictionary of Contemporary English Online*[16] was consulted in order to get a second opinion. Additionally, a google search was conducted to find out the meaning of the expression "struggle for existence" as it did not appear in the *MacMillan Dictionary.* Furthermore, the meaning of the compound noun "natural selection" was also consulted for clarification as it is considered a key concept[17] to understand Darwin´s theory of Evolution. Likewise, based on these results, and using the *Macmillan Dictionary and Thesaurus: Free English Dictionary Online*[18] word association maps were created and used as a complementary tool and criteria to discriminate student´s linguistic awareness of the metaphorical lexical items[19].

After the analysis of the first expression, the words: "appear, cradle, graveyard, interstellar, and life, were marked as metaphorically used. Only one lexical item: "cloud" was not catalogued as a MRW. Table 6 shows the results of this search.

[16] Longman Dictionary of Contemporary English Online http://www.ldoceonline.com/
[17] In fact, Juchem (2006) recommends that language learners "be sensitised to use solely biologically grounded metaphors in intercultural communication as they are mainly universal. On the contrary, culture-specific use of metaphorical expressions may lead to misunderstandings" (p.14).
[18] Macmillan Dictionary | Free English Dictionary and Thesaurus Online http://www.macmillandictionary.com/
[19] See Appendix T for the word association maps.

Table 6. Contextual vs prototypical meanings of the lexical units – Assessment 1

Lexical unit	Contextual meaning	Prototypical meaning	MRW
appear	give impression. to say that someone or something seems to have a particular quality or feeling (Longman).	seem to make other people think that you are something or feel something (MacMillan).	Yes
cloud	a white or grey mass of very small drops of water in the sky (MacMillan).	a white or grey mass of very small drops of water in the sky(MacMillan).	No
cradle	a place where something began (n) = BIRTHPLACE (MacMillan).	swinging bed for baby (n). a small bed for a baby that you can move gently from side to side (MacMillan).	Yes
graveyard	death. a place where people or things fail (Longman).	an area of land where dead people are buried, usually around a church (MacMillan).	yes
interstellar	relating to the planets, stars and other objects in space(MacMillan).	between the stars(MacMillan).	Yes
life	living things. living things such as plants and animals (MacMillan).	time from birth to death. the period of time from someone's birth until their death (MacMillan).	yes

After the analysis of the second group, the word "struggle" and both expressions "natural selection" and "struggle for existence" were marked as metaphorically used. Only the lexical item "existence" was not catalogued as MRW. Table 7 shows the results of this search.

Table 7. Contextual vs prototypical meanings of the lexical units – Assessment 2

Lexical unit	Contextual meaning	Prototypical meaning	MRW
existence	the state of being a real or living thing, or of being present in a particular place, time, or situation (MacMillan).	the state of being a real or living thing, or of being present in a particular place, time, or situation (MacMillan).	No
struggle	to use your strength to fight against someone or something (v) (MacMillan).	to try hard to do something that you find very difficult (v) (MacMillan).	Yes

struggle for existence	the automatic competition of members of a natural population for limited vital resources that results in natural selection	Yes
natural selection	the process by which only plants and animals that are naturally suitable for life in their environment will continue to live and breed, while all others will die out (Longman)	Yes

3.6.6 MOMENTUM C: Analysis of students' performance

To explore the way undergraduate students in a Venezuelan university setting dealt with two tailor-made reading assessment tasks designed to see their interpretation of metaphorical meaning in authentic language usage, students` responses were textually transcribed and categorised based on the type of answer detected during the analysis. The set of categories created were the following:

- **Content awareness (CAW):** the answer was correctly based on the knowledge of the content of the topic, as in the following quote: *Él dice esto con relación a que algunas personas creen que a partir de las nubes interestelares se creó la vida, y él dice que es todo lo contrario: que ahí mueren.*
- **Content unawareness (CUAW):** the answer showed some misunderstanding of the question being asked and both, the content of the text as well as the metaphorical interpretation of the message were misinterpreted, as shown in the following example: *Dice que la llegada de las nubes interestelares con vida no son una coincidencia, insinúa que fue planeado.*

- **Metaphorical awareness (MAW):** the answer demonstrated an awareness of the meta-pragmatic message of the metaphor in itself, and of the metaphorical sense of the expression, as in the following example: *Se refiere a que las moléculas orgánicas que hay en las nubes interestelares son en realidad restos de bacterias destruidas o muertas en vez de estar vivas, por eso usa la metáfora de que estas nubes son cementerios en vez de cunas.*
- **Metaphrase awareness (MPAW):** the answer was based on a word-for-word or literal translation into Spanish of the text, without any further explanation or analysis, as in the example that follows: *Que las nubes interestelares parecen ser el cementerio de la vida, no su cuna.*
- **Metacognitive unawareness (MCUAW):** the answer expressed a lack of knowledge of the meaning of the expression, as in the following quote: *No entiendo a que se refiere con "struggle for existance". El lenguaje se me dificulta.*
- **Did not answer (DA):** there was not any answer provided.

3.7 Summary

In this chapter, we have explained the methods used to carry out our research study. These comprise three different MOMENTUMS: A) students' perception of metaphorical language in EST reading, B) teachers' perception of the role of metaphorical language in EST reading, and C) students' performance when dealing with metaphorical interpretations in EST authentic language usage.

The chapter presents a description of the teaching context where the study took placed that includes the syllabus, the teaching materials and methodology, and the students' evaluation. It also explains the research method used for each different

MOMENTUM that includes the data collection instruments, the participants, and the data collection and analysis procedures.

The next chapter reports on the results and analysis obtained from the research study. It presents the results and discusses the findings.

CHAPTER 4: RESULTS AND ANALYSIS OF RESEARCH STUDY

4.1 Introduction

This chapter reports on the results obtained from the research study through the examination of data gathered in three different stages (MOMENTUM A, MOMENTUM B, and MOMENTUM C). Initially, these results are presented and discussed separately. Then, taking into account that each different stage complements each other, a holistic interpretation of the findings is finally provided.

4.2 Findings of MOMENTUM A

As mentioned in Chapter 3, MOMENTUM A was conducted to surveying students` perception and awareness of metaphorical language within the specific register they have to manage in the EST reading courses. It explored students` opinion about the value of metaphorical awareness to enhance reading comprehension. A sample of 38 students, 20 males (53%) and 18 females (47%), average age 18 years old, from different specialised areas of engineering and pure and applied sciences participated in this part of the research. As a data collection tool a questionnaire was designed. For the analysis, responses were textually transcribed, classified and categorised based on the answers reported.

4.2.1 Understanding of metaphorical language

On the one hand, with regard to Question number 1[20]: What do you understand by metaphorical language?, the majority of the answers (71%) show that students seemed to have some idea of the meaning of this type of figurative language. For

[20] Appendix I shows the transcribed answers to Question 1 – MOMENTUM A

them metaphorical language was perceived as something that is not literal or direct (eight subjects), a comparison (six subjects), something that is colloquial and/or aesthetic (six subjects), or something that is intended to represent another situation or idea (seven subjects). Table number 8 displays the distribution of the answers obtained with respect to the type of category reported.

Table 8. Students´ awareness of the meaning of metaphorical language (n=27)

Not literal or direct	**Comparison**	**Colloquial / aesthetic**	**Representation of another idea**
No es lenguaje directo, estético.	*Es el lenguaje usado mediante comparaciones.*	*El uso de recursos literarios para embellecer o decir de forma coloquial algo de un texto.*	*Lenguaje utilizado para representar algo con diferentes palabras "ideadas".*
Que no sea su significado directo.	*Lenguaje que se usa para comparar algo.*	*Palabras coloquiales, metáforas, parábolas.*	*Un lenguaje que trae un doble sentido, es relativo.*
Un lenguaje que no es directo ni literal.	*La forma de comunicar un mensaje usando comparaciones y otros recursos.*	*Lenguaje coloquial.*	*Lenguaje metafórico según el contexto.*
Entiendo que es un lenguaje que no es directo.	*Es el lenguaje que puede hacer referencias o comparaciones entre cosas o personas.*	*Un lenguaje basado en frases coloquiales.*	*Lenguaje que se utiliza en textos para hacer entender una idea.*
Tipo de lenguaje no directo donde predominan las imágenes literarias para expresar ideas.	*Un lenguaje que emplea ciertas comparaciones con objetos etc., a lo largo del texto*	*Es algo ficticio que deja un lenguaje.*	*Considero que son palabras usadas para decir algo que significa otra cosa.*

Cuando se dice algo de manera indirecta.	*Lenguaje metafórico es entendido como si se hablara de modo satírico comparando ciertas cosas con otras.*	*Entiendo como el lenguaje cargado de recursos metafóricos*	*Es un lenguaje que requiere cierto conocimiento y análisis para poder entenderlo.*
Is when something it´s not direct.			*Que se utilizan experiencias pasadas o*
Cuando se usa un lenguaje que no es directo.			

In the other hand, 13% of the participants did not seem to be aware of the meaning of metaphorical language. For them, metaphorical language was perceived manifold: as a writing strategy, as a type of communication not related to the main idea, as the way language changes, as connected to some type of cognate words, or as a learning method. Table number 9 exemplifies the answers obtained with respect to the type of category reported.

Table 9. Students' unawareness of the meaning of metaphorical language (n=5)

Category	**Answer**
A writing strategy	*Es una estrategia de escritura que ayuda a escribir de manera más directa*
A way of communication	*Well sounds like a sort of communication way that doesn`t involve direct contact with the main idea*
The way language changes	*Como cambia el lenguaje*
A cognate word	*Palabras parecidas al español con significado similar*
A learning method	*Lo entiendo como algún método para entender otro idioma que sea el mío*

Finally, less than half of the sample (16%) did not answer this question. Table 10 summarises the total percentages obtained in Question number 1- MOMENTUM A.

Table 10. Students' understanding of metaphorical language (n=38)

Q1	n	Percentage (%)
AW	27	71%
DA	6	16%
UAW	5	13%
Total	38	100%

4.2.2 Presence of metaphorical language

With respect to Question 2: Have you ever found any metaphorical words, phrases or expressions in the texts you read in the EST reading program? it was found that the great majority of the students (74%) seemed to be aware of the presence of metaphorical language in their reading material. Only a minority (26%) either showed a lack of awareness of the meaning of metaphorical language or did not answer the question (see Table 11 for details).

Table 11. Students 'awareness of the presence of metaphorical language (n=38)

Q 2a	n	Percentage (%)
AW	28	74%
UAW	9	24%
DA	1	2%
Total	38	100%

Regarding the clarification part for Question 2, more than half of the sample (55%) did not answer it. From the answers obtained, 25% related their awareness to the Type II category, in other words, to the presence of metaphorical language in the teaching and learning context. The following are examples of the quotes obtained from the corpus [21]

- *Si y no los entiendo.*
- *No lo entendí y pregunté que era.*
- *Algunas lecturas tienen metáforas muy concretas.*

In addition, the clarification answer of 11% of the sample showed a lack of awareness of both content and the learning context (Type III category), as shown in the following quotes:

- *No recuerdo si leí tales palabras.*
- *Ahorita no recuerdo exactamente.*
- *No leí prácticamente ninguna lectura.*

Moreover, the clarification answer of 19% of the sample related the presence of metaphorical language to the content in itself (Type I category), as shown in the quotes that follow:

- *En algunos textos que he leído.*
- *Muchos autores lo usan.*
- *Sí, en algunos textos hacen uso del mismo porque es un recurso común así que no es extraño encontrarlo.*

[21] Appendix J presents the transcribed answers for the clarification part of question 2, momentum A.

Table 12 shows the general percentages obtained to the clarification part for Question 2.

Table 12. Clarification part for Question 2 (n=38)

Q 2b	n	Percentage (%)
i	3	9%
ii	10	25%
iii	4	11%
v	21	55%
Total	38	100%

4.2.3 Interpretation of metaphorical language

Regarding Question 3: Are you able to identify and interpret this kind of metaphorical language? the findings indicate that the majority of the students (58 %) seemed to be able to identify and interpret this kind of language when reading EST texts whereas 42% stated they were not able to do so. Table 13 shows the percentages obtained in Question 3, MOMENTUM A.

Table 13. Students´ ability to interpret metaphorical language (n=38)

Q 3a	n	Percentage (%)
AW	22	58%
UAW	16	42%
Total	38	100 %

These results are supported by the answers obtained in the clarification part to Question 3[22]. The majority of students (53%) related their understanding of metaphorical language to the learning context (Type ii category) and many of them confessed that it was not always easy to identify and interpret this kind of figurative language when reading EST texts; see the following quotes taken from students' comments:

- *Si pero no en todas las ocasiones.*
- *No en la mayoría de los casos.*
- *No lo entendí.*

Moreover, 39% of the group did not answer the question (Type v category), and the rest 8% either remarked they were able identify and interpret metaphors without any help (Type i category) or showed a lack of awareness regarding both the any reading content in general and the EST learning setting (Type iii category). Appendix K displays the textually transcribed answers obtained for the Clarification part for Question 3 – MOMENTUM A, and Table 14 below shows the general percentages found.

Table 14. Clarification part for Question 3 (n=38)

Q 3b	n	Percentage (%)
i	2	5%
ii	20	53%
iii	1	3%
v	15	39%
Total	38	100%

[22] See appendix K for the complete transcription.

4.2.4 Benefits of metaphorical awareness

In relation to question number 4: Would it be beneficial for you to understand metaphorical language when reading EST texts? The answers indicate that almost everyone (89%) agreed with the fact that the understanding of this kind of figurative language would be valuable to enhance reading comprehension and only a minority (11%), did not agree with it (see Table 15).

Table 15. Students' opinion of the benefits of metaphorical awareness – MOMENTUM A (n = 38)

Q 4a	n	Percentage (%)
AG	34	89%
DAG	4	11%
Total	38	100%

These results are also supported by the results obtained on the subject of the clarification answers to Question 4. In this respect, more than half (70%) of the students' comments supported the fact that being aware of the presence of metaphorical language would be helpful to enhance their reading comprehension skills in EST[23], as it is seen in the following quotes:

- *El lenguaje metafórico forma parte de las comunicaciones, hace la conversación más amena así que es una buena práctica. Por lo tanto, seria excelente poder comprenderlo en ingles también.*
- *Para entender la personalidad y el carácter del texto y su autor. Me ayuda a entender más.*

[23] See Appendix L for details.

- *Para entender mejor, algunas son un poco complicadas para entender a la primera.*

Table 16 shows the general percentages obtained for the clarification part for Question 4 – MOMENTUM A.

Table 16. Clarification part for Question 4 (n=38)

Q 4b	n	Percentage (%)
ii	24	62%
iv	3	8%
v	11	30%
Total	38	100%

4.2.5 Main findings for MOMENTUM A

In summary, the main findings in MOMENTUM A suggest that the majority of the students surveyed seemed to have some idea of the meaning of metaphorical language and many of them appeared to be aware of the presence of this kind of figurative language when reading EST material. However, more than half of the sample did not answer the clarification part when they were asked to briefly explain if they had ever found any metaphorical language in the reading material.

Moreover, the majority of the sample related their understanding of metaphorical language to the learning setting and many reported their belief that it was not always easy for them to identify and interpret this kind of figurative language. Finally, almost everyone agreed with the fact that the understanding of metaphorical language would be valuable to enhance reading comprehension.

4.3 Findings for MOMENTUM B

As it has already been mentioned, MOMENTUM B was designed to evaluate teachers' perception regarding the role of metaphorical language in reading comprehension for academic purposes, particularly in the EST reading program. MOMENTUM B was also planned to compare teachers' beliefs and perspectives regarding the role of metaphorical language in the academic context. In this particular case, an online questionnaire was designed and administered as a data collection tool. In order to analyse data, professors' responses were textually transcribed and categorised.

4.3.1 Understanding of metaphorical language

With regard to Question 1. What do you understand by metaphorical language? it could be said that the position of majority of the participants (85%) is the traditional one, in other words, their views showed an understanding of metaphorical language as a not literal figure of speech that uses one thing to mean another and makes a comparison between the two; see the examples that follow taken from teachers' responses:

- *The use of a figure of speech based on similarity of a trait or quality in order to structure an explanation of a novel concept.*
- *Es un tipo de comunicación que se basa en la comparación de ciertos rasgos coincidentes entre los objetos comparados.*
- *Language that will use analogies to convey the message.*

In addition, only a minority (12%) seemed to be aware in a certain way of the contemporary view of metaphor understanding[24], which regards metaphor as a matter of language and thought that is part of our everyday life and conceptualisation. See the following examples:

- *Language that expresses an idea in an "indirect" way or using a meaning that is not literal but figurative. Metaphorical language refers to a concept by making an analogy to another situation. It is a very common resource in everyday language, even though sometimes we are not aware of it.*
- *Considering the basic idea, language in general would be the instrument that allows us to express ourselves in order to communicate our ideas to others. A metaphor would be then, the use of a part of language in such a way, that its original meaning is applied to another part of language, the meaning of which belongs to another topic, in order to illustrate some idea more richly or more precisely.*
- *Language used to represent reality through metaphors, that is, associations between meanings and symbolic signs different from socially accepted semantic meanings. For example, in psychology a common metaphor is the brain as a computer or the mind represented as a "processor".*

Table 17 shows the percentages obtained for Question 1, MOMENTUM B.

[24] See Appendix N to see the transcribed answers for question 1 – Momentum B.

Table 17. Teachers´ understanding of metaphorical language – MOMENTUM B (n = 26)

Q1	n	Percentage (%)
TPM	22	85%
CPM	3	12%
OPM	1	3%
Total	26	100%

4.3.2 Awareness of metaphorical language in EST

With respect to Question 2[25]. Have you ever found any metaphorical words, phrases or expressions in the texts we use in our EST reading program? it was found that the great majority of the teachers (73%) appeared to be aware of the presence of metaphorical language in the reading material, and only a minority (27%) did not seem to be aware of it (see Table 18).

Table 18. Teachers´ awareness of metaphorical language – MOMENTUM B (n = 26)

Q 2a	n	Percentage (%)
AW	19	73%
UAW	7	27%
DA	0	0%
Total	26	100%

[25] Appendix O shows the transcription of the answers to question 2 – Momentum B.

In addition, taking into account the clarification comments about this issue, many of the teachers (42%) agreed with the fact that metaphorical instances frequently appear in the content of the EST texts; see the examples that follow:

- *Recuerdo en un texto llamado Biometheorology que incluía la siguiente expresión "Roll up their sleeves" para referirse a iniciar un trabajo.*
- *I could locate hundreds of examples in our instructional material. One example I could describe by heart is found in a text called "How to make ice in five minutes" which describes a refrigerator that uses chemical reactions to increase the temperature. In the text, it says "it will land on the shelves" meaning that the product will be available in the market or it will be commercialised.*
- *Yes, I have. "When there's smoke, there's fire," "fiery volcanoes dominated the landscape (…) spewing gasses (…)" These are just some of the ones I read. They serve either to introduce a topic, or to define a concept.*

Nonetheless, a few teachers (19%) confessed that they were not aware of the presence of metaphorical instances; this is shown in the following examples:

- *I don´t really remember, but I had to tick one of the options.*
- *Creo que sí, pero, para ser honesta, no estoy segura porque nunca las he buscado en forma intencional.*
- *I do not remember.*

Additionally, an important percentage (31%) of the teachers' comments indicated the classical belief that metaphorical instances are mostly used in literature and poetry contents; see for instance the next examples:

- *The use of metaphors is used in all contexts although is more common in fiction.*
- *La metáfora es una figura muy usada en la literatura, pero los textos científicos generalmente no la usan.*
- *This type of language is usually found in literary texts.*

Table 19 shows the percentages obtained in the clarification part for question 2 in Momentum B.

Table 19. Clarification part for Question 2 – MOMENTUM B (n = 26)

Q 2b	n	Percentage (%)
i	8	31%
ii	11	42%
iii	5	19%
v	2	8%
Total	26	100%

4.3.3 Perception of students' awareness of metaphorical language

Regarding Question 3. Do you think our students are able to identify and interpret this kind of figurative language? the results indicate that the majority of the teachers (69%) perceived that the students are not able to identify and interpret metaphorical language in reading comprehension (see Table 20).

Table 20. Teachers´ perception of students' awareness – MOMENTUM B (n=26)

Q 3a	n	Percentage (%)
AG	8	31%
DAG	18	69%
Total	26	100%

The abovementioned findings were corroborated by the clarification answers to Question 3 in MOMENTUM B. It was seen that the great majority of the teachers (81%) believe that students do not have the linguistic threshold to understand this kind of language[26]; as shown in the following examples taken from the teachers' answers:

- *The problem is the lack of awareness. During my teaching I encounter situations in which students took metaphorical language too literally. The problem is to make them understand that it is figurative language.*
- *My short answer is No but it is a bit more complicated than that. There might be a good percentage of students who may fail to put their finger on precise metaphorical features simply because they cannot do much with language anyways. Also, a good number of students who may know English well would be surprised to see how much figurative language texts contain. They may lack awareness of the existence of those features in our texts. The teacher has a role here then. Now, very few but sensitive and language gifted students both in their L1 and L2 are very much capable of detecting and understanding ML.*
- *Si el proceso mental de la metáfora no es demasiado abstracto, en caso contrario no creo que sea tan obvio para los estudiantes. Al hecho de la metáfora se le podría agregar las limitaciones que pueda tener el estudiante en su dominio de la lengua inglesa. Ahí, entonces sería muy difícil que un estudiante pueda llegar a entender.*

[26] See Appendix P for details.

Table 21 below shows the percentages obtained on the clarification part for Question 3 – MOMENTUM B.

Table 21. Clarification part for Question 3 – MOMENTUM B (n = 26)

Q 3b	n	Percentage (%)
i	3	12%
ii	2	7%
iv	21	81%
Total	25	100%

4.3.4 Help to raise awareness of metaphorical language

In relation to Question 4. Do you help students understand metaphorical language when reading EST texts? The results show that almost every teacher (77%) considered that they help their students with the understanding of metaphorical language in the reading process and only a minority did not think to do so (see Table 22).

Table 22. Teachers` help awareness of metaphorical language – MOMENTUM B (n= 26)

Q 4a	n	Percentage (%)
HAW	20	77 %
HUAW	6	13 %
Total	26	100 %

In this respect, the clarification answers to Question 4[27] indicated that the great majority (81%) of the teachers' comments support the fact that making students aware of the presence of metaphorical language would be beneficial to

[27] The transcribed answers are shown in Appendix Q.

enhance reading comprehension. Look at the next examples taken from the teachers' responses:

- *When these structures came up in readings, I pointed them out, but I also used songs in class and figurative language is quite common in songs.*
- *By showing students that all languages use metaphor, you can make them aware that the vocabulary they learn is actually richer than they think due to word connotations.*
- *I explain to them that a metaphor always involves an implicit comparison between X and Y, and one way of handling it is to analyse what X and Y may have in common that is relevant to the context.*

Appendix Q shows the textually transcribed answers obtained to this question and Table 23 the percentages obtained.

Table 23. Clarification part for Question 4 – MOMENTUM B (n = 26)

Q 4b	n	Percentage (%)
iii	4	15%
iv	21	81%
v	1	4%
Total	26	100%

4.3.5 Raising of metaphorical awareness

In relation to Question 5. Do you think it would be beneficial to make students aware of the presence of metaphorical instances when reading EST text? the results indicate that almost all of the teachers (96%) support the fact that raising metaphorical awareness would be beneficial to enhance reading comprehension in EST (see table 24).

Table 24. Teachers´ beliefs on raising metaphorical awareness – MOMENTUM B (n=26)

Q 5a	n	Percentage (%)
AG	25	96 %
DAG	1	4 %
Total	26	100 %

These percentages are verified by the clarification answers to Question 5, where the great majority (96%) of the teachers' comments support the idea that the raising of metaphorical awareness would be beneficial to enhance students reading comprehension[28]. Look at the following examples taken from the teachers' answers:

- *Because many metaphors are language specific and they really need that help. They cannot infer the meanings.*
- *Definitely. One should not take anything for granted. Exercises with samples taken from actual technical texts should be included in the workbooks and make students aware of these forms. I am sure metaphorical language is also included in one way or another in the freshman courses of the Language and Literature courses. Maybe something could be done to include them in the same trimester so that the transfer L1-L2 or even L2-L1 can be made. All the best in this interesting research study and I look forward to reading about its results.*
- *Learning a language without learning at least some of its many metaphors is unwise and also not so much fun. I also think that the sister concept of analogy can and should be included explicitly in the program along that of metaphor. Analogies can act as a bridge to metaphors since they are, in a manner of speaking, metaphors made explicitly clear.*

[28] See the transcribed answers in Appendix R.

Table 25 below displays the percentages gotten in the clarification part, question 5, Momentum B.

Table 25. Percentages of Clarification part- Question 5 – MOMENTUM B (n=26)

Q 5b	n	Percentage (%)
i	1	4%
iv	25	96%
Total	26	100%

4.3.6 Main findings in MOMENTUM B

Summarising the main findings of MOMENTUM B it could be said that the position of the majority of the teachers concerning their understanding of metaphorical language is the traditional one. In their opinions, metaphorical language is viewed as a non-literal figure of speech that uses one thing to mean another and makes a comparison between the two. Only a minority of the teachers appeared to be aware of the contemporary view of metaphor understanding.

In addition, most of the teachers agreed with the fact that metaphorical instances frequently appear in the EST reading content and learning setting; even so, a few of the them confessed that they were not aware of the presence of this type of figurative language in EST. Furthermore, an important part of the teachers' notes seemed to indicate the classical belief that metaphorical instances are mostly use in literature and poetry contents.

Additionally, the majority of the teachers perceived that the students are not able to identify and interpret metaphorical language in reading comprehension because they do not have the linguistic threshold to understand this kind of

language. Correspondingly, almost every teacher believed that they help their students with the understanding of metaphorical language in the reading process and only a minority did not think to do so. Additionally, the great majority of the teachers' comments support the fact that the raising of metaphorical awareness would be beneficial to enhance students reading comprehension in EST.

4.4 Findings for MOMENTUM C

MOMENTUM C of the study was designed to observe the way in which university students enrolled in the third and last course of the FYEP actually dealt with metaphorical meaning in authentic language usage. The study was also designed to support students' answers in MOMENTUM A with their actual performance on two tasks based on the interpretation of metaphorical language used in EST texts.

In this particular case, students` responses were textually transcribed, coded, and categorised based on the type of answer detected during the analysis. Moreover, as explained in Chapter 3, the metaphorical meanings of the lexical items were operationalised using MIP (Pragglejaz Group, 2007).

4.4.1 "Interstellar clouds"

As mentioned before, the first task was distributed to 94 students as part of a summative assessment on a unit test on the topic of **the universe**. In this case, students were asked about their interpretation of the expression "Interstellar clouds appear to be the graveyard of life not its cradle" used by the author as an argument to support the hypothesis that interstellar clouds do not promote life since organic molecules are destroyed in them.

It is seen that the lexical units (words) used by students were metaphorically related and associated to the literary meaning of the words used in the metaphorical expression. Nevertheless, for many of the participants it was difficult to grasp and guess the real metaphorical meaning from the context of the text.

Table 26 shows the results of the most repeated words, in alphabetic order, used by students when answering the first task after the use of a word frequency counter[29] to group and analyse data.

Table 26. Word frequency repetition – Task 1

Lexical units	Frequency
bacterias	23
cementerio	22
cometas	26
cuna	23
interestelar	50
moleculas	20
nubes	67
planeta/planetas	20/25
vida	81

From these results, we can see that the Spanish noun students mentioned the most was *vida,* a metaphorical related word*,* followed by *nubes*, *planeta/planetas* and the adjective *intestelar*, which is also a metaphorical related word. Nonetheless, it appeared that 62% of the sample did not seem to understand to some extent the underlying message of the expression; therefore, their answers were categorised

[29] Word Frequency Counter http://www.writewords.org.uk/word_count.asp

as Content unawareness (CUAW). The following quotes illustrate students' answers:

- *Dice que la llegada de las nubes interestelares con vida no son una coincidencia, insinúa que fue planeado.*
- *A mi parecer quiere decir que las nubes interestelares no son los cementerios de la vida, sino que a través de ellas se transportan de planeta en planeta, es decir, como una incubadora o su cuna.*
- *Indica que para Wickremasinghe la vida no se forma en la tierra, sino en otros planetas. El planeta no es la cuna del universo.*

Moreover, 33% of the sample seemed to have a closer idea of the underlying meaning of the metaphorical expression and their responses were categorised as Content awareness (CAW), look at the following examples:

- *Porque en realidad los microbios sobrevivientes se encuentran en los cometas y en la nube de polvo solo hay moléculas orgánicas (posiblemente sin vida).*
- *Las nubes interestelares que muchas personas piensan o pensaban que de ahí se formó la vida, no lo son, en cambio son los residuos de las bacterias que no formaron vida en los planetas, es decir, un cementerio para microbios, no la cuna para la vida.*
- *Él se refería a que en las nubes interestelares se encontraban materiales orgánicos o bacterias que, en lugar de multiplicarse, morían.*

Additionally, a minority of the group (3%) did not answer the question. One answer showed Metaphrase awareness (MPAW) as it was based on a word-for-word or literal translation into Spanish of the text, without any further explanation of the message. Another participant showed Metaphorical awareness (MAW) as he was able to identify the meta-pragmatic message of the metaphor in itself, and became aware of the metaphorical sense of the expression. The following quotes illustrate the answers:

- *Que las nubes interestelares parecen ser el cementerio de la vida, no su cuna* (MPAW).
- *Se refiere a que las moléculas orgánicas que hay en las nubes interestelares son en realidad restos de bacterias destruidas o muertas en vez de estar vivas, por eso usa la metáfora de que estas nubes son cementerios en vez de cunas* (MAW).

Appendix U shows the textually transcribed answers to this question and Table 27 shows the percentages obtained.

Table 27. Students´ interpretation of the expression "Interstellar clouds" (n = 94)

Category	%	n
CUAW	62	57
CAW	33	32
DA	3	3
MAW	1	1
MPAW	1	1

4.4.2 "Struggle for existence"

As it has been explained, the second task, distributed to 135 students, was part of a formative assessment on the topic of evolution. Students were asked on their

interpretation of the meaning of the metaphorical expression “struggle for existence”, used to illustrate the phenomenon of natural selection in which Darwin’s theory of evolution was based.

Table 28 shows the results of the most repeated words, in alphabetic order, used by students when answering the second task after the use of a word frequency counter to group and analyse data.

Table 28. Word frequency repetition – Task 2 MOMENTUM C

Lexical units	Frequency
ambiente/ambientales	35
existencia/existir	72
fuerte	26
gen/genética	29
lucha/luchar	51
natura/naturleza	29
población	34
selección	22
sobrevivir	60
struggle	28

As it can be seen, the Spanish noun students mentioned the most was *existencia*, followed by the verbs *sobrevivir*, *luchar* and the noun *especies*. In this case, half of students´ answers (50%) showed some kind of misunderstanding of the question being asked and a misinterpretation of both the content of the text as well as the metaphorical interpretation of the message. Consequently, these

answers were categorised as Content unawareness (CUAW), see the following examples taken from students' answers:

- *Son las adaptaciones genéticas en el ser humano producido por los cambios en el ambiente.*
- *Mezclas para la existencia, una gran variedad de genes ayuda a la reproducción individual de las especies.*
- *This expression for me means that when the earth is full of people, we will have to fight for our existence.*

Moreover, an important percentage of the sample (38%) seemed to have a closer understanding of the underlying meaning of the metaphorical expression and their responses were categorised as Content awareness (CAW), look at the following textual quotes:

- *Significa luchar para sobrevivir, esto es debido a que se crean más individuos de los que el medio ambiente puede soportar por lo tanto solo sobreviven los más aptos con mejores capacidades para sobrevivir hasta la madurez sexual y así poder reproducirse.*
- *La lucha por la existencia, o mejor dicho, la lucha por la supervivencia, lo cual implica la supervivencia del más apto a las adversidades naturales del entorno, también denominado "selección natural". El hecho de que la naturaleza presente adversidades implica que solo los más aptos sobrevivirán a esta lucha.*
- *Como se maneja la selección natural, "La existencia" puede referirse a la supervivencia del más apto, como se producen menos genes y otros mueren.*

Additionally, a minority of the group (2%) did not answer the question, and 6% showed Metaphrase awareness (MPAW) as it was based on a word-for-word or literal translation into Spanish of the text, without explaining their understanding in them, for example:

- *The expression means fighting for live.*
- *Es como una capacidad de existir o sobrevivir en un ambiente.*
- *La lucha por la sobrevivencia.*

Finally, 4 % of the sample showed Metacognitive unawareness (MCUAW) as they confessed that they could not understand the meaning of the expression. The following quotes illustrate the qualitative answers:

- *No entiendo a qué se refiere con "struggle for existence". El lenguaje se me dificulta.*
- *No tengo idea.*
- *No comprendo mucho lo que quiere decir.*

Appendix V shows the textually transcribed answers to this question and Table 29 the percentages obtained.

Table 29. Students´ interpretation of the expression "Struggle for existence" (n = 135)

Category	%	n
CUAW	50	67
CAW	38	51
DA	2	3
MPAW	6	9
MUAW	4	5
TOTAL	100	135

4.4.3 Main findings in MOMENTUM C

MOMENTUM C was designed to observe the way university students enrolled in the third and last course of the FYEP actually dealt with metaphorical meaning in authentic language usage while involved in two reading tasks.

Regarding the first task in which students were asked for their interpretation of the metaphorical expression “Interstellar clouds appear to be the graveyard of life”, the data show that more than half of the non-native speakers (NNSs) of English did not seem to be aware of the underlying communicative intention of the message. In contrast, the remaining percentage of the sample seemed to have a closer idea of the meaning of the metaphorical expression, and only one subject was able to identify the meta-pragmatic message of the metaphor in itself.

With respect to the second task in which students were asked for their interpretation of the metaphorical expression “struggle for existence”, it could be said that half of the sample showed some kind of misunderstanding of the question being asked and a misinterpretation of both the content of the text as well as the metaphorical interpretation of the message. Additionally, a minority of the group confessed that they could not understand the meaning of the expression. On the contrary, the reaming percentage of the sample seemed to have a closer understanding of the underlying meaning of the metaphorical expression.

On the one hand, it could be said that the first metaphorical stance “Interstellar clouds appear to be the graveyard of life”, was not easy to interpret by the majority of the subjects in general. Even though students seem to be familiar with the content of the topic and particularly with the specific subject of the theory of panspermia, the metaphor appeared to be less prototypical and only a few students

seemed to be conscious of the real communicative intention of the message. On the other hand, the second metaphorical expression “struggle for existence” seemed to be more prototypical and therefore easier to be interpreted by an important part of the group.

4.5 Findings of MOMENTUMS A – B – C compared

In order to see if there is any connection between students’ answers in MOMENTUM A, teachers’ perception in MOMENTUM B, and the actual performance of students on two tasks based on the interpretation of metaphorical language used in EST texts in MOMENTUM C, the findings of the three stages are compared here. By combining self-reported data (students and teachers’ answers to the questionnaire) with more objective assessment instruments of analysis, we expect to provide evidence to compare students’ and teachers` points of view of metaphorical instances, with students’ actual interpretation and immediate performance of metaphorical language in the reading comprehension tasks.

Concerning the answers to the questionnaire in Momentum A, the results indicate that many of the students seemed to have an idea of the meaning of metaphorical language and appeared to be aware of the presence of this kind of figurative language when reading EST material. However, an important part of the group confessed that it was not always easy for them to identify and interpret this kind of figurative language in reading comprehension. What is more, the majority of students’ comments emphasised the fact that being aware of the presence of metaphorical language would be very helpful to enhance their reading comprehension skills in EST.

In relation to teachers' opinion in MOMENTUM B, it could be said that most of them are aware of the fact that metaphorical instances are frequently encountered in the EST reading materials. Moreover, many of them perceived that the students are not able to identify and interpret metaphorical language in reading comprehension. Likewise, the majority of the teachers believed that they help their students with the understanding of metaphorical language in the reading process and agreed with the fact that the raising of metaphorical awareness would be beneficial to enhance students reading comprehension in EST.

Regarding the way students comprehend metaphorical language in EST in MOMENTUM C, we concluded that although some of the students appeared to be aware of the real communicative intention of the figurative expressions, in general terms, the majority of them do not seem to be able to do so.

Summarising, and combining the findings, it could tentatively be concluded that, to a certain extent, there is a link among the three stages in the study with respect to students' perceptions, teachers' opinions and students' performance. On the one hand, the meaningful and relevant data yielded from the self-reported instruments, which are of a metacognitive nature, showed that both students and teachers agree with the fact that increasing learners' knowledge of figurative language will be useful to enhance their reading comprehension performance in EST university settings. On the other hand, the results obtained from the students' performance indicated some reading comprehension weaknesses and low levels of awareness when they have to critically deal with metaphorical language.

The results also indicated that only a minority of the students were able to identify or express their meta-pragmatic knowledge of the metaphors being asked,

and only a few appeared to be conscious of the real communicative intention of the message. These findings partially match those of Littlemore (2001b, 2008), which demonstrated that overseas students attending university lectures in English for Academic Purposes (EAP) often misunderstood and misinterpreted the main point of lectures due to inappropriate metaphorical connotations. Other similar results are reflected in the study of Pereira (2016) conducted to assess metacognitive and metaphorical awareness of Business Administration students when reading financial accounting texts in English in a pro-CLIL[30] university situation.

In our case, one of the possible explanations for students' weak performance in reading comprehension may be precisely linked to a lack of training and practice, which in turn is related to the fact that metaphor is not frequently included as an integral part of the second and foreign language curriculum (MacArthur, 2016).

To that effect, we agree with the documented position that the explicit use of metaphors in EFL classroom might enhance the communicative skills of the learners (Cameron and Low, 1999; Low, 1999; Littlemore and Low, 2006; Roldán and Úbeda, 2013). Consequently, it is advisable to include the notion of metaphor as part of any ESP teaching program (Velasco, 2005), from the earliest to the most advance stages of learning.

Moreover, the teaching and learning methodologies should place more emphasis on the development of metaphorical awareness in EST reading comprehension (Hirvela, 2013). The material design and implementation of activities that help students raise metaphoric competence would help them not only to increase their motivation and cultural knowledge in general, but also to improve their

[30] Content and Language Integrated Learning (CLIL) as a recommended teaching method.

reading comprehension and self-esteem and encourage them to use the English language more confidently and creatively. Classroom-based research (Gass and Mackey, 2007), which is mainly design to gather data to gain more information about a particular learning problem, is an effective option to improve teaching practice and enhance our insights in terms of second language acquisition theory.

4.6 SUMMARY

In this chapter, we have reported the results obtained from the data analysis of our research study in three different stages (MOMENTUM A, MOMENTUM B, and MOMENTUM C). First, a separate interpretation of the findings were presented and discussed. After that, taking into consideration that each different stage complements each other, a holistic interpretation of the findings was offered.

In the following chapter, we provide a description of a classroom-action study that was conducted with the purpose of developing classroom material for raising metaphorical awareness among university students and enhance their reading comprehension. The focus was on a pedagogical intervention by means of the development and implementation of a didactic unit based on a teaching methodology intended to explicitly promote the identification of metaphorical instances in EST reading as a metalinguistic and metacognitive activity through the setting of practical teaching and learning goals.

CHAPTER 5: MATERIALS DEVELOPMENT FOR CLASSROOM-ACTION RESEARCH

5.1 Introduction

As stated in Chapter 4, a possible reason for students not being successful in identifying and understanding metaphors in EST reading may be due to a lack of training and practice in this specific area. In our view, the design and implementation of conscious-raising tasks (Ellis, 2010) that "would promote language awareness and foster learners' autonomy" (St. Louis et al, 2019, p. 252), could help students with the development and the efficient application of reading strategies through the use of activities to be practiced in class (Nation, 2009).

In this regard, with the intention of raising metaphorical awareness amongst university students a classroom-based research (Gass and Mackey, 2007) was designed. Classroom-based research typically implies action research, a practical framework that "can help a teacher develop and reflect on their own teaching" (Hugues, 2010, p. 198). According to Burns (2009), action research "is the combination and interaction of two modes of activity – *action* and *research"* (p. 289). It consists in the development of a plan intended to generate change in any aspect of the teacher´s own classroom with a subsequent implementation, observation and critical reflection on the effects of the action plan (Richard and Lockhart, 1994).

Action research is an approach that corresponds to the requirements of material development, adaptation and evaluation. It supports teachers' classroom context-specific material development based on learners needs (Edwards and Burns, 2016). In our particular case, a classroom-action research was conducted by means of the design of a didactic unit inspired on a metalinguistic approach to

foreign language learning. The emphasis was plased on the raising of awareness in specialised reading as a metacognitive activity (Nagy and Anderson, 1995; Nagy, 2007). This process methodology aids students in developing knowledge of how vocabulary and other language forms are used in different text types. The purpose is to try to make students' conscious of the presence of metaphorical language in their reading texts, to encourage them to identify and make use of metaphorical instances while reading, and to reflect about their own learning progress and outcomes.

5.1.1 Participants

One English Reading Comprehension (ERC) class, totalling a sample of 26 students, participated in this classroom-action study. The participants were all Spanish native speakers, first-year students, enrolled in the second (ID1112) 3-month ERC course at the USB in the September - December 2016 academic term. Students´ ages ranged from 17 to 20 years old, who belonged from different specialised areas of engineering, pure, and applied sciences.

5.1.2 Materials development: The didactic unit

This section describes the stages in the development of materials. According to Tomlinson (2016), materials development is now recognised as one of the most important activities in applied linguistic research. Materials are any mechanism that is used to facilitate language learning. Materials development can be informative, instructional, experiential, eliciting and exploratory, and involves the production, evaluation, adaptation, and exploitation of resources planned to ease language learning and progress (Tomlinson, 2012).

In our study, a tailor-made didactic unit, specially planned by the researcher, was developed to try to raise university students' metaphorical awareness in specialised reading. In this regard, an understanding of the nature of reading is essential in the development of assessment materials (Alderson, 2000). The didactic unit called *Focus on figurative language* [31] consisted on four lessons that included reading and writing assessment tasks. The activities were made up of multi-text exercises such as images, matching, and multiple choice, which constitute an effective and relatively simple design for teaching materials (Low, 1988). In addition, this type of reading and writing activities could be seen as an integral part of effective teaching.

In order to build the input material, the researcher examined some readings texts from the original material included in the *Focus on Reading selections for ID1112* (2015) guide designed for the second course of the reading program. The examples and texts selected were aligned with the specific objectives of the course and with the rhetorical functions that has to be taught along the lessons, that is to say: definition, description, classification, comparison, and contrast. When developing the activities, several variables were also taken into account such as the learning context, the learners' linguistic and cultural backgrounds, and their linguistic threshold in the foreign language. Activities were designed keeping in mind that most of the students have a low proficiency level in the foreign language in relation to lexico-grammatical and socio-cultural aspects, which makes the cross-linguistic transfer of reading skills more difficult (Koda, 2007).

[31] See appendix W for the complete didactic unit.

After attempting a couple several previous drafts, the concluding didactic unit was finally created as supplementary teaching materials It was developed by applying problem-solving skills (analysis), decision-making skills (synthesis) and critical thinking skills (evaluation). This promotes active learning and metacognition (Kuhn, 2000) because students are involved in doing things and thinking about the activities they are carrying out. The aim was to highlight the metaphorical meanings of several words and phrases that appeared in the reading passages articles. Some of the activities were adapted and followed the methodology suggested by Gillian Lazar (2003) in her seminal book *Meaning and Metaphors Activities to practice figurative language.*

In general, the didactic unit was mainly designed to accomplish the following **purposes**:

a. To raise students' awareness of the existence of figurative language in EST reading.
b. To introduce the concepts of metaphors and similes.
c. To raise students' awareness of some functions of metaphorical language in EST genre.
d. To raise students' awareness of how visual metaphors are use in science.
e. To stimulate imagination, creativity and critical thinking.
f. To develop metalinguistic and metacognitive awareness.
g. To enhance reading comprehension.

Lesson 1 of the didactic unit was created to introduce the notion of figurative language and its role in reading comprehension in EST. The instructions were arranged as follows:

1 First, students were requested to read an introduction about the concept of figurative language, to read the definitions of metaphor and simile, and to be conscious of the difference between the two concepts. In addition, to promote analogical reasoning and activate imagination, a visual metaphor in science that compares the atom with the solar system was introduced and explained.

2 Second, using the example of a simile, the lesson made clear that some words have both, literal and metaphorical meanings. In order to check understanding, students were asked to identify some simple examples of metaphors and similes and to explain their meanings.

3 Third, to consolidate learning and activate imagination and creativity, students were told to work in pairs to create their own metaphors and similes in English.

4 Finally, to activate metacognition and critical thinking, students were asked to reflect about their own learning during the activity.

Lesson 1 is presented in the following chart (see Figure 3).

Figure 3. Lesson 1.

Lesson 1 *Focus on figurative language: metaphors and similes*

It is important to understand how figurative language is used in reading. Figurative language, which is also known as metaphorical language, involves the using of comparisons between two things, different enough that when compared, they provide a more abstract or imaginative meaning in the mind of the reader.

Figurative language is the opposite of literal language; it uses words or expressions with a meaning that is different from the literal interpretation or most basic meaning of the phrase to show or create a picture in your mind.

Figurative language is very common in poetry and prose, but it is also used in nonfiction writing and science and technology texts. Becoming aware of figurative language may be very useful to increase and organise your vocabulary knowledge, to

improve your reading comprehension in science and technology texts, and to understand better some cultural aspects of the English language.

Some of the most common types of figurative language are *metaphors* and *similes.*

What is a metaphor?

A metaphor is a form of figurative language that compares two objects or ideas in order to emphasise a particular quality they have in common despite their essential differences. It is a comparison made between things that are essentially not alike.

For example, the sentence ***The atom is a miniature solar system*** compares the atom with the solar system. As the picture below shows, the solar system consists of a sun in the middle with smaller planets rotating around it in their orbits. Similarly, an atom consists of a nucleus with a number of electrons in orbits around that nucleus. Therefore, some of the characteristics of the solar system are transferred to the atom.

The following diagram helps to illustrate this relationship. [32]

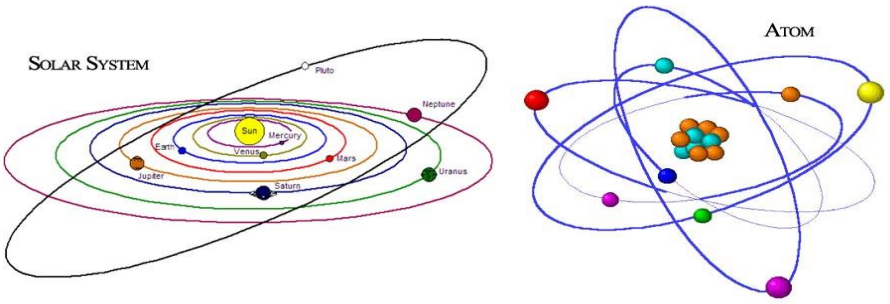


DIAGRAM OF THE SOLAR SYSTEM AS COMPARED TO THAT OF AN ATOM

What is a simile?

Like a metaphor, a simile is a comparison between two situations, processes or concepts that are similar in a few ways. A simile describes something by comparing it to something else. In a simile the words *as* and *like* are used to explicitly make the comparison as in the following example:

The atmosphere is like a blanket of gases that surrounds the earth.

In this case, the *atmosphere* is compared to a *blanket*.

The literal meaning of **blanket** is a cover made of wool or another material that you use to keep you warm in bed. In the example however, a **blanket** has a metaphorical connotation as it is seen as a **layer** of something, for example snow or cloud, that completely **covers** an area, in this case the earth. Therefore, different meanings must be understood in their context.

Summarising

A metaphor compares two things without using like or as, for example:

[32]Retrieve from http://www.nextculture.net/wpcontent/uploads/2014/11/SolarSystem_to_Atom.jpg?width=750

The brain is a machine.

A simile compares two things using like or as, for example:

A computer works like the brain.

Exercise 1. Identifying metaphors and similes

Read the following sentences and identify if they are metaphors (M) or similes (S). Circle your option as you read. Explain what each one means.

a. The clouds are marshmallows in the sky. M S

_____

b. The sea is as blue as the sky. M S

_____

c. The atmosphere is like an invisible shield of air. M S

_____

d. The light is as bright as the sun. M S

_____

e. The earth is keep warm by the sun´s heat. M S

_____

Now, in pairs, write down a metaphor and a smile that you can think about in English. Discuss them with the rest of the class.

_____
_____
_____

 What have you learnt from this activity?

_____

Lesson 2 of the didactic unit was aimed at highlighting and reinforcing that some words have both a prototypical or more basic meaning, and a figurative meaning. Five short texts were selected from the reading guide as input for reflection and discussion. The steps were the following:

1 First, students were asked to read the texts and to try to identify the underlying metaphors.

2 Then, in the consolidation part, students were encouraged to do a matching exercise in other to link each key term with both its literal and its metaphorical meaning.

3 Finally, at a higher cognitive level, the whole class was asked to discuss about the different possible interpretations these metaphors could have.

Lesson 2 is next presented in Figure 4.

Figure 4. Lesson 2

Lesson 2 *Focus on figurative language: literal vs metaphorical meanings*

In lesson 1, the concepts of metaphor and simile were introduced. You were also encouraged to identify metaphors and similes, to create your own metaphors, and to reflect about your learning experience.

Remember that a metaphor is a direct comparison between two or more seemingly unrelated subjects. Its essence is to understand one thing in terms of another; for example: Time flies.

A simile is a figure of speech that compares two unlike things by the use of like or as.: for example: A feather is as light as the air.

As a result, it may be said that a metaphor equates two items whereas a simile compares them.

Exercise 2. Metaphor Hunt

1. These short texts are written to define or describe something. All of them contain at least one word that is used metaphorically. Read them and try to hunt all the metaphorical words you can find. Underline the words in the text.

A. Parasitoids, organisms that are parasitic but kill the host, albeit gradually, are, however, usually included in predator-prey discussions.

B. Some nutrients build and repair body tissues and help control different processes of the body like the absorption of minerals and the clotting of blood.

C. Vitamin A in the diet comes from deep yellow fruits and vegetables, dark green leafy vegetables, and whole milk.

D. Vitamin D is called the "sunshine" vitamin. When people sit outside, ultraviolet rays from the sun change a fat in their skin to vitamin D.

E. Certain plants, like the popular sansevieria, need very little water. Other plants, called succulents, need even less. They store their water in their leaves.

Use the space below to write the words that you underlined in the texts.

_____

_____

2. In the following chart, there are some words taken from the texts. Match each word with both its literal meaning in column A and its metaphorical meaning in column B.

Words	A. Literal meanings	B. Metaphorical meanings
build (Text B)	1 to make a building or other large structure by putting its parts together	a. used for talking to someone or something who you are annoyed with
deep (Text C)	2 going a long way down from the top or the surface	b. a dark and strong colour
host (Text A)	3 someone who invites people to a meal or party, or to stay in their home	c. a plant or animal that has another plant or animal
store (Text E)	4 to keep something in a particular place	d. to increase, or to make something increase
sunshine (Text D)	5 the light from the sun	e. to save information in electronic form, for example in a computer's memory

 Can you think of other uses of the word host? In which areas? You can find some of them in your dictionary.

Lesson 3 of the didactic unit was created to make students aware of polysemy. The steps were the following:

1. First, the learners were required to use their background knowledge to fill a word association semantic map. This allowed students to engage with the topic, to gain confidence and to break up the monotony. The text selected was called *The branches of mathematics* which was used to present classification as a rhetorical function in reading comprehension.
2. Next, four polysemy words were chosen from the text to create a multiple-choice activity. The main purpose was to make students aware of the fact words may have more than one sense. One word can have several meanings and the literal meaning of a word may vary depending on the context in which it appears.
3. Finally, to explore the topic further, students were asked to think and write down any other polysemy word they could think about.

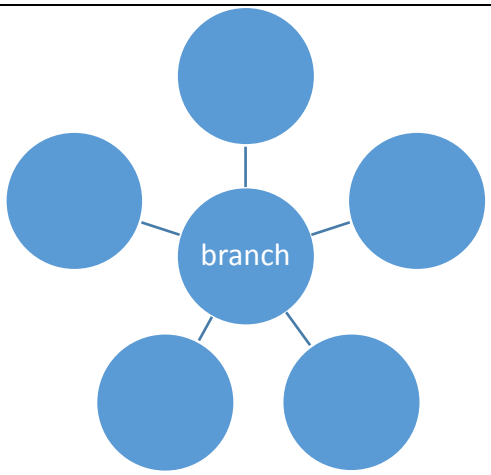
Lesson 3 is shown in the following space (see Figure 5).

Figure 5. Lesson 3

Lesson 3 Focus on figurative language: polysemous words

In lesson 2, we learnt that in science and technology texts we could find words that can have both, literal or more common meanings, or metaphorical or more abstract ones. These words are known as polysemous words because they have more than one meaning.

The title of the text you are about to read is ***The branches of mathematics.*** What does the word *branch* mean in this context? Can you think of any other meaning for the word *branch*? Use the balloons to write your ideas or key words.



The Branches of Mathematics

Mathematics is an essential and fascinating branch of human knowledge. It has important uses in many areas of modern life, including science, industry, and business. Mathematics can be defined simply as the study of quantities and relations. It uses numbers and symbols to do this. This definition, however, does not explain that mathematics can be divided into many different branches. There are at least eight areas of math generally studied by elementary, secondary, and college students: arithmetic, algebra, geometry, trigonometry, analytic geometry, calculus, probability, and statistics.

Arithmetic can be divided into four basic operations: addition, subtraction, multiplication, and division. It is the simplest branch of math and is usually studied in school. After arithmetic, students usually study algebra. Algebra is more general than arithmetic. It uses letters such as "x" and "y" to find unknown numbers. One interesting invention of algebra is logarithms. They are usually found by referring to a logarithm table.

Geometry is generally learned in secondary schools. This branch of math deals with lines, angles, planes, and solids. For purposes of teaching, geometry is often divided into two branches, plane geometry and solid geometry. Plane geometry deals with shapes, such as circles and squares that lie on a flat surface. Such shapes are in two dimensions. Solid geometry deals with shapes that have three dimensions. Such shapes are spheres, cubes, and pyramids.

The branch of math that deals with the relation between the sides and angles of triangles is trigonometry. Trigonometry also is often divided into two branches: plane trigonometry and spherical trigonometry. Plane trigonometry deals with triangles on a flat surface. Spherical trigonometry deals with triangles on the surface of a sphere. Trigonometry is very useful to navigators, astronomers, and surveyors.

Analytic geometry is the branch of math that applies algebra to geometry. It is often used by engineers and physicists. An example of analytic geometry is the drawing of a curved line to represent an algebraic equation (e.g. "$y = x^2$").

The branch of math that deals with changing quantities is calculus. Calculus has many applications in all areas of science. Without calculus, the calculations necessary for landing on the moon could not have been made.

Two final subdivisions of mathematics are probability and statistics. Probability is used to make predictions about whether something will happen, and has a wide range of applications. Statistics is used to analyze large bodies of numbers. It is used in all the sciences to organize and analyze masses of facts and draw conclusions from them.

Taken from: Drobnic, K., Abrams, S., & Murray, M. (1981).
SCI Tech. Reading and writing: The English of science and technology. ELS Publications, p. 74.

Exercise 3. Polysemous words.

Choose the best dictionary meaning for the words found in **bold print.**

1. This **branch** of math deals with lines, angles, planes, and solids.

   a. part of a complex body as an area of knowledge that may be considered a part from related areas
   b. a natural subdivision of a plant stem
   c. a division of an organization

2. This branch of math deals with lines, angles, **planes**, and solids.

   a. powered heavier-than-air aircraft that has fixed wings from which it derives most of its lift
   b. flat or level surface
   c. level of existence, consciousness, or development

3. Plane geometry deals with shapes, such as circles and **squares** that lie on a flat surface.

   a. a person who is conventional or conservative in taste or way of life
   b. the product of a number multiplied by itself
   c. a rectangle with all four sides equal

4. Plane geometry deals with shapes, such as circles and squares that lie on a **flat** surface.

   a. an apartment on one floor
   b. a deflated tire
   c. a level part

 Can you think of any other polysemous words in English? Write them in the space provided. Why are they polysemous? Discuss them with your classmates.

Lesson 4 of the didactic unit was designed to encourage the learners to focus closely on the language of science and to help them to develop their critical thinking abilities. In this case, the text selected was called *What is the Greenhouse effect?*

It is important to highlight that the "greenhouse effect" metaphor has been historically used in science. Nowadays, it is widely used in climate change issues to explain the risky phenomenon of global warming (Nerlich and Hellster, 2014). The greenhouse metaphor maps our knowledge about how a greenhouse functions "onto what happens in the earth´s atmosphere as a result of human action" (Koteyko and Atanosova, 2016, p. 301).

In this case, the lesson was arranged as follows:

1 First, students were given a matching exercise to consolidate key metaphorical terms included in an article.
2 Next, to meet the objectives of the course, they were asked to identify and write down the definitions found in the text. In addition, some of these definitions were written with the help of metaphorical expressions.
3 Then, to explore and analyse students' interpretation and awareness of metaphorical stances, they were asked to look for one figurative word or expression found in the text.
4 Afterwards, they were encourage to explain, in Spanish and using his or her own words, why the word or expression was being used figuratively.
5 Finally, to explore the topic further, a post-task activity was designed to trigger students' metacognitive awareness with respect to both,

content and language. It was also designed to make students reflect about their own learning process.

Lesson 4 is shown in Figure 6.

Figure 6. Lesson 4

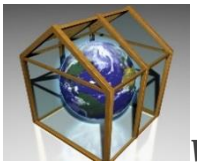
Lesson 4 Focus on figurative language: the greenhouse metaphor

Many times scientist use metaphors to try to explain scientific events. The greenhouse metaphor is one of those cases. It is used to explain a climate change phenomenon called the greenhouse effect.

What do you know about the greenhouse effect? Why do scientist refer to a ***"greenhouse"*** when talking about climate change aspects?

_____

_____



WHAT IS THE GREENHOUSE EFFECT?

A greenhouse is a glass or plastic building in which the temperature and humidity are controlled so plants have the best possible conditions. The glass or the plastic keeps the warmth of the sunlight inside. The Earth is kept warm by the atmosphere. The atmosphere acts very much like a glass of a greenhouse. Some natural gases in the atmosphere are warming gases. These gases form a blanket which allows sunlight to enter but does not allow all of the heat in the atmosphere to escape back into outer space. They prevent the Earth from reflecting solar heat back into space. This result is called the greenhouse effect. Planets that do not have greenhouse protection may be much colder than the Earth. Without the greenhouse effect, the earth would be 33 degrees cooler, and it would be covered by ice. Human activities have increased the amount of natural gases in the atmosphere. Modern developments have also created synthetic gases. The atmosphere is now holding in more heat than it is used to. This added heat is known as global warming. Global warming has changed the heat balance of our planet. [33][34]

[33]Image retrieve and adapted from http://www.livescience.com/37743-greenhouse-effect.html
[34] Reading prepared and adapted from http://climatekids.nasa.gov/greenhouse-effect/

Exercise 4

Match the terms found in column **A** with their definition in **B**.

A	B	Matching
1. atmosphere	a. a building made of glass that is used for growing plants that need protection from the weather	
2. blanket	b. the slow increase in the temperature of the Earth that increase the amount of carbon dioxide in the atmosphere	
3. global warming	c. the process in which heat is unable to escape from the atmosphere and causes the temperature of the Earth to rise.	
4. greenhouse	d. the air round the Earth or round another planet	
5. greenhouse effect	e. a thick cover made of wool or another material that you use to keep warm in bed	

Identify the terms being defined in the passage and write them in the space below. Circle in the text the signal words that correspond to each definition.

_____
_____

Identify one figurative expression found in the text. a) Write it in the space provided. b) Why is it figurative? c) Is it a metaphor or a simile? Explain your answer in Spanish using your own words.

_____
_____
_____

 What have you learnt from this exercise? You can answer in English or in Spanish.

_____
_____

Furthermore, as a final project assignment, students were asked to create a glossary of terms to be submitted at the end of the term. Students were requested to record in alphabetic order 10 new words they have learnt along the unit. The purpose was to encourage vocabulary building, to consolidate learning, to raise

metaphorical awareness and metacognition, and to develop motivation and critical thinking. In addition, this kind of activities provide “students with an aid to memory and a sense of progress” (Lazar, 2003; p.2). The criteria for the construction of the glossary was adapted from the **student record sheet** proposed by Lazar (2003). In our specific case, students had to:

a. Select 10 new words or expressions they have learnt in the unit.
b. Record them in alphabetic order.
c. Use a dictionary to record both the literal and the metaphorical meaning of each of the word or expression selected. Indicate the dictionary or dictionaries used.
d. Write the example sentence from which the word or expression was taken.
e. Use an image to illustrate the metaphorical sense of the word or expression.
f. Explain in Spanish and using his or her own words the reason why the word or expression selected is used figuratively in the example given.

5.1.3 Classroom-action research: material implementation

The participants involved received pedagogical treatment during four weeks distributed in eight micro lessons of 15-minute instruction on metaphorical awareness among the regular schedule of the term. Class activities were gradually conducted with the purpose of:

a. informing students about the existence of metaphorical language in EST reading
b. guide them in the practice and use of the language
c. encourage them to make discoveries about the language used.

The teaching methodology was designed to show students how to recognise and interpret the meaning of figurative language, including similes and metaphors in context and to think critically about metaphorical language. Along the whole treatment, awareness of cross-linguistic similarities and differences in figurative expressions were used to increase the chances of reading comprehension and to help with the understanding of complex concepts. As a result, because it was a monolingual class, some of the concepts and examples were clarified in Spanish to encourage students' discussion.

During all the lessons, students were helped with any vocabulary queries and were also encouraged to use dictionaries if necessary. Their examples and answers were most of the time written on the board, discussed and corrected with the whole class. For additional help, students were also provided with a copy from a Glossary of figurative language terms (Lazar 2003) that included the definition of the following terms: analogy, association, collocation, to collect, fable, figurative, idiom, literal, metaphor, metaphorical, proverb, rhetoric and simile. The meaning of these terms were studied in class. In addition, internet links to assess some useful online dictionaries were provided. The links appear in the following footnote[35]

5.2 Summary

In this chapter, we have presented a classroom-action research carried out with the purpose of raising students' awareness of metaphorical language in reading comprehension in EST. The focus was on an action research pedagogical intervention by means of the development and implementation of a didactic unit

[35] http://www.collinsdictionary.com/ http://www.oxfordlearnersdictionaries.com/us/ http://www.macmillandictionary.com/ http://www.ldoceonline.com/

based on a teaching methodology that explicitly promotes metaphorical awareness. The emphasis was placed on the identification of metaphorical instances in EST reading as a metalinguistic and metacognitive activity through the setting of practical teaching and learning goals.

In the next chapter, we present the data analysis procedures and the analysis of the results obtained from the descriptive data obtained from the classroom-action research. It also presents a discussion of the data analysis, a summary of the findings and of the research objective reached.

CHAPTER 6: ANALYSIS AND RESULTS OF THE CLASSROOM-ACTION RESEARCH

6.1 Introduction

In this chapter, we present the data analysis procedures and the results obtained from a classroom-action research that was conducted in order to raise metaphorical awareness in the students at the Universidad Simón Bolívar and enhance their specialised reading comprehension.

Another important goal could be to provide a rich descriptive data about what happens in the foreign language classroom through an in-process evaluation of student performance, comprehension and learning needs that can later be used to improve instruction. Once more, students' responses were textually transcribed and grouped based on the type of answer reported. Next, categories were created for the analysis[36].

6.2 Data analysis procedures

In this particular case, two instants were taking into consideration for the analysis.

Firstly, as a pre-test measurement, we analysed the answers obtained from the last question included in exercise 1 of Unit 1:

What have you learnt from this activity?

Secondly, as a post-test measurement, we analysed the answers obtained from the third questions included in exercise 4 of Unit 4:

[36] The transcriptions and categorizations are shown in Appendix X.

Identify one figurative expression found in the text. Why is it figurative? Explain your answer in Spanish using your own words.

These two specific questions were selected because they encompass the most important aspects related to this investigation: on the one hand, the raising of metaphorical awareness and, on the other, the enhancement of reading comprehension.

The categories used for the analysis of these questions were similar to those created in the research study: metaphorical awareness (MAW), aware (AW), unaware (UW), and did not answer (DN). To illustrate this, if the answer to the first question showed that the student was able to recognise the pragmatic as well as the meta-pragmatic message of the lesson, the response was classified as MAW; see for instance the following quote:

- *Aprendí que tanto en la vida cotidiana como en la científica se usan metáforas y símil para comparar casi todo y son importantes para describir cualquier cosa.*

In addition, if the answer to the first question showed that the student was able to recognise more concretely the practical message of the lesson, the response was classified as AW, as in the following example:

- *Aprendí a distinguir bien tanto en inglés como en español cuando es una metáfora y cuando es un símil, ya que siempre me confundía, en especial el símil.*

Moreover, if the answer to the second question under analysis showed that the student was able to identify and understand the metaphorical sense of the

expressions found in the reading, the answer was also categorised as MAW; for example:

- *Greenhouse effect, es figurativa porque tiene un significado metafórico. Se denomina efecto invernadero por la similitud de las características entre este efecto y el invernadero, en donde la temperatura y la humedad son controladas debajo de un plástico. De esta misma forma la atmosfera controla la temperatura y otras características de la tierra.*

Likewise, if the answer to the second question under analysis showed that the student was able to identify and understand the pragmatic sense of the metaphorical expression, the answer was also categorised as AW; for example:

- *"The atmosphere acts very much like a glass of a greenhouse". Hace una comparación de la función de un invernadero con la de la atmosfera. Es un símil.*

If on the contrary, the student was not able to recognise the meta-pragmatic message of the lesson, or was unable to identify and understand the metaphorical sense of the expression, the answer was categorised as UAW, as in the example:

- *Esto se refiere a una especie de jardín botánico en la cual se conservan plantas.*

Additionally, to discover how students dealt with the activation of imagination and creativity, the metaphors and similes that students created in Unit 1, were also recorded; see the following examples:

- *The lion is the king of the jungle.*

- *The NBA players are as tall as giraffes.*

In the next section, the results obtained from this classroom-action research are presented and discussed.

6.3 Classroom-action research: Results

As previously stated the purpose of the classroom-action research was to activate metaphorical awareness in EST reading and to enhance reading comprehension. Data were collected through a tailor-made reading-writing didactic unit specially developed, and implemented by the researcher to try to achieve the objectives proposed.

As an initial measurement, in order to obtain students' feedback and find out if the first goal of the study was accomplished, we analysed the descriptive data obtained from students' answers to the last question included in the exercise 1 of Unit 1 of the handout:

What have you learnt from this activity?

The results are shown in Table 30.

Table 30. Initial measurement result – (n=26)

Category	n	%
MAW	5	19
AW	12	46
UAW	0	0
DA	9	35

As the table exhibits, most students (46%) were aware of the practical purpose of the lesson; that is, to establish the difference between metaphors and similes; the following examples illustrate the learners' comments:

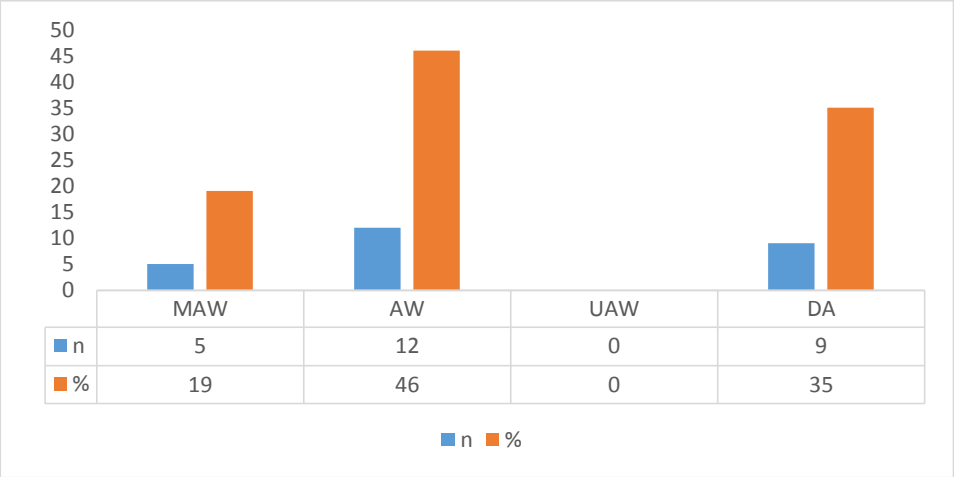
- *Aprendí a diferenciar la metáfora del símil.*
- *Aprendí la diferencia entre un símil y una metáfora.*
- *Aprendí la diferencia entre metáfora y símil y como diferenciarlos.*
- *Aprendí a diferenciar la metáfora del símil y viceversa.*
- *Aprendí a distinguir bien tanto en inglés como en español cuando es una metáfora y cuando es un símil, ya que siempre me confundía, en especial el símil.*

Moreover, 19% of the participants expressed some kind of reflexion and metacognitive awareness of the fact that figurative language is part of scientific language, as in the following examples:

- *Que tanto en la vida cotidiana como en la científica se usan metáforas y símil para comparar casi todo y son importantes para describir cualquier cosa.*
- *Que en inglés, incluso en el inglés científico, las metáforas están presentes aunque a veces no lo sabemos y esto nos puede ayudar a entender mejor los términos. También aprendí a diferenciar los símiles de las metáforas.*

These results are also represented in Graphic 1 below.

Graphic 1. Initial measurement results



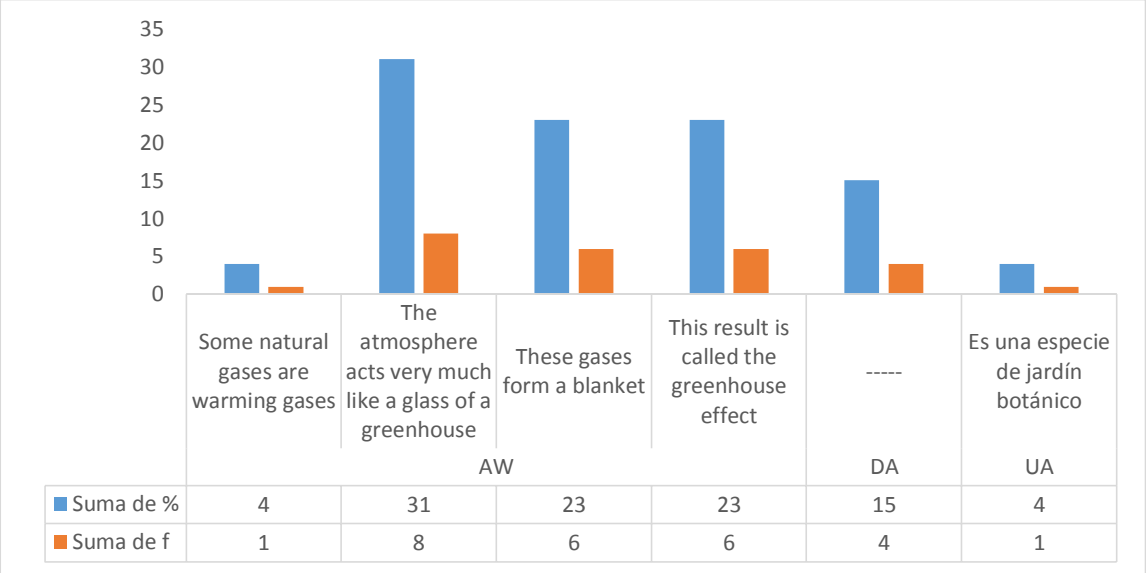
From these results, it could be say that the kind of instruction students receive during this first lesson of the treatment fulfilled one of the objectives of the study; in other words, to raise metaphorical awareness, as the majority of the participants (65%) who attended the task were able to answer it correctly. These findings agree with the position of Low (2008) when stating that: "One possible approach to helping learners identify and work with L2 metaphor might be to teach it initially in explicit form as simile, paralleling science teaching account, such as "atoms are like solar systems" (p. 219).

Furthermore, in order to find out if the second goal of our study was fulfilled; that is, to examine the enhancement of reading comprehension, we analysed the data obtained from the answers to the third question included in exercise 4 of Unit 4:

> Identify one figurative expression found in the text. Why is it figurative? Explain your answer in Spanish using your own words.

Graphic 2 shows the frequency (*f*) and the percentage (%) of the words or expressions the students used to answer the second question based on each category.

Graphic 2. Second question word/expression frequency and percentage.



	Some natural gases are warming gases	The atmosphere acts very much like a glass of a greenhouse	These gases form a blanket	This result is called the greenhouse effect	-----	Es una especie de jardín botánico
	AW				DA	UA
Suma de %	4	31	23	23	15	4
Suma de f	1	8	6	6	4	1

As it can be seen, the majority of the students (81%) were able to identify the figurative words and expression found in the text. At the same time, we could say that the explanation students gave to support the selection of the metaphorical connotations showed the use of critical thinking skills as a metacognitive enterprise. The following quotes transcribed from students' answers state the way in which the participants explained and analysed their responses to the second question.

1. *Ya que la atmosfera trabaja como una cobija o manta para mantener caliente la tierra. Relacionan la función de la atmosfera con el de una manta.*
2. *Hace una comparación de la función de un invernadero con la de la atmosfera. Es un símil.*

3. *Es una expresión idiomática porque compara el uso del "greenhouse" (invernadero) con el calentamiento global. Ya que el invernadero atrapa el calor del sol y eso mismo pasa con los gases de la atmosfera.*
4. *Es figurativo ya que "blanket" se usa frecuentemente para señalar que una persona se ha cubierto con una manta o ropaje, pero en este sentido es usada para demostrar que existe una capa que recubre la tierra.*
5. *Es figurativo porque está comparando el vidrio protector delos invernaderos con la atmosfera de la tierra ya que cumplen con funciones iguales, como un escudo protector.*
6. *Es una expresión figurativa ya que está comparando dos elementos utilizando el conector "like". Por ello es un símil.*
7. *Es una expresión figurativa porque su significado literal no corresponde con lo explicado en el texto ya que en el texto se refieren a esta expresión como el efecto invernadero.*
8. *Es una metáfora. Se refiere a que los gases pueden servir como cobija de la atmosfera.*
9. *Se usa la palabra "blanket" para referirse a la capa que cubre a la atmosfera por completo al igual que una sábana cubre a una persona.*
10. *Cuando se refiere a que la atmosfera actúa de una manera similar como un vidrio del efecto invernadero.*
11. *Se compara el vidrio de in invernadero con la atmosfera ya que esta cubre la tierra como lo hace el vidrio en ese caso.*
12. *Es figurativo porque esa palabra en inglés se refiere a invernaderos que son estructuras para controlar la temperatura con el motivo de mantener la*

adecuada temperatura para las plantas que están ahí. Por eso se le dice así a este efecto de la tierra.

13. *En mi opinión lo es porque no es literal. Solo puede compararse pues tiene propiedades similares. Cuando hablamos de un lenguaje figurativo nos referimos a algo no literal pero se puede utilizar por la similitud que tiene a algo de lo cual queremos hablar y este es el caso.*
14. *Esta expresión es figurativa porque compara algunos gases de la atmosfera con una cobija que arropa o envuelve a la tierra para mantenerla protegida permitiendo que entren los rayos del sol para calentarse un poco.*
15. *Es figurativo porque la atmosfera es una capa gaseosa de la tierra y en esta expresión se señala que actúa como un vidrio.*
16. *Es figurativa porque tiene un significado metafórico. Se denomina efecto invernadero por la similitud de las características entre este efecto y el invernadero, en donde la temperatura y la humedad son controladas debajo de un plástico. De esta misma forma la atmosfera controla la temperatura y otras características de la tierra.*
17. *Es una metáfora porque se está explicando que existen gases que acobijan a la tierra o la protegen. A pesar de que en un sentido literal un gas no puede acobijar a un planeta. Se expresa así para explicar que lo protege.*
18. *It´s figurative because there is not a blanket, the gases only act like a blanket.*

From these results it may be concluded that the kind of instruction students received during the learning treatment fulfilled the second objective of the action-research study; in other words, to enhance reading comprehension. Accordingly, the results of this study agree with the position of Boers (2000a) who argues that it is worthwhile to enhance language learners' metaphoric awareness of figurative

expressions by means of the explicit reference of the literal meaning of words in comparison with their underlying analogies. As a result, the teaching of metaphors may be useful to raise students' awareness of technical and semi-technical vocabulary and to improve specialised reading comprehension (Velasco, 2004).

In addition, we can say that during the implementation of the didactic unit students had the opportunity to use the English language with more confidence and with imagination from the first lesson to the last one. The different activities presented, show that the inclusion of metaphor in a specific language program may facilitate the development of conceptual and communicative competence in EFL. In this direction, the explicit teaching of metaphoric language and information within a lesson is crucial to help learners to cope with meaning (Cameron, 2003).

Firstly, while working in the first lesson of the didactic unit, students were encouraged to produce their own metaphors and similes. This type of A IS B discussion actively engaged the learners with the language, made them reflect on it, and helped them to create new metaphors. In addition, this sort of activities can be useful to develop students' motivation and class discussion in language awareness sessions (Low, 2008).

The examples displayed describe how students, working cooperatively and using cross-linguistic connections, created the sentences. Table 31 shows the textually transcribed metaphors and similes students made in a pair work activity during Lesson 1 of the didactic unit.

Table 31. Students´ similes and metaphors

Pair work	Simile	Metaphor
1	Her lips are red like the blood in her veins.	Frozen heart.
2	Your eyes are blue like the sea.	I say it by heart.
3	Her eyes are bright like a diamond.	My heart is broken.
4	She cries like a sea of tears	You are the sunshine of my life.
5	Her white teeth are like the sea.	The eyes are the window of the soul
6	The Italy form is like a boat.	The soldiers have a stone heart.
7	The NBA players are as tall as giraffes.	The cigarette is a time bomb.
8	Your lips are red like an apple.	This man is a rock.

Secondly, as a final unit task, students were encouraged to work in the construction of a glossary of terms. The creation of a glossary as a final project might activate cognitive linguistic motivation as it implies deep processing and effective vocabulary learning (Boers and Lindstromberg, 2008). In addition, the preparation and compilation of the glossary may foster vocabulary awareness and motivate dictionary use (Bozzo, 2012).

The following pages include three examples of the glossaries that students produced in this classroom-action research project.

Figure 7. Glossary 1

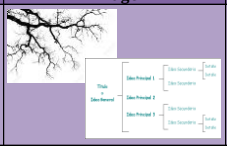
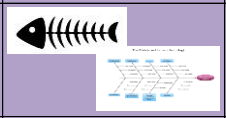
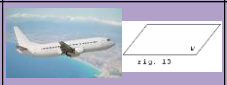
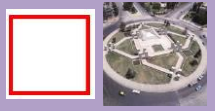
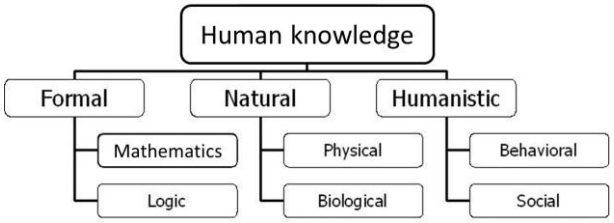
Word/Phrase	Literal meaning	Metaphorical meaning	Example sentence	Image	Explanation
Branch	A part of a tree that grows out of its trunk with leaves, flowers, or fruit growing on it.	Part of a complex body as an area of knowledge that may be considered a part from related areas.	Mathematics is an essential and fascinating branch of human knowledge.		Esta metáfora existe debido a que el humano vio las ramas de los árboles notando que estas son subdivisiones del tronco y por esta razón, se hace la asociación con el equema.
Fishbone	Fishbone:a bone from a fish.	Map in the form of a fish skeleton.	Some other graphic organizer that will be useful: the double cell diagram, the Venn diagram, the problem/solution map, and the fishbone.		Se le llama "fishbone" (hueso de pez) debido a que el diagrama tiene la forma de su esqueleto.
Flat	Horizontal; level ⇒ flat ground, ⇒ a flat roof	Spread out, unrolled, or levelled.	Plane geometry deals with shapes, such as circles and squares that lie on a flat surface.		"Flat" es algo plano pero por costumbre en el habla, se puede expresar que la llanta se averió o espichado.
Fuel	A substance such as oil, gas, coal, or wood that produces heat or power when it is burned.	Something that provides energy to the human.	Nutrients are the parts of food that are important for life and health. Nutrients are important for three reasons. First, some nutrients provide fuel for energy.		Conociendo la función del combustible en los medios de transportes, se asocia con la función de los nutrientes en el cuerpo humano.
Land	An area of the ground, especially one that is used for a particular purpose such as farming or building.	When someone or something lands, they come down to the ground after moving through the air or falling.	"(…) But Rockenfeller expects that it will be about 18 months before any new devices land on the store shelves"		Land significa tierra pero tambien se le da el significado de caida o aterrizaje por la accion que produce.
Plane	An aircraft with wings and at least one engine	A flat surface.	Geometry is generally learned in secondary schools. This branch of math deals with lines, angles, plane and solids.		Se sabe que un significado de la palabra el es avión. Sin embargo, esta palabra también se usa para hacer referencia a superficies planas por su forma por ejemplo, en matemáticas.
Squares	A rectangle with all four sides equal.	an open area in a town, sometimes including the surrounding buildings, which may form a square	Plane geometry deals with shapes, such as circles and squares that lie on a flat surface.		Por costumbre o cotidianidad, se tiene entendido que "square" también se le llaman a las plazas.
Sunshine	The light received directly from the sun.	Something that makes me happy	Vitamine D is called the "sunshine" vitamins.		El cuerpo produce la vitamina D cuando la piel se expone directamente al sol y esta vitamina, se podría decir que es lo que ilumina al cuerpo y lo alegra, pues ayuda al cuerpo a absorber el calcio y este a suvez ayuda para la formación normal de los huesos.
Upstairs	Up the stairs; to or on an upper floor or level.	Informal in the mind ⇒ a little weak upstairs	Recent studies that highlight sex-associated brain differences may lead us to believe that men and women have little in common upstairs.		Literalmente, como se expresa con aneterioridad, upstairs significa "subir escaleras" o "en el piso de arriba" sin embargo, en el ejemplo se utiliza para hacer referencia a algo que está arriba entendiendo así que se refiere al "cerebro".

Figure 8. Glossary 2

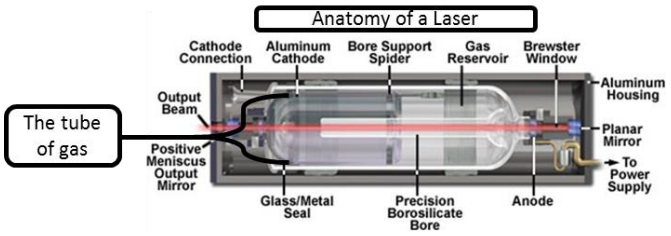
Word		Branch
Meaning	Literal	(Noun) A secondary woody stem arising from the trunk or bough of a tree or the main stem of a shrub. *Collins English Dictionary*
	Metaphorical	(Noun) a subdivision or subsidiary section of something larger or more complex. *Collins English Dictionary*
Example sentence		Mathematics is an essential and fascinating **branch** of human knowledge.
Sentence illustration		
Explicación		En esta oración no se está utilizando la palabra "branch" para referirse a las partes de las plantas que brotan del tallo principal, sino más bien para describir que la matemática es una de las áreas en que se puede dividir el conocimiento humano.

Word		Fashion
Meaning	Literal	(Noun) style in clothes, cosmetics, behavior, etc., especially the latest or most admired style. *Collins English Dictionary*
	Metaphorical	(Noun) manner of performance; mode; way. *Collins English Dictionary*
Example sentence		The material should be presented in a neutral **fashion**.

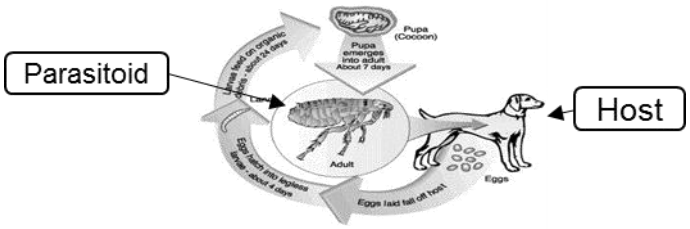
Sentence illustration	
Explicación	"Fashion" es una palabra que comúnmente está relacionada con aspectos de moda (la manera de vestir, lucir y actuar más populares del momento), sin embargo también puede utilizarse para abarcar un enfoque más amplio y significar simplemente la manera o método de hacer o presentar algo, tal como se muestra en la oración.

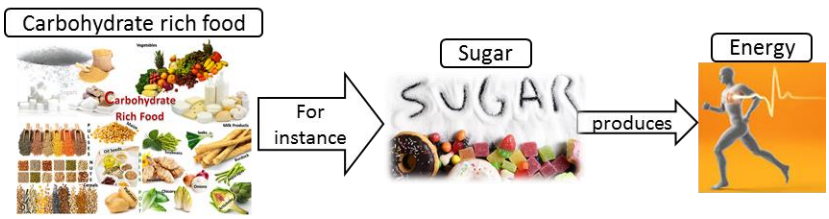
Word		Fuel
Meaning	Literal	(Noun) any substance burned as a source of heat or power, such as coal or petrol. *Collins English Dictionary*
	Metaphorical	(Noun) any material that produces heat or power, usually when it is burnt. *Oxford English Dictionary*
Example sentence		Some nutrients provide **fuel** for energy.
Sentence illustration		
Explicación		La palabra "fuel" se utiliza más que todo para referirse a combustibles como petróleo o carbón, pero en esta oración hace referencia, de forma metafórica, a que los nutrientes actúan como un combustible ya que proporcionan energía.

Word		Heart
Meaning	Literal	(Noun) the hollow muscular organ in vertebrates whose contractions propel the blood through the circulatory system. In mammals, it consists of a right and left atrium and a right and left ventricle. *Collins English Dictionary*

	Metaphorical	(Noun) the part that is in the center of something. *Oxford English Dictionary*
Example sentence		The **heart** of the laser is a crystal or tube of gas or liquid into which energy is pumped.
Sentence illustration		
Explicación		La traducción literal de "Heart" es corazón, y como este se encuentra justo en el centro del cuerpo, esta palabra se utiliza también para referirse a la parte central o interior de cualquier objeto, siendo este el caso de la oración de ejemplo.

Word		Highlight
Meaning	Literal	(Noun) an area of the lightest tone in a painting, drawing, photograph, etc. *Collins English Dictionary*
	Metaphorical	(Verb) to describe something in a way that makes people notice it and think about it. *Macmillan English Dictionary*
Example sentence		Recent studies **highlight** a long-held suspicion about the brains of males and females.
Sentence illustration		
Explicación		La traducción literal de "Highlight" tiene que ver con nombrar objetos o áreas que son muy brillantes o claras en comparación a su entorno. Por ello su significado, en contextos parecidos al de la oración, puede relacionarse también con el hecho de destacar, publicar o resaltar algo.

Word		Host
Meaning	Literal	(Noun) A person who receives or entertains guests, esp. in his own home. *Collins English Dictionary*
	Metaphorical	(Noun; biology) A plant or animal that has another plant or animal, called a parasite, living on it. *Macmillan English Dictionary*
Example sentence		The adult parasitoid locates the **host** or prey and lays an egg in or on the host.
Sentence illustration		
Explicación		Aunque "host" se use normalmente para denominar a aquella persona que atiende a los invitados de una reunión, cuando se utiliza en un contexto sobre biología, como en el caso de esta oración, su concepto va dirigido al ser vivo que hospeda a otro ser vivo dentro de sí.

Word		Instance (*for instance*)
Meaning	Literal	(Noun; rather formal) a particular situation or a situation of a particular type. *Oxford English Dictionary*
	Metaphorical	(With "*for*" before) for or as an example. *Collins English Dictionary*
Example sentence		Carbohydrates are important because they provide the body with heat and energy. Sugar, **for instance**, is 100 percent energy.
Sentence illustration		

Explicación	La palabra “instance” se utiliza para referirse a casos o momentos específicos de alguna situación o proceso, pero en realidad es mucho más común que esta se utilice para señalar ejemplos, y para ello la precede la preposición “for” como puede verse en la oración.

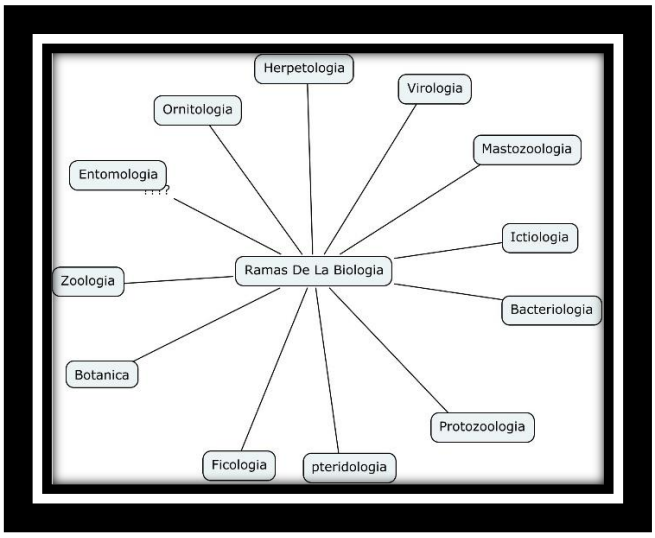
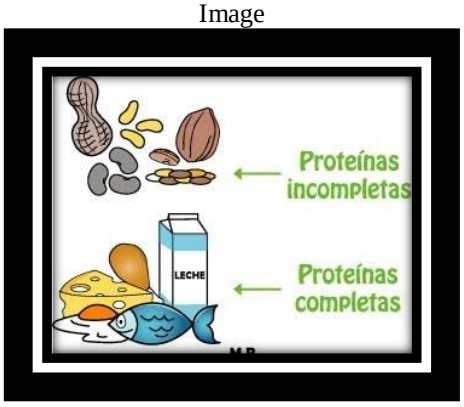
Word		Land
Meaning	Literal	(Noun) the solid part of the surface of the earth as distinct from seas, lakes, etc. *Collins English Dictionary*
	Metaphorical	(Verb; informal) To deliver. *Oxford English Dictionary*
Example sentence		But Rockefeller expects that it will be about 18 months before any new devices **land** on store shelves.
Sentence illustration		
Explicación		Comúnmente “land” es un sustantivo que se refiere a la superficie terrestre. Sin embargo, en esta oración está siendo usado como un verbo y por contexto se puede notar que se está refiriendo a términos como aterrizar, entregar o llegar.

Word		Pain (*pain in the neck*)
Meaning	Literal	(Noun) the sensation of acute physical hurt or discomfort caused by injury, illness, etc. *Collins English Dictionary*
	Metaphorical	(*Pain in the neck*; Informal) a person or thing that is a nuisance. *Collins English Dictionary*
Example sentence		But clouds can be a real **pain in the neck** for climate researchers.

Sentence illustration	
Explicación	Aunque la frase “pain in the neck” pueda traducirse literalmente como “dolor en el cuello”, en realidad es una expresión que se utiliza comúnmente para representar que algo es muy difícil o causa mucha molestia.

Word		Upstairs
Meaning	Literal	(Adverb) up the stairs; to or on an upper floor or level. *Collins English Dictionary*
	Metaphorical	(Adverb; informal) in the mind. *Collins English Dictionary*
Example sentence		Men and women have little in common **upstairs**.
Sentence illustration		
Explicación		El significado literal de la palabra “upstairs”, piso de arriba, no es coherente en esta oración, sin embargo, al tomar en cuenta el uso informal de esta palabra, el cual hace referencia al cerebro o la mente, la oración cobra mucho más sentido.

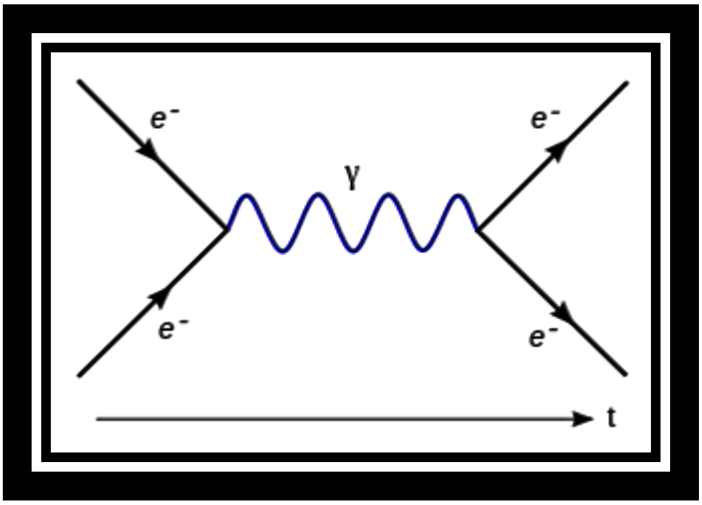
Figure 9. Glossary 3

Word/Phrase	Literal Meaning	Metaphorical Meaning	Example Sentence	Notes
Branch	A part of the trees	Subdivision of a science	¨Parasitology may be defined as the *branch* of biology which deals with the nature of parasitism¨	Es una metáfora porque, así como los troncos de los árboles se dividen en ramas, la biología también se subdivide en otras ciencias (ramas).
Image 				
Complete	Something that has all its parts	Which have the essential amino acids	¨*Complete* proteins, which the body needs for growth, have all the essential amino acids. "	Es una metáfora porque no es que hallan proteínas completas e incompletas, se llaman así porque contienen los aminoácidos esenciales, las incompletas contienen otro tipo de aminoácidos
Image 				
Greenhouse	A building with glass sides and a glass roof for	The process by which radiation from a planet's atmosphere	¨*Greenhouse* gases like carbon dioxide and methane are	Es una metáfora porque no es que el planeta este dentro de un invernadero, la atmosfera actúa como tal protegiéndonos en los

	growing plants in	warms the planet's surface	perhaps more widely discussed¨	rallos UV y permitiendo que crezca vida en la tierra
Image 				
Maturation	The process of becoming or being made mature (ready to eat after being left for a period of time)	When someone grows up and becomes an adult.	¨Another process that produces change in behavior, for reasons other than learning is *maturation*¨	Es una metáfora por que el concepto de maduración se refiere principalmente a frutas, etc. Cuando crecen o se terminan de desarrollar, por eso cuando un niño crece también se dice que maduró.
Image 				
Pain in the neck	A physical discomfort in the neck	Something that causes problems or inconveniences	¨But clouds can be a real *pain in the neck* for climate researchers. ¨	Es una metáfora porque las nubes como tal no producen un dolor de cuello, si no que representan un problema o un inconveniente fastidioso, así como los dolores de cuello.
Image				

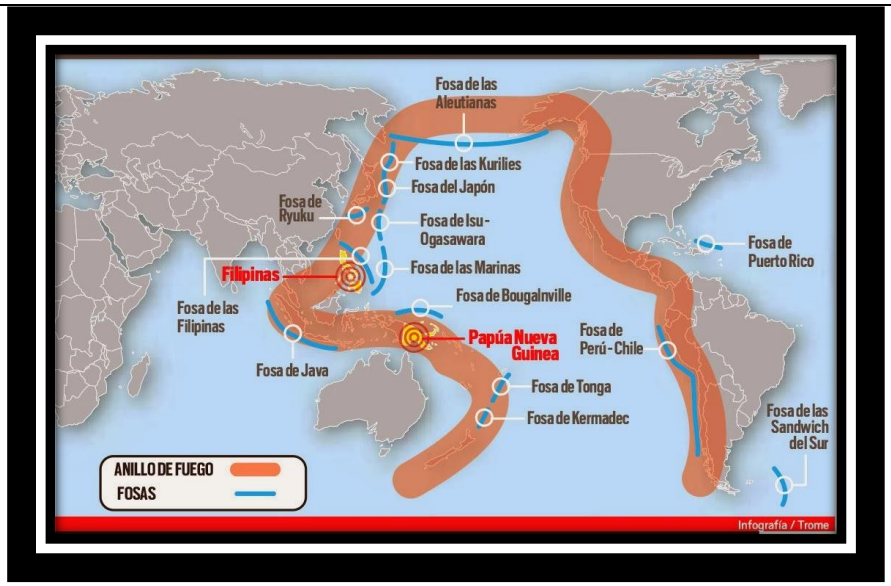
Reconcile	Make that some people re-establish their friendship	Make that two or more things match.	¨… an attempt to *reconcile* the laws of mechanics with the laws of the electromagnetic field. ¨	Es una metáfora porque se busca establecer puntos en común y resolver las diferencias entre las dos leyes, así como cuando se busca reconciliar a dos personas

Image



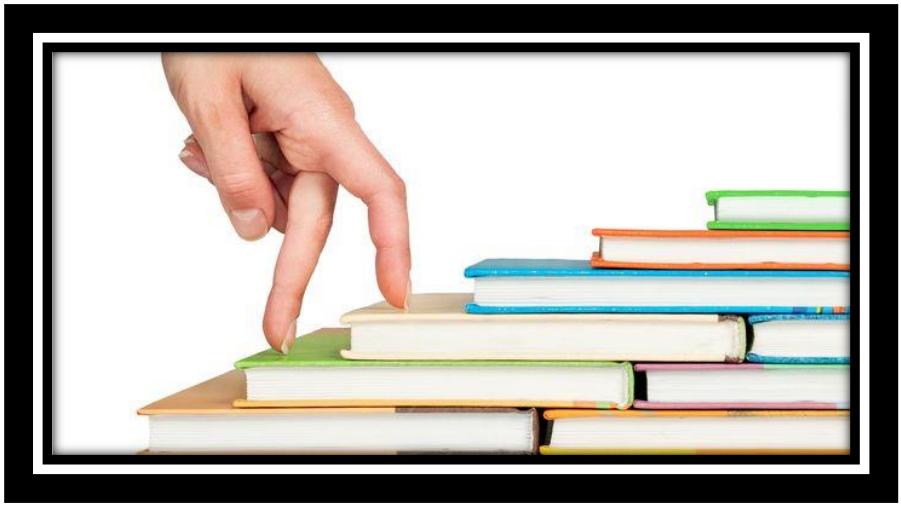
Ring of fire	A circle made of fire	Mountain chains, deep ocean trenches and island arcs	¨The Pacific Ocean is surrounded by a series of mountain chains, deep ocean trenches and island arcs, sometimes called a *ring of fire*"	Es una metáfora porque no hay un anillo de fuego en el pacifico, si no que al haber tantos volcanes formando un circulo se asemeja a un anillo de fuego

Image



Stepping-stones	A doorstep or a road made of stones	Steps to achieve new achievements	¨… He regarded his major achievements as mere *stepping-stones* for the next advance. "	Es una metáfora por que se refiere a la cantidad de pasos que una persona sigue para lograr algo así como si estuviera siguiendo un camino.

Image



Sunshine	The light received directly from the sun	That brings you happines	¨Vitamin D is called the *sunshine* vitamin¨	Es una metáfora porque no es que la vitamina estuviera en los rayos del sol, la vitamina se obtiene por la transformación del colesterol en la piel mediante la exposición a los rayos solares UVy produce energía.

Image

Tackle	To make an opponent fall to the ground	Deal with a specific problem in a very determined or efficient way	¨Another problem CERES will *tackle* concerns aerosols¨	Es una metáfora porque se refiere a que la nave se va a enfrentar a un problema, como si una persona se enfrentara a otra.

Image

From the examples presented, it can be seen that the use of glossaries could be an enjoyable and motivating exercise to help learners increase language awareness and support their development of autonomy and critical thinking. The glossaries are aimed at helping students understand the vocabulary found in the text and reinforce English monolingual dictionary practice. The use of pictures and images can also aid to elucidate and remember the meaning of figurative language and remedy comprehension problems (Boers, 2011). Furthermore, the use of images can be an effective tool for those learners who are not yet equipped with the necessary metalanguage for discussion and analysis (Low, 2008).

It is advisable that teachers who are involved in materials development in ESP keep working in the creation of teaching activities that facilitate the raising of figurative language awareness. In order to enhance the development of specialised reading in ESP, these materials should be oriented to suit the different levels of proficiency in the foreign language, not only as one aspect of vocabulary learning, but also at the level of discourse (Low, 2008). The teaching materials herein presented may create a situation for further discussion and inspiration for materials development for any linguistic skills.

Up to this point, it could be said that the raising of figurative language awareness through the implementation of tailor-made classroom activities is a very useful enterprise for a variety of reasons. First, it is an effective way of helping increasing students' vocabulary knowledge because it can offer a simple and easy to follow means of organising new vocabulary. Likewise, it can be a useful facilitator to integrate skills work, to improve students' language awareness, and to encourage their use of English with confidence and imagination.

It is also important to consider that, being language an integral part of culture, often metaphors are used to communicate that culture (Boers, 2003). Foreign language teachers should then foster learners' deep engagement with the metaphorical senses of words and phrases in the target language to facilitate comprehension and recall (MacArthur, 2016). For that reason, it could be said that the growth of metaphor awareness would benefit language learners and educators in general.

6.4 Summary

In this chapter, we have reported on the results from the qualitative data obtained from the classroom-action research that was carried out with the purpose of raising students' metaphorical awareness and enhance reading comprehension. The focus was on the effect of the implementation of a 4-week didactic unit on the raising of metaphorical awareness in reading EST texts. The chapter has also presented a discussion of the data analysis, as well as a summary of the findings and of the research objective reached.

The following chapter offers a review of the complete investigation including its aims and objectives. It also shows the major findings and discusses them in terms of their pedagogical implication to FL education, metaphor studies, and ESP reading. It concludes with a number of recommendations for future research.

CHAPTER 7: CONCLUSIONS

7.1 Introduction

The aim of the present study was to shed light on students' needs regarding figurative language in specialised reading. It was planned to explore students´ perception and awareness of the metaphorical language and their ability to identify and interpret metaphorical discourse within the specific genre they have to manage. The study involved native Spanish-speaking freshmen students at the undergraduate level, pursuing engineering and science majors, enrolled in an English for Science and Technology (EST) reading program. It also involved a group of foreign language professors, experts in the area of linguistics pedagogy that were familiar with the EST reading program in a Venezuelan university.

The research adopted a mixed method approach, using questionnaires and reading assessment tasks as data collection tools to support the hypothesis that the raising of metaphorical awareness enhances reading comprehension. This approach drew on the application of cognitive linguistic pedagogy, with an emphasis on applied linguistics in second and foreign languages teaching and learning. The methodological and theoretical bases helped us to understand how students interpreted metaphors in EST and how metaphors could impact reading comprehension in a specific educational context and situation.

The results obtained from this study intent to contribute to the growing interest in applied Cognitive Linguistics-inspired research regarding the problems figurative language can cause to foreign language learners. In terms of pedagogical implications, we predict that the dissertation may help to foster understanding of the influence of metaphors in ESP reading comprehension; particularly, in university

students when engaged in EST reading. These pedagogical implications need to be further translated into practical classroom-action research and curriculum design. Concurrently, such research needs to be supported by language theories to provide effective insights into how metaphors can be taught effectively, to achieve learning goals, and to "demonstrate successful outcomes in the classroom" (Grabe, 2009; p. 18).

7.2 Main research findings

The research was intended to explore the role of metaphorical language in an EST reading program from four different perspectives. First, it explored students' perception of metaphorical language in reading comprehension. Second, it investigated teachers' views about the role of metaphorical language in reading. Third, it examined students' ability to identify and interpret metaphors in authentic language usage. Finally, a classroom-action research was conducted in order to test the hypothesis that raising students' awareness of metaphorical language enhances reading comprehension.

7.2.1 Students' awareness and interpretation of metaphorical language

The results of the study reveal that most students seem to distinguish the traditional conception of metaphor as a linguistic feature to represent one thing in terms of another. Metaphorical language also appears to be a problem for them when reading EST texts. Despite many students affirmed to be aware of the presence of metaphorical language, they also admitted that it was not always easy for them to identify and interpret this kind of language in the reading material. Moreover, students agreed with the fact that the raising of metaphorical awareness would be beneficial to enhance their reading comprehension skills in EST.

These significant results provide a better understanding of students needs in relation to the problems L2 readers perceive to face with metaphorical language. The fact that university students feel the need to improve their ability to deal with metaphor in the target language, support the assumption that in ESP educational contexts foreign language learners need to be trained to view metaphor as a linguistic aspect that is used on a regular basis to express and explain simple issues, as well as complex concepts and ideas.

7.2.2 Teachers' perception of the role of metaphorical language

The results of the study show that most teachers perceive metaphor in the traditional way as a not literal figure of speech that uses one thing to mean another and makes a comparison between the two. Considering this fact, the findings suggest that foreign language teachers are not familiar with the contemporary view of metaphor. If teachers have never been in touch with the contemporary theory of metaphor, it should not be a surprise that they conceive metaphor more as a poetic, ornamental linguistic devise than as a phenomenon of human thought processes and conceptualisation.

Another important finding is that teachers´ beliefs and perspectives reveal their awareness of metaphor in EST texts. Their comments also support the view that students do not have the linguistic threshold to understand this kind of figurative language in the academic context. In fact, most of them perceive that they help their students with the understanding of metaphorical language in the reading process and favour the thesis that the raising of metaphorical could be of value. This last fact could also be contemplated as a positive finding since is one of the central issues of this investigation. If language teachers perceive that their students need to notice

and understand metaphors in reading, it would be necessary to develop pedagogical practices that help students to solve the problems that figurative language might cause in specialised genre.

7.2.3 Students´ performance

The findings from the language data samples elicited highlight that even though the lexical units used by students to answer their questions in the reading tasks were metaphorical related and associated to basic meaning of the words used in the expressions, it was difficult for them to grasp and guess the underlying message of the metaphorical statements. This reveals a lack of understanding of how to extend the more basic senses of a word to be able to explain the new meaning based on the context.

Another potential significant finding is that the majority of students did not seem to be able to interpret the real communicative intention of the figurative expressions. One possible reason of this result is that figurative language often relies on encyclopaedic knowledge (Littlemore, 2008), which is many times difficult to understand for foreign language learner without the help of an expert. For this reason, if our goal were to help students to be able to engage in the metaphorical nature of technical and scientific English, we would probably need to help them with the explicit repeated exposure of figurative thinking to bring metalinguistic and metacognitive awareness to the classroom.

7.2.4 Significance of the findings

The findings presented constitute meaningful and relevant data that were obtained through the questionnaires and the reading tasks. These results represent an

original contribution to the field of applied cognitive linguistics by examining the nature of the problems L2 readers experience when dealing with metaphorical language from three different perspectives: students' perceptions, teachers' beliefs, and students' performance. The information collected from the self-reported instruments showed that both university students and teachers seemed to agree with the benefits and need of increasing awareness of figurative language in reading comprehension. Moreover, the results from the students' performance indicate low levels of awareness when they have to critically deal with metaphorical language.

These findings support the point that in some cases it is not always easy for EFL university students to deal with metaphorical connotations (Littlemore, 2001b; Littlemore et al, 2010) and that metaphorical language can generate a variety of comprehension difficulties "that the students are not always aware of" (Littlemore and Juchem-Grundman, 2010, p.189). As this paper shows, the students who have participated in the present study may need some kind of previous preparation in order to cope properly with abstract language and metacognition in specialised reading discourse.

The reasons for students not being successful should be various. Some obstacles may include a lack of knowledge of the basic senses of words, a lack of culturally embedded encyclopaedic knowledge, or a lack of awareness of the metaphorical nature of technical language (Littlemore and Low, 2006a; Litllemore, 2009). Another possible reason may be due to a lack of training and practice considering that metaphor is not frequently included as an integral part of second and foreign language curriculum (MacArthur, 2016). In this respect, to help to enhance the communicative skills of the learners (Cameron and Low, 1999; Low, 1999; Littlemore and Low, 2006; Roldán and Úbeda, 2013), the explicit instruction

of metaphors should be part of any ESP teaching program (Velasco, 2005). Therefore, it could be beneficial to enhance both metaphoric and metacognitive awareness on the part of the language student when they have to deal with specialised genre and guide them, in a pedagogical way, in the understanding of figurative and specialised language, paying more attention to the socio-cognitive aspects of genre construction, interpretation and usage.

The design of conscious-raising tasks (Ellis, 2010) that "would promote language awareness and foster learners autonomy" (St. Louis et al, 2019, p. 252), could help students with the development and the efficient application of reading strategies through the use of activities to be practice in class (Nation, 2009). The implementation of classroom activities for the raising of metaphorical awareness would help to increase students' motivation and cultural knowledge in general, and to encourage them to use the English language more confidently and creatively.

Classroom-action research would be an effective alternative to put into practice the positive influence of applied Cognitive Linguistics in foreign language teaching. From a Cognitive Linguistics point of view, we agree with the position that teaching practices should take into account the following aspects: language is an intrinsic part of our human basic cognitive capabilities, the symbolic nature of language is based on our physical and social experiences, and meaning is an essential part in language (Piquer-Píriz and Alejo, 2016). This novel perspective would be useful to improve materials development in foreign language learning, to enrich our teaching practices and to enhance our insights in terms of second language acquisition theory and usage.

7.3 Classroom-action research

With the intention of raising metaphorical awareness amongst university students, a classroom-action research was designed and implemented. Classroom-action research is a practical framework that "can help teachers develop and reflect on their own teaching" (Hugues, 2010, p. 198). In our case, the purpose was on trying to make students' conscious of the presence of metaphorical language in their reading texts, to encourage them to identify and make use of metaphorical instances while reading, and to reflect about their own learning progress and outcomes.

7.3.1. Materials development and implementation

With the purpose of raising university students' metaphorical awareness in specialised reading, a tailor-made didactic unit was developed. The didactic unit include four lessons and different activities made up of multi-text exercises such as images, matching, and multiple choice, which constitute an effective and relatively simple design for teaching materials (Low, 1988).

The activities were developed keeping in mind that most of the students had a low proficiency level in the foreign language in relation to lexico-grammatical and socio-cultural aspects, which could make the cross-linguistic transfer of reading skills more difficult (Koda, 2007). The participants involved received pedagogical treatment during four weeks on metaphorical awareness among the regular schedule of one term. The teaching methodology was designed to show students how to recognise and interpret the meaning of figurative language, including similes and metaphors in context, and to think critically about metaphorical language. Along the whole treatment, awareness of cross-linguistic similarities and differences in

figurative expressions were used to increase the chances of reading comprehension and to understand complex concepts.

The results indicate that the instruction students received during the initial part of the treatment fulfilled one of the objectives of the study; in other words, to raise metaphorical awareness. The majority of students' answers revealed reflection about their own learning process during the consciousness-raising tasks. These findings agree with the position of Low (2008) when stating that: "One possible approach to helping learners identify and work with L2 metaphor might be to teach it initially in explicit form as simile, paralleling science teaching account, such as "atoms are like solar systems" (p. 219). The results also indicate that the kind of instruction students receive during the treatment fulfilled the second objective of the action-research study; in other words, to enhance reading comprehension.

In general, the results of this study agree with the position of Boers (2000a) who argues that it is worthwhile to enhance language learners' metaphoric awareness of figurative expressions by means of the explicit reference of the literal meaning of words in comparison with their underlying analogies. As a result, the teaching of metaphors may be useful to raise students' awareness of technical and semi-technical vocabulary and to improve specialised reading comprehension (Velasco, 2004). In addition, the explicit teaching of metaphoric language and information within a lesson is crucial to help learners to cope with meaning (Cameron, 2003). As a result, consciousness-raising activities might be influence by the metacognitive instruction of the underlying conceptualisation of metaphorical items as a pedagogical tool in ESP and EFL.

7.4 Pedagogical implications

A constructivist approach to learning would emphasise the importance of individual cognitive process and individual differences when acquiring a second or a foreign language. It would also expect that learning would improve if students could participate critically with academic concepts by producing their own analogies (Low, 2008). Subsequently, designing teaching practices aimed at guiding learners towards the development of self-awareness, critical thinking, and a questioning attitude is vital. Based on such awareness, learning responsibility can be promoted and therefore learners´ autonomy can be improved in order to achieve successful learning results (Pérez-Vidal 2009).

Metaphors in education have multidimensional functions. For example, they can be used to fill vocabulary gaps, to clarify the unfamiliar by reference of the familiar, to explain abstract concepts, and to describe new scientific phenomena that is not always easy to understand and for which there are not well stablish terms. The didactic effects of creating tailor-made pedagogical materials that develop learners' awareness might be various. They could be a suitable tool for helping teachers in addressing the academic reading needs students might have. In addition, they may help students increase their knowledge of reading strategies usage, improve their understanding of the reading process, and enhance confidence in their own reading ability.

In turn, teachers could use this information to help their students learn to become "constructively" thoughtful readers. The fact that in the first lesson of the didactic unit, students were encouraged to produce their own metaphors and similes actively engaged the learners with the language, made them reflect on it, and helped

them to create new metaphors (Low, 2008). In addition, the creation of metaphorical glossaries as a final class project was challenge as it involved the section, arrangement and presentation of data carefully organised (Bozzo, 2012).

However, materials development such as the handout designed for this study should be combined with other language activities and assessment measures designed to improve reading skills and strategies. Considering that testing for metaphoric competence in a foreign language could be particularly difficult for proficiency testing as currently conceived (Low, 2008), one of the ways in which students might acquire metaphoric competence is through frequent practice of the target strategies entrenched in reading comprehension tasks piloted by their teachers.

Teachers' explicit explanations focused for instance on teaching vocabulary, key terminology, and discourse in classroom instruction could also be very helpful for the development of student´s metacognitive awareness about metaphoric language and content in reading comprehension assessment tasks. In this respect, there is a need to implement competent models for teaching figurative language in ESP at tertiary settings. One option could be based on the idea of a text-driven genre approach (Dafouz and Nuñez 2009, 2010; Llinares and Dafouz 2010) where the language to be reviewed would appear authentically within the text, as in our case.

This would give students more exposure to the different ways in which figurative language in their specific area could be used and would help learners to develop an awareness of how vocabulary, grammatical and discursive forms are metaphorically used in different text types and for different purposes. In line with

this, the present study could help with the understanding of the several stages in the genre process approach such as triggering prior knowledge, using examples of the text type to see the overall structure, and the activation of critical reading skills.

ESP knowledge and skills cannot be developed if learners do not have access to the kind of language in which that knowledge is constructed, evaluated and discussed and if they do not have extensive possibilities to use the language in authentic context. Regarding the variation in disciplinary discourses, the understanding of metaphors seems to be fundamental bearing in mind that it is a cognitive ability that allows individuals to deal with abstract concepts and phenomena (Boers, 2000b, Lakoff, 2006).

It should not be forgotten that professional discourse in ESP contains plentiful of figurative language that is sometimes not very easy to understand by the learner. For that reason, it is imperative to foster metaphoric competence in the foreign language classroom (MacArthur, 2016), from the earliest to the most advance steps of learning (Boers and Lindstromberg, 2006; Lazar, 1996; Littlemore, 2001a, 2001b, 2012; Littlemore and Low, 2006b; Low, 1988; MacArthur, 2010).

As this thesis shows, the students surveyed in the present study may need some kind of previous preparation in order to be able to properly deal with abstract language in specialised genre. As a result, it would be beneficial to enhance both metaphoric and metacognitive awareness on the part of the language student and guide them, in a pedagogical way, in the understanding of figurative and language, paying more attention to the sociocultural context and the socio-cognitive aspects of genre construction, interpretation and usage.

7.5 Concluding remarks

This study was undertaken in an attempt to help with the productive area of metaphor research in applied cognitive linguistics, specifically with the field of second and foreign language pedagogy (MacArthur, 2016). With our input, we hope to support the existing instructional methods and syllabus design in this important area of language pedagogy. Particularly, it is an attempt to contribute with the development of Cognitive Linguistics oriented specific materials (Piquer-Píriz and Alejo, 2016) nourished with the help of applied linguistics instruction (Boers, 2011).

The findings of this study have a number of important implications not only for foreign language teaching and learning in tertiary education, but also for materials development and syllabus design. Language teachers can incorporate little by little figurative language awareness in their daily practices considering that it is a necessary component of reading comprehension. These practices should include awareness of the basic senses of words, cultural awareness, and specialised genre awareness based on students' needs. Reading activities could also include collaboratively exercises that promote metacognition, reflections and autonomy learning.

The supplementary material that have been developed in this investigation could be an inspiration for the creation of new didactic materials. It would be our challenge that future research focus on "studies with larger, mixed-level samples, delayed post-test and were effect sizes are reported" (Low, 2008, p.226). Larger-scale instructional research should include different methods and techniques of teaching metaphor and "go hand-in-hand with innovative attempts to develop innovative metaphor teaching materials and to integrate metaphor teaching, at both

semantic and pragmatic levels, into learning tasks and activities" (p. 226). Any change or innovation in the educational system that promotes the raising of metaphorical awareness should result in benefits for students.

This could probably be achieved by looking more particularly at discourse-related areas and strategic competence through the design and implementation of a sound curriculum based on students' specific needs. This will include the formulation of achievable objectives, the selection of authentic input materials, the analysis of genre and the creation of high cognitive continuous assessment tasks that will make students aware of their own particular requirements and will help them to set and work accordingly in order to become more efficient and autonomous learners.

It is also highly recommended to pay more attention to teacher education with respect to language-teaching competences by providing them with the specific training in the linguistic and methodological features regarding metaphoric competence. Teacher professional development is essential for successful education at any particular level. ESP teachers should be given the academic support to be trained to use the specific linguistic and generic tools in specific language settings if the goal is to fulfil learning standards and needs[37].

It would be worth to reflect and evaluate how all these aspects of curriculum development and language planning come together in a specific tertiary educational setting for future decision-making processes. It should not be forgotten the complex issues that educators and administrators have to deal with when updating and

[37] It is worthwhile to emphasise that nowadays, in Venezuelan university settings, it would probably be more difficult to put into practice this enterprise.

implementing a new curriculum. Until then, we could take advantage of the results of different case studies, such as the present one, conducted differently for different situational contexts, cultures and discourse communities that could be taken into consideration for future replication.

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APPENDICES

UNIVERSIDAD SIMÓN BOLÍVAR
Vicerrectorado Académico
Decanato de Estudios Generales
Coordinación del Ciclo Básico

1. DEPARTAMENTO: IDIOMAS (6705)

2. ASIGNATURA:

INGLÉS CIENTÍFICO Y TÉCNICO I

Programa de lectura en Inglés Científico y Técnico

Descripción: Este programa está diseñado para desarrollar destrezas de lectura en inglés científico y técnico. El presente es el primero de tres cursos de 48 horas cada uno (*Inglés Científico y Técnico I, II y III*: ID1111, 1112 y 1113). Los estudiantes pueden eximir los tres cursos, o ingresar al programa en cualquiera de ellos, con base en los resultados que obtengan en la prueba de ubicación que se administra a cada cohorte al inicio del año académico. Los tres cursos que componen el programa se consideran interdependientes: los objetivos y estrategias especificados para cada uno constituyen la base para los cursos siguientes.
El programa está dirigido a los estudiantes de ingeniería y ciencias básicas. Forma parte del plan de estudios del Ciclo Básico ya que se considera que las destrezas de comprensión de lectura en inglés como lengua extranjera tendrán una aplicación inmediata para los estudiantes en las diferentes asignaturas que corresponden al Ciclo Profesional de sus estudios universitarios.

3. CÓDIGO DE LA ASIGNATURA: ID1111

No. de unidades-crédito: 3
No. de horas semanales: Teoría 3, Práctica 0, Laboratorio 1

4. FECHA DE ENTRADA EN VIGENCIA DE ESTE PROGRAMA: Septiembre 2010

5. OBJETIVO GENERAL:

Al finalizar el curso *Inglés Científico y Técnico I* (ID1111), el estudiante habrá ampliado sus repertorios lingüístico y estratégico iniciales a un nivel que le permita enfrentarse como lector a la información contenida en textos de carácter científico y tecnológico en inglés.

6. OBJETIVOS ESPECÍFICOS:

El énfasis de este curso está en un enfoque de lectura intensiva, el cual plantea la instrucción y práctica en destrezas específicas. A través de la lectura de textos cortos o fragmentos de texto, se espera que el estudiante:

1. Comprenda las unidades léxicas más frecuentemente encontradas en textos de carácter científico y tecnológico. Para ello, el estudiante debe adquirir un mínimo vocabulario de vista que le permita:

a) reconocer automáticamente el significado de unidades léxicas de la lengua general que se encuentran con alta frecuencia en el discurso científico y tecnológico en inglés, y

b) reconocer automáticamente el significado del léxico semiespecializado o 'académico' de mayor frecuencia en el discurso científico y tecnológico en inglés.

2. Aplique la técnica de lectura más apropiada a sus propósitos como lector en una situación dada.
3. Desarrolle la metacognición, o reflexión sobre el propio conocimiento, como elemento para la aplicación de estrategias de comprensión de lectura en inglés como lengua extranjera.
4. Determine el significado de elementos léxicos desconocidos a partir del contexto.
5. Deduzca las relaciones entre oraciones, y entre partes de un mismo texto, mediante elementos cohesivos.
6. Entienda la información explícita y/o implícita que se presenta.
7. Distinga entre la idea principal y las ideas secundarias.
8. Identifique el propósito principal del autor.
9. Reconozca la organización de un texto.
10. Integre información para llegar a una conclusión.
11. Interprete la información de una tabla o un gráfico.
12. Se familiarice con las expresiones de medida y magnitud para cuantificar las diferentes unidades utilizadas en inglés científico y técnico.
13. Aplique la información obtenida a través de los contenidos del curso a situaciones nuevas.

7. CONTENIDOS:

1. Listas de vocabulario general y académico de alta frecuencia en inglés.
2. Técnicas de lectura rápida: *skimming* y *scanning*.
3. Estrategias de comprensión de lectura y metacognición.
4. Estrategias para determinar el significado de palabras desconocidas:

   a) Uso de los indicios contextuales,

   b) Categorías gramaticales,

   c) Prefijos y sufijos,

   d) Cognados y falsos amigos,

e) Sinónimos y antónimos,

f) El sintagma nominal en el discurso científico-técnico, y

g) Uso del diccionario,

5. Elementos cohesivos tales como referentes y conectores discursivos, entre otros.
6. Tópico, idea principal y detalles.
7. Patrones de organización del texto (introducción, desarrollo, conclusión).
8. Inferencias y conclusiones.
9. Mapas conceptuales.
10. Expresiones numéricas: contrastes entre el español y el inglés.
11. Sistema Anglosajón vs. Sistema Internacional de Unidades.

8. ESTRATEGIAS METODOLÓGICAS:

Las clases serán conducidas en inglés tanto como sea posible. Sin embargo, el estudiante puede expresarse en español tanto en las actividades de clase como en las evaluaciones. Las actividades de aula tienen como fin primordial el desarrollo de procesos cognitivos que faciliten que el estudiante se convierta en un lector crítico e independiente, es decir, se espera que el estudiante pueda, entre otros, comparar, analizar, hacer síntesis, investigar, tomar decisiones, reflexionar, opinar y resolver problemas a partir de su interacción con los textos. Dicho desarrollo cognitivo se apoya en la potencialidad epistémica de la tarea de producción y de su interacción con la lectura. Así, se aprovecha la experiencia de la escritura como herramienta para aprender, asimilar, revisar y transformar los modos de comprensión y organización de los textos propios del inglés científico y técnico. Además, se sirve de la escritura para evaluar lo aprendido por el estudiante.

El esquema general de las lecciones incluye actividades de pre-lectura, durante la lectura y post-lectura. Tanto la primera como la última se centran en la interacción de todo el grupo, mientras que en la etapa de lectura el estudiante trabaja por lo general en forma individual con el texto, bien sea de manera libre, o guiado por preguntas y/o ejercicios propuestos por el profesor. El diccionario bilingüe y/o monolingüe se usa como apoyo.

A lo largo del trimestre, se ofrecen actividades en el laboratorio como un refuerzo al trabajo de aula, a través de la presentación de material audiovisual y/o multimedia relacionado con los contenidos de los cursos. El material que se utiliza en el laboratorio ha sido seleccionado, desarrollado y/o adaptado por los profesores del Departamento de Idiomas específicamente para servir de complemento a los contenidos de cada curso.

9. ESTRATEGIAS DE EVALUACIÓN:

1. Dos exámenes departamentales (25% cada uno)
2. Evaluación de cada profesor sobre los objetivos del curso, compuesta por no menos de tres diferentes medidas de rendimiento (30%)
3. Evaluación del conocimiento del léxico de alta frecuencia (20%)

10. FUENTES DE INFORMACIÓN:

Bauman, J., & Culligan, B. (1995). [Versión de *A General Service List of English Words* (West, 1953; Longman, Londres) ordenada según frecuencia]. Recuperada de http://jbauman.com/gsl.html el 4 de noviembre de 2007. Disponible en Microsoft Excel para este curso en http://tinyurl.com/2ev85x2 .

Cartaya, N. (2006, diciembre). *Aprendizaje de vocabulario en inglés: El computador manual de Leitner* [Video (aproximadamente 16 minutos de duración) realizado con el apoyo de ArteVisión USB]. Disponible en: http://www.labidiomasaiac.usb.ve/manualcomputer.html. Caracas: Universidad Simón Bolívar, Departamento de Idiomas.

St. Louis, R. y Pereira, S. (2010). *Focus on Reading.* [Edición revisada por C. Mayora]. Caracas: Universidad Simón Bolívar, Departamento de Idiomas.

St. Louis, R. y Mayora, C. (Eds.). (2010). *Reading Selections for ID1111.* Caracas: Universidad Simón Bolívar, Departamento de Idiomas.

Los materiales didácticos han sido desarrollados tomando en cuenta las necesidades particulares del programa. La selección de los textos utilizados obedece a los siguientes parámetros: (a) la temática: información sobre avances científicos e innovaciones tecnológicas de potencial interés para estudiantes de carreras como las que ofrece la USB, (b) la longitud: fragmentos de artículos, o artículos cuya longitud ronde las 3.500 palabras; (c) la autenticidad: que no hayan sido redactados para efectos de la enseñanza del inglés como lengua extranjera; (d) las fuentes documentales: publicaciones no especializadas dirigidas a un público educado interesado en temas de la ciencia y la tecnología; y (e) las estructuras retóricas características del lenguaje de la ciencia y la tecnología contempladas luego en detalle en los objetivos específicos del segundo y tercer curso.

Muchas lecturas vienen acompañadas de actividades diseñadas por los profesores del departamento, típicamente, ejercicios de pre-lectura (destinados a activar el conocimiento previo del estudiante con respecto al tema de los textos), ejercicios centrados en la práctica de destrezas específicas, y ejercicios orientados a promover la comprensión del texto.

UNIVERSIDAD SIMÓN BOLÍVAR
Vicerrectorado Académico
Decanato de Estudios Generales

1. DEPARTAMENTO: IDIOMAS (6705)

2. ASIGNATURA:

INGLÉS CIENTÍFICO Y TÉCNICO II

Programa de lectura en Inglés Científico y Técnico

Descripción: Este programa está diseñado para desarrollar destrezas de lectura en inglés científico y técnico. El presente es el segundo de tres cursos de 48 horas cada uno (*Inglés Científico y Técnico I, II y III:* ID1111, 1112 y 1113). Los estudiantes pueden eximir los tres cursos, o ingresar al programa en cualquiera de ellos, con base en los resultados que obtengan en la prueba de ubicación que se administra a cada cohorte al inicio del año académico. Los tres cursos que componen el programa se consideran interdependientes: los objetivos y estrategias especificados para cada uno constituyen la base para los cursos siguientes.

El programa está dirigido a los estudiantes de ingeniería y ciencias básicas. Forma parte del plan de estudios del Ciclo Básico ya que se considera que las destrezas de comprensión de lectura en inglés como lengua extranjera tendrán una aplicación inmediata para los estudiantes en las diferentes asignaturas que corresponden al Ciclo Profesional de sus estudios universitarios.

3. CÓDIGO DE LA ASIGNATURA: ID1112
No. de unidades-crédito: 3
No. de horas semanales: Teoría 3, Práctica 0, Laboratorio 1

4. FECHA DE ENTRADA EN VIGENCIA DE ESTE PROGRAMA: Septiembre 2010

5. OBJETIVO GENERAL:

Al finalizar el curso *Inglés Científico y Técnico II* (ID1112), el estudiante estará en capacidad de acceder a la información contenida en textos expositivo-explicativos de carácter científico y tecnológico en inglés, utilizando la estrategia de lectura más adecuada a sus propósitos específicos como lector.

6. OBJETIVOS ESPECÍFICOS:

En esta asignatura los contenidos giran en torno a las principales formas de organizar el discurso propias de la estructura retórica expositivo-explicativa que caracteriza el lenguaje de la ciencia y la tecnología.

Al igual que el primer curso del programa, este segundo curso contempla un enfoque de lectura intensiva, con énfasis en la instrucción y práctica en destrezas específicas. Al leer los textos seleccionados para este curso, el estudiante analizará los mismos con el propósito de entender la información explícita y/o implícita que se presenta. Para tal fin utilizará todas las destrezas adquiridas en el curso anterior, además de incorporar las siguientes:

1. Entender los indicadores léxicos o léxico-gramaticales de las formas de organización del discurso propias de la estructura retórica expositivo-explicativa, a saber:

   a) Definición,

   b) Descripción estática y dinámica,

   c) Clasificación,

   d) Comparación,

   e) Exposición cronológica y

   f) Relación causa-efecto.

2. Organizar en forma gráfica la información contenida en el texto.

3. Distinguir las relaciones entre las partes de la oración a través de la identificación de los patrones sintácticos utilizados con frecuencia en el inglés científico y técnico.

4. Discriminar el grado con que el autor afirma, niega o pone en duda un enunciado.

5. Identificar la actitud del autor.

6. Resumir la información presentada en el texto.

7. CONTENIDOS:

1. Formas de organización del discurso expositivo-explicativo:

   a) Definición

   b) Descripción estática y dinámica,

   c) Clasificación,

   d) Comparación,

   e) Exposición cronológica y

   f) Relación causa-efecto.

2. Indicadores léxicos específicos que expresen:

   a) Relaciones temporales;

   b) Certeza y duda; y,

   c) Actitudes positivas, negativas o neutrales.

3. Estructuras sintáctico-gramaticales propias del texto científico y técnico:

a) Adjetivación,

b) Voz pasiva,

c) Comparativos y superlativos y

d) Oraciones condicionales (Parte I).

4. Organizadores gráficos.

5. Técnicas para la elaboración de resúmenes.

8. ESTRATEGIAS METODOLÓGICAS:

Las clases serán conducidas en inglés tanto como sea posible. Sin embargo, el estudiante puede expresarse en español tanto en las actividades de clase como en las evaluaciones. Las actividades de aula tienen como fin primordial el desarrollo de procesos cognitivos que faciliten que el estudiante se convierta en un lector crítico e independiente, es decir, se espera que el estudiante pueda, entre otros, comparar, analizar, hacer síntesis, investigar, tomar decisiones, reflexionar, opinar y resolver problemas a partir de su interacción con los textos. Dicho desarrollo cognitivo se apoya en la potencialidad epistémica de la tarea de producción y de su interacción con la lectura. Así, se aprovecha la experiencia de la escritura como herramienta para aprender, asimilar, revisar y transformar los modos de comprensión y organización de los textos propios del inglés científico y técnico. Además, se sirve de la escritura para evaluar lo aprendido por el estudiante.

El esquema general de las lecciones incluye actividades de pre-lectura, durante la lectura y post-lectura. Tanto la primera como la última se centran en la interacción de todo el grupo, mientras que en la etapa de lectura el estudiante trabaja por lo general en forma individual con el texto, bien sea de manera libre, o guiado por preguntas y/o ejercicios propuestos por el profesor. El diccionario bilingüe y/o monolingüe se usa como apoyo.

A lo largo del trimestre, se ofrecen actividades en el laboratorio como un refuerzo al trabajo de aula, a través de la presentación de material audiovisual y/o multimedia relacionado con los contenidos de los cursos. El material que se utiliza en el laboratorio ha sido seleccionado, desarrollado y/o adaptado por los profesores del Departamento de Idiomas específicamente para servir de complemento a los contenidos de cada curso.

9. ESTRATEGIAS DE EVALUACIÓN:

1. Dos exámenes departamentales (25% cada uno)

2. Evaluación de cada profesor sobre los objetivos del curso, compuesta por no menos de cuatro diferentes medidas de rendimiento (50%)

10. FUENTES DE INFORMACIÓN:

St. Louis, R., y Pereira, S. (2010). *Focus on Reading.* [Edición revisada por C. Mayora]. Caracas: Universidad Simón Bolívar, Departamento de Idiomas.

St. Louis, R., y Mayora, C. (Eds.). (2010). *Reading Selections for ID1112*. Caracas: Universidad Simón Bolívar, Departamento de Idiomas.

Los materiales didácticos han sido desarrollados tomando en cuenta las necesidades particulares del programa. La selección de los textos utilizados obedece a los siguientes parámetros: (a) la temática: información sobre avances científicos e innovaciones tecnológicas de potencial interés para estudiantes de carreras como las que ofrece la USB, (b) la longitud: fragmentos de artículos, o artículos cuya longitud ronde las 3.500 palabras; (c) la autenticidad: que no hayan sido redactados para efectos de la enseñanza del inglés como lengua extranjera; (d) las fuentes documentales: publicaciones no especializadas dirigidas a un público educado interesado en temas de la ciencia y la tecnología; y (e) las estructuras retóricas características del lenguaje de la ciencia y la tecnología.

Muchas lecturas vienen acompañadas de actividades diseñadas por los profesores del departamento, típicamente, ejercicios de pre-lectura (destinados a activar el conocimiento previo del estudiante con respecto al tema de los textos), ejercicios centrados en la práctica de destrezas específicas, y ejercicios orientados a promover la comprensión del texto.

UNIVERSIDAD SIMÓN BOLÍVAR
Vicerrectorado Académico
Decanato de Estudios Generales
Coordinación del Ciclo Básico

1. DEPARTAMENTO: IDIOMAS (6705)

2. ASIGNATURA:

INGLÉS CIENTÍFICO Y TÉCNICO III
Programa de lectura en Inglés Científico y Técnico

Descripción: Este programa está diseñado para desarrollar destrezas de lectura en inglés científico y técnico. El presente es el tercero de tres cursos de 48 horas cada uno (*Inglés Científico y Técnico I, II y III:* ID1111, 1112 y 1113). Los estudiantes pueden eximir los tres cursos, o ingresar al programa en cualquiera de ellos, con base en los resultados que obtengan en la prueba de ubicación que se administra a cada cohorte al inicio del año académico. Los tres cursos que componen el programa se consideran interdependientes: los objetivos y estrategias especificados para cada uno constituyen la base para los cursos siguientes.

El programa está dirigido a los estudiantes de ingeniería y ciencias básicas. Forma parte del plan de estudios del Ciclo Básico ya que se considera que las destrezas de comprensión de lectura en inglés como lengua extranjera tendrán una aplicación inmediata para los estudiantes en las diferentes asignaturas que corresponden al Ciclo Profesional de sus estudios universitarios.

3. CÓDIGO DE LA ASIGNATURA: ID1113
No. de unidades-crédito: 3
No. de horas semanales: Teoría 3, Práctica 0, Laboratorio 1

4. FECHA DE ENTRADA EN VIGENCIA DE ESTE PROGRAMA: Septiembre 2010

5. OBJETIVO GENERAL:

Al finalizar el curso *Inglés Científico y Técnico III* (ID1113), el estudiante estará en capacidad de acceder a la información contenida en textos argumentativos de carácter científico y tecnológico en inglés, manteniendo una postura crítica y utilizando la estrategia de lectura más adecuada a sus propósitos específicos como lector.

6. OBJETIVOS ESPECÍFICOS:

En esta asignatura se hace énfasis en la argumentación como estructura retórica. Además, los contenidos se organizan por unidades temáticas (por ejemplo: Universo, Evolución, Inteligencia Artificial, Desarrollo Sostenible, entre otros). El propósito específico de este curso se centra en el desarrollo de destrezas de lectura crítica.

Este curso contempla la lectura de textos completos y de mayor longitud. La instrucción adopta un carácter de lectura restringida (*narrow reading*), que incluye en cada una de las unidades varios textos sobre un mismo tema con puntos de vista diferentes. El estudiante leerá los textos seleccionados para este curso con la intención de:

1. Identificar las formas de razonamiento y los indicadores léxicos o léxico-gramaticales instituidos a través de las convenciones discursivas de la argumentación.

2. Diferenciar entre hechos e hipótesis expresadas en un texto.
3. Diferenciar entre hechos y opiniones expresadas en un texto.
4. Resumir la información contenida en diversos textos referentes al mismo tema.
5. Comparar textos con base en criterios como la secuencia en la que se presentan las ideas, la coherencia lógica, la capacidad de persuasión y la vigencia de sus argumentos.
6. Expresar juicios sobre la validez de la información contenida en un texto con base en criterios internos, tales como el desarrollo lógico, la coherencia y la pertinencia de los ejemplos.
7. Expresar juicios sobre la validez de la información contenida en un texto con base en criterios externos, tales como opiniones de autoridades en la materia u otras fuentes que confirmen, contrasten o complementen dicha información.
8. Reevaluar un determinado texto con base en nueva información sobre el mismo tema.
9. Aproximarse al texto científico especializado a través de diversas fuentes de información y herramientas de investigación.
10. Explorar géneros alternativos y complementarios al discurso científico y tecnológico con el objeto de desarrollar el gusto por la lectura.

7. CONTENIDOS:

1. Componentes básicos de la argumentación:
   a) Tesis (conclusión),
   b) Razón (premisa, argumento),
   c) Justificación, y
   d) Alcance
2. Indicadores léxicos y léxico-gramaticales que expresen:
   a) Hechos,
   b) Opinión, y
   c) Probabilidad
3. Estructuras sintáctico-gramaticales propias del texto científico-técnico:
   a) Verbos modales, y
   b) Oraciones condicionales (Parte II).

4. Razonamiento inductivo vs. deductivo.
5. Herramientas de investigación: resúmenes (*abstracts*) y reseñas bibliográficas (*book reviews*).
6. Selección de lecturas con base en dos o tres tópicos específicos.

8. ESTRATEGIAS METODOLÓGICAS:

Las clases serán conducidas en inglés tanto como sea posible. Sin embargo, el estudiante puede expresarse en español tanto en las actividades de clase como en las evaluaciones. Las actividades de aula tienen como fin primordial el desarrollo de procesos cognitivos que faciliten que el estudiante se convierta en un lector crítico e independiente, es decir, se espera que el estudiante pueda, entre otros, comparar, analizar, hacer síntesis, investigar, tomar decisiones, reflexionar, opinar y resolver problemas a partir de su interacción con los textos. Dicho desarrollo cognitivo se apoya en la potencialidad epistémica de la tarea de producción y de su interacción con la lectura. Así, se aprovecha la experiencia de la escritura como herramienta para aprender, asimilar, revisar y transformar los modos de comprensión y organización de los textos propios del inglés científico y técnico. Además, se sirve de la escritura para evaluar lo aprendido por el estudiante.

El esquema general de las lecciones incluye actividades de pre-lectura, durante la lectura y post-lectura. Tanto la primera como la última se centran en la interacción de todo el grupo, mientras que en la etapa de lectura el estudiante trabaja por lo general en forma individual con el texto, bien sea de manera libre, o guiado por preguntas y/o ejercicios propuestos por el profesor. El diccionario bilingüe y/o monolingüe se usa como apoyo.

A lo largo del trimestre, se ofrecen actividades en el laboratorio como un refuerzo al trabajo de aula, a través de la presentación de material audiovisual y/o multimedia relacionado con los contenidos de los cursos. El material que se utiliza en el laboratorio ha sido seleccionado, desarrollado y/o adaptado por los profesores del Departamento de Idiomas específicamente para servir de complemento a los contenidos de cada curso.

9. ESTRATEGIAS DE EVALUACIÓN:

1. Dos exámenes departamentales (20% cada uno)
2. Evaluación de cada profesor sobre los objetivos del curso, compuesta por no menos de cuatro diferentes medidas de rendimiento (60%)

10. FUENTES DE INFORMACIÓN:

St. Louis, R., y Pereira, S. (2012). *Focus on Argumetation.* [Edición revisada por M Aceti, C. Mayora, y S. Pereira]. Caracas: Universidad Simón Bolívar, Departamento de Idiomas.

St. Louis, R., y Mayora, C. (Eds.). (2010). *Reading Selections for ID1113.* Caracas: Universidad Simón Bolívar, Departamento de Idiomas.

Los materiales didácticos han sido desarrollados tomando en cuenta las necesidades particulares del programa. La selección de los textos utilizados obedece a los siguientes parámetros: (a) la temática: información sobre avances científicos e innovaciones tecnológicas de potencial interés para estudiantes de carreras como las que ofrece la USB, (b) la longitud: fragmentos de artículos, o artículos cuya longitud ronde las 3.500 palabras; (c) la autenticidad: que no hayan sido redactados para efectos de la enseñanza del inglés como lengua extranjera; (d) las fuentes documentales: publicaciones no especializadas dirigidas a un público educado interesado en temas de la ciencia y la tecnología; y (e) las estructuras retóricas características del lenguaje de la ciencia y la tecnología. Asimismo, con el objeto de introducir al estudiante a las bondades de la lectura extensiva por placer, se complementa el material de lectura de este curso con cuentos cortos que pertenezcan al género de la ciencia-ficción.

Muchas lecturas vienen acompañadas de actividades diseñadas por los profesores del departamento, típicamente, ejercicios de pre-lectura (destinados a activar el conocimiento previo del estudiante con respecto al tema de los textos), ejercicios centrados en la práctica de destrezas, y ejercicios orientados a promover la comprensión del texto.

Appendix D - Students´ questionnaire

Universidad Simón Bolívar - Departamento de Idiomas - ID1113 12-11-2014

Dear student:
The following questionnaire is part of a research study I am doing at the moment. The objective is to obtain information about your perception regarding metaphorical language. Please answer each question, by ticking (√) and briefly explaining your reasons. Your answers may be written in English or in Spanish.

PERSONAL PROFILE

Age _____ Sex: Male _____ Female _____

Major Degree:
_____

QUESTIONS

1. What do you understand by metaphorical language?

2. Have you ever found any metaphorical words, phrases or expressions in the texts you read in the EST reading program?
   Yes ___ No___ Briefly explain your answer.

3. Are you able to identify and understand this kind of metaphorical language?
   Yes___ No ___ Briefly explain your answer.

4. Would it be beneficial for you to understand metaphorical language when reading EST text?
   Yes ____ No ____ Briefly explain your answer.

Thank you very much for your help! I do really appreciate it!

Appendix E - Teachers´ questionnaire

Dear colleagues:
The following questionnaire is part of a research study I am doing at the moment. The objective is to obtain information about your perception regarding metaphorical language.
Please answer each question by ticking (√) and briefly explaining your reasons. Your answer may be written in English or in Spanish.
When you finish completing the questionnaire please send it to me: Prof. Silvia Pereira
E-mail address: spereira@usb.ve by the end of this term.

PERSONAL PROFILE

Age _____ Sex: Male _____ Female _____
Working situation: Active_____ Retired _____
Subject (s) that you teach: _____
Major Degree: _____
Master's Degree: _____
PhD Degree: _____

QUESTIONS

1. What do you understand by metaphorical language?

2. Have you ever found any metaphorical words, phrases or expressions in the texts we use in our EST reading program? Yes ___ No___

Briefly explain.

3. Do you think our students are able to identify and understand this kind of metaphorical language? Yes___ No ____

Briefly explain.

4. Do you help students understand metaphorical language when reading EST text? Yes ____ No____

Briefly explain.

5. Do you think it would be beneficial to make students aware of the presence of metaphorical instances when reading EST text? Yes ____ No ____

Briefly explain.

Thank you very much for your help! I do really appreciate it!

UNIVERSIDAD SIMÓN BOLÍVAR
DIVISIÓN DE CIENCIAS SOCIALES Y HUMANIDADES
DEPARTAMENTO DE IDIOMAS

MEMORANDUM INTERNO

FECHA: Sartenejas, 15 de enero de 2015

PARA: Profesor (a):

DE: Profesora Silvia Pereira

ASUNTO: AGRADECIMIENTO

Por el presente deseo expresarle mi más sincero agradecimiento por su valiosa contribución con el proyecto de investigación titulado *Activación del conocimiento metafórico para la comprensión de lectura en inglés científico y técnico para propósitos académicos* durante el trimestre septiembre-diciembre 2014.

En especial, le agradezco su ayuda al responder el *Metaphorical Thinking Questionnaire.* Sus respuestas representan un aporte invaluable para llevar a cabo este proyecto. Ha sido un placer haber contado con su aporte durante este trimestre.

Sin otro particular , reciba un cordial saludo,

Silvia Pereira

Appendix G - BBC Text: Alien life seed theory claimed

BBC NEWS

Alien life 'seed' theory claimed

New evidence from astrobiology "overwhelmingly" supports the view that life was seeded from outside Earth, a scientist has claimed. Prof Chandra Wickramasinghe of Cardiff University says the first microbes were deposited on Earth 3,800m years ago. The astrobiologist has helped developed the panspermia theory which suggests an extra-terrestrial origin for life. He argues for a cycle of life as microbes find their way into comets and "multiply and seed other planets".

In the article, published in the International Journal of Astrobiology, Monday, he argues humans and indeed all life on Earth is of alien origin, brought onto the planet by comets hitting the planet. Prof Wickramasinghe, of Cardiff University's centre for astrobiology, says there is a cyclical transfer process of life from planet to planet.

He believes comets hit planets and push living organic matter out into space, some of which survives and in turn gets transferred to developing planetary systems over a timescale of millions and millions of years, seeding life on the newly formed planets.

He accepts this model still does not explain how life actually began in the first place, but says there is no hard evidence to support the theory that life only began in a "primordial soup" on Earth, or other places. Over the past three decades research has shown that large swathes of the Milky Way are strewn with gigantic dust clouds full of organic molecules, which some people have argued shows life emerging independently from new in these clouds.

In his paper, he says recent interpretation of spectra readings from the organic molecules found in interstellar clouds has indicated that they are in fact the remains of bacteria which has been broken down, rather than being built up.

"Interstellar clouds appear to be the graveyard of life not its cradle," he said.

"Each time a new planetary system forms a few surviving microbes find their way into comets. These then multiply and seed other planets," he said. He adds: "We are thus part of a connected chain of being that extends over a large volume of the cosmos. Evidence is pointing inexorably in this direction." The professor and his late colleague Sir Fred Hoyle championed the panspermia theory from the 1960s.

Story from BBC NEWS:

http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/wales/south_east/8491398.stm

Published: 2010/02/01 13:47:55 GMT

Appendix H[38] - Biology: Evolution text

Read the text and briefly and answer the question. Use your own words. Your answer can be written in English or in Spanish.

Evolutionary change in a species depends on the existence of genetic variability among the individual in the species, which leads to differential reproductive success among them. Mutation provides the basis for genotypic variability. Sexual reproduction creates new gene combination by crossing over, random assortment of homologous chromosomes, and out breeding. All the genes present in a population constitute its gene pool. In large, randomly breeding populations, the frequency of each gene in the gene pool remains constant. Populations produce more young than the number that would replace the parental population. If, as is usually the case, the environment already is supporting as large a population as it can, the offspring will be subjected to a "struggle for existence." Any gene or gene combination that increases the likelihood that an individual will survive to sexual maturity, mate, and raise larger families will be favoured. This is natural selection.

1. What does the expression "struggle for existence" mean?

[38] Taken from: Dubin, F. & Olshtain, E. (1990). Biology: Evolution. In F. Dubin and E. Olshtain (Eds,) *Reading by all means: Reading Improvement Strategies for English Language Learners* (2nd ed.) (pp. 62-63). New York: Addison-Wesley.

Appendix I - Transcription Question 1 – MOMENTUM A

n		CA
1	El uso de recursos literarios para embellecer o decir de forma coloquial algo de un texto	AW
2	-----	DA
3	Palabras coloquiales, metáforas, parábolas.	AW
4	Es una estrategia de escritura que ayuda a escribir de manera más directa	UAW
5	Sounds like a sort of communication way that doesn´t involve direct contact with the main idea	UAW
6	Lenguaje utilizado para representar algo con diferentes palabras “ideadas”	AW
7	Es el lenguaje usado mediante comparaciones	AW
8	El lenguaje metafórico según el contexto	AW
9	Que no sea su significado directo	AW
10	No es lenguaje directo, estético	AW
11	Lenguaje colloquial	AW
12	Un lenguaje que no es directo ni literal	AW
13	Entiendo que es un lenguaje que no es directo	AW
14	-----	DA
15	Tipo de lenguaje no directo donde predominan las imágenes literarias para expresar una idea	AW
16	-----	DA
17	Cuando se dice algo de manera indirecta	AW
18	-----	DA
19	Is when something it´s not direct	AW
20	Cuando se usa un lenguaje que no es directo	AW
21	Un lenguaje basado en frases coloquiales	AW
22	La forma de comunicar un mensaje usando comparaciones y otros recursos	AW
23	Considero que son palabras usadas para decir algo que significa otra cosa	AW
24	Lenguaje que se usa para comparar algo	AW
25	-----	DA
26	-----	DA
27	Es un lenguaje que requiere cierto conocimiento y análisis previo para poder entenderlo	AW
28	Es el lenguaje que puede hacer referencias o comparaciones entre cosas o personas	AW
29	Entiendo como el lenguaje cargado de recursos metafóricos	AW
30	Un lenguaje que trae un doble sentido, es relativo	AW
31	Un lenguaje que emplea ciertas comparaciones con objetos etc., a lo largo del texto	AW
32	Que se utilizan experiencias pasadas o ejemplos para explicar algo	AW
33	Como cambia el lenguaje	UAW
34	Palabras parecidas al español de significado similar	UAW

35	Lenguaje metafórico es entendido como si se hablara de modo satírico comparando ciertas cosas con otras	AW
36	Es algo ficticio que deja un lenguaje	AW
37	Lenguaje metafórico se utiliza en textos para hacer entender una idea.	AW
38	Lo entiendo como algún método para entender otro idioma que no sea el mío	UAW

n		T
1	En algunos textos que he leído	i
2	DA	v
3	Muchos autores los usan.	i
4	DA	v
5	DA	v
6	Hoy leimos	ii
7	DA	v
8	DA	v
9	DA	v
10	Si y no los entiendo	ii
11	DA	v
12	DA	v
13	DA	v
14	DA	v
15	DA	v
16	DA	v
17	Se discutió en clase lo que significaba	ii
18	In a few texts of ‘ universe´	ii
19	DA	v
20	No lo entendí y pregunte que era	ii
21	La profesora explico el significado	ii
22	No recuerdo si leí tales palabras	iii
23	DA	v
24	Se encuentran frases que intentan decir algo pero que no se pueden tomar literalmente	ii
25	DA	v
26	DA	v
27	DA	v
28	Sí, en algunos textos hacen uso del mismo porque es un recurso común así que no es extraño encontrarlo.	i
29	Todos los textos tiene un solo sentido	iii
30	DA	v
31	Ahorita no recuerdo exactamente	iii
32	Algunas lecturas tienen metáforas muy concretas	ii
33	Hay expresiones que cambian según el contexto	ii
34	DA	v
35	DA	v
36	No leí prácticamente ninguna lectura	iii
37	DA	v
38	En algunos libros científicos	ii

Appendix K - Transcription Clarification part – Question 3 – MOMENTUM A

n		T
1	DA	v
2	Sí, pero no en todas las ocasiones	i
3	No todas, pero algunas las identifique porque sabía el significado de las palabras	ii
4	No, en la mayoría de los casos	i
5	DA	v
6	Tengo que buscar o preguntar en clase	ii
7	DA	v
8	DA	v
9	No siempre, la profesora lo explicó	ii
10	Hay que conocer el ingles	ii
11	DA	v
12	Por lo general la profesora me explicaba el significado	ii
13	Tuvieron que explicármelo para entenderlo	ii
14	DA	v
15	A veces	i
16	DA	v
17	Pido ayuda a las demás personas para comprenderlo	ii
18	I can, but it can take time	ii
19	DA	v
20	No lo entendí	ii
21	Debido a que pase varios veranos en Estados Unidos por lo que ya lo he escuchado	i
22	Porque se puede manejar con el contexto	ii
23	A través del significado de todo el texto	ii
24	Por el tipo de palabras usadas	ii
25	DA	v
26	DA	v
27	DA	v
28	Sí, ya que este tiene un contexto que permite identificarlo y entenderlo.	ii
29	Se entiende porque es lo mismo en español que en ingles	iii
30	DA	v
31	Sí, porque es algo usual en ciertos textos que tenemos que leer para clase o que nos gusta.	ii
32	Si se utilizan ejemplos o suposiciones se está haciendo uso de metáfora	ii
33	DA	v
34	DA	v
35	Solo algunas, no todas	ii
36	Soy capaz	i
37	DA	v
38	Porque ahora tengo las herramientas para ello	ii

Appendix L - Transcription Clarification part – Question 4 – MOMENTUM A

n		T
1	Para comprender mejor el mensaje del texto	ii
2	El lenguaje metafórico forma parte de las comunicaciones, hace la conversación más amen así que es una buena práctica. Por lo tanto, seria excelente poder comprenderlo en ingles también.	iv
3	Para entender la personalidad y el carácter de texto y su autor. Me ayuda a entender más.	ii
4	Sí, porque me ayuda a entender mejor los textos	ii
5	DA	v
6	Me ayudaría en el futuro	ii
7	DA	v
8	DA	v
9	DA	v
10	Sí, porque así entiendo mejor los textos	ii
11	Conocimiento para la vida	i
12	Porque me ayudaría a entender los textos	ii
13	Me permitiría a entender más rápidamente los textos	ii
14	Para tener mas conocimiento	ii
15	DA	v
16	DA	v
17	Porque sale en la mayoría de los textos y podría entender con mucha más precisión el texto	ii
18	Totally, it would be easier to read.	ii
19	DA	v
20	Sería más fácil identificar todo	ii
21	Debido a que desconozco algunos términos científicos y facilitaría la lectura	ii
22	Es útil en muchas cosas porque comprendería mejor las ideas de los autores	ii
23	DA	v
24	Ayuda a identificar cosas que a lo mejor siendo literal no se entienden	ii
25	DA	v
26	Así tener más dominio del tema. Ayudaría a entender más a fondo el texto	ii
27	Ayuda a entender mejor el texto y a enriquecer el conocimiento	ii
28	Si, ya que este es muchas veces usado en los textos.	ii
29	Se comprendería mejor todo	ii
30	DA	v
31	Porque a veces está presente en ciertos textos los cuales son necesarios.	ii
32	Para entender mejor. Algunas son un poco complicadas para entender a la primera.	ii
33	Bastante. Me ayudaría a tener una mejor comprensión.	ii
34	DA	v
35	Todo lo que sea enseñanza es beneficioso	iv

36	Si puede ser de ayuda	i
37	Si me gustaría para poder comprender mejor los textos que leo en ingles	ii
38	Porque si no se el idioma, puedo tener alguna idea general.	ii

Appendix M – Teachers demographic data

n	Date and time	Age:	Sex:	Working situation:	Subject (s) that you teach:	Degree	Degree area (s):
1	11/18/2014 15:32:45	20-29	Female	Active	EST	Master	Translation
2	11/18/2014 15:33:34	60-69	Female	Active	English	PhD	Education
3	11/18/2014 15:38:59	50-59	Female	Active	Inglés como lengua extranjera	PhD	Ciencias Sociales y Humanidades
4	11/18/2014 16:12:15	50-59	Female	Retired	Linguistics, psycholinguistics and neurolinguistics. Research methodology.	PhD	Linguistics
5	11/18/2014 17:15:19	50-59	Female	Active	ID111/ID112/ID113	Major	Law
6	11/18/2014 22:57:24	60-69	Female	Retired	EFL reading and writing	Master	Education
7	11/19/2014 13:43:36	50-59	Female	Active	EFL	Master	TEFL
8	11/19/2014 20:34:24	60-69	Male	Retired	English-Spanish-Translation and Interpretation, Linguistics, Tesol	PhD	Linguistics, Applied Linguistics
9	11/19/2014 20:36:32	50-59	Male	Active	ID1111, ID1112. It's been a while since I last taught ID1113 and ID7756 (graduate course on language testing)	Master	Lic. en Idiomas Modernos; Especialista en Gestión de Servicios de Información; M.A. in Applied Linguistics
10	11/22/2014 22:15:21	40-49	Female	Active	Inglés Técnico Científico del Primer Año (Regular y paralelo) y CIU	Master	Licenciatura en Educación, Mención Inglés. Maestría en Lingüística Aplicada
11	11/26/2014 9:32:32	50-59	Female	Active	French, Spanish	Master	Applied Linguistics
12	12/1/2014 11:39:01	50-59	Female	Active	A reading program in English for Science and Technology	PhD	Master in Applied Linguistics / PhD in Interculturality and Translation
13	12/1/2014 15:19:00	50-59	Male	Active	Políticas Lingüísticas	Master	Literatura Latinoamerica

14	12/1/2014 16:55:07	40-49	Female	Active	English for architecture and urban planning	Master	Applied Linguistics
15	12/2/2014 12:59:50	60-69	Female	Active	English reading skills, The World of Literature in English, Contemporary British Theatre, British Culture	Master	Major in Speech and Drama, Master in Curriculum and Instruction
16	12/3/2014 5:37:58	50-59	Female	Active	ESP	Master	Applied Linguistics
17	12/3/2014 11:03:28	50-59	Female	Active	English	Master	Magister en Inglés como lengua extranjera
18	12/3/2014 11:47:47	40-49	Female	Active	Lectura de textos en ICT y Evaluación del Aprendizaje de Idiomas	Master	Lingüística Aplicada
19	12/3/2014 14:21:38	60-69	Female	Retired	English, German, Hungarian and Spanish as a foreign language	Master	Psychology - Expression of Crises through language
20	12/4/2014 12:16:06	60-69	Female	Retired	ID1111, 112, 113 Teaching English Pronunciation	Master	TESL
21	12/5/2014 20:32:18	20-29	Male	Active	English for science and technology (first year section)	Major	English teaching
22	12/9/2014 16:01:28	40-49	Female	Active	English for Architecture and Urban Planning	Master	Applied Linguistics
23	12/13/2014 9:27:30	60-69	Female	Retired	English	Master	Applied Linguistics
24	12/19/2014 18:02:30	50-59	Female	Active	French language and culture.	PhD	French language and literature
25	1/5/2015 7:43:10	50-59	Male	Retired	ID1113, ID2131 (Inglés para matemáticas), Métodos de investigación en LA	PhD	ESL Teacher - Education
26	11/01/2015 12:03:21	30-39	Male	Active	ID1112, ID1113	Master	Applied linguistics

Appendix N - Transcription Question 1 – MOMENTUM B

n		CA
1	Is when the speaker refers to things with words that are not literally what they mean, for example saying that a person is sweet as a chocolate, does not mean literally that a person is chocolate or made of it.	TPM
2	Figurative language, non-literal.	TPM
3	Lenguaje que no es literal, sino que invoca lo real.	TPM
4	The use of a figure of speech based on similarity of a trait or quality in order to structure an explanation of a novel concept. That is, an attempt to explain a new idea through a known idea.	TPM
5	Language that will use analogies to convey the message	TPM
6	The uses of metaphors, comparisons of unlike ideas or objects, in order to clarify, describe or explain an idea, which can be complex at times.	TPM
7	Una forma de expresión que se usa para designar un elemento diferente al que normalmente o típicamente refiere. El significado original (o al menos parte de este) es transferido a otro elemento con el cual guarda cierta relación.	TPM
8	It is juicy part of our language use. Although with time and use those forms descend from metaphor to everyday language, human creativity still has the capacity to make up new figures of speech from these “normal”, everyday linguistic forms. In sum, ML is the tool we have to sweetened, highlight, emphasize, hide, beautify, define, describe, things, concepts, devices, means of transportation, regulations that we enter in contact with.	TPM
9	Language that means something different from what the actual words mean.	TPM
10	Es un tipo de comunicación (estilo de expresión) en donde se emplea términos que describen a un objeto o bien una acción de manera figurativa. Ello se basa en la comparación de ciertos rasgos coincidentes entre los objetos comparados.	TPM
11	The comparison of two objects which are not similar. Es una figura en la cual se comparan las cualidades de dos objetos/seres que normalmente no tienen similitud y se crea una relación. Es un proceso mental.	TPM
12	The type of language in which associations or analogies are established for apparently unrelated things.	TPM
13	Hacer sentir y/o comprender algo en términos de otra cosa.	TPM
14	I think that metaphorical language is the form, kind of language that uses metaphors	OPM
15	Metaphorical language is language which uses words which are not usually associated to describe something or to create an effect. For example: She felt she was drowning in a sea of troubles.	TPM
16	As I remember from school, it was a literary device used by authors to describe something that you wouldn´t normally associate with what is being described. For example, She put on her wooden face or she has a stone cold heart, or the famous “the whole world’s a	TPM

	stage". It isn´t a literal description but it paints a whole picture with few words.	
17	It is the language that expresses something that cannot be interpreted literally.	TPM
18	Language that expresses an idea in an "indirect" way or using a meaning that is not literal but figurative. Metaphorical language refers to a concept by making an analogy to another situation. It is a very common resource in everyday language, even though sometimes we are not aware of it. For example: When someone says: "You're an angel!" It probably truly means that this person thinks you have been very kind and generous.	CPM
19	Considering the basic idea, language in general would be the instrument that allows us to express ourselves in order to communicate our ideas to others. A metaphor would be then, the use of a part of language in such a way, that its original denotated meaning is applied to another part of language, the meaning of which belongs to another topic, in order to illustrate some idea more richly or more precisely. Metaphorical language, as a compound noun, would be a text of larger extent, which would have the same use as described above.	CPM
20	Language that uses words to mean something different from their ordinary meaning in order to achieve a particular effect.	TPM
21	I understand it as the use of language in a way that evokes the comparison of concepts and images with a particular intention towards the interlocutors. The intention can have esthetical, rhetorical, or humorous motives.	TPM
22	It is the use of certain words or terms to refer to something else.	TPM
23	Implicit language, use of words in a creative way, not in a literal way.	TPM
24	Language procedure by which a concrete term is used in an abstract context by substitution without introducing an element of comparison.	TPM
25	It is that language in which you might compare something with another that could be quite ideal.	TPM
26	Language used to represent reality through metaphors, that is, associations between meanings and symbolic signs different from socially accepted semantic meanings. For example, in psychology a common metaphor is the brain as a computer or the mind represented as a "processor".	CTM

Appendix O - Transcription Question 2 – MOMENTUM B

n	CA		T
1	AW	DA	v
2	UAW	I don´t really remember, but I had to tick one of the options.	iii
3	UAW	Creo que sí, pero, para ser honesta, no estoy segura porque nunca las he buscado en forma intencional.	iii
4	AW	All the time. Metaphors are widely used by any language in any subject, even without the awareness of the users.	ii
5	AW	Well, expository texts can be dry, but sometimes the authors will use them to show a point.	iI
6	AW	There are “technical language functions” we specifically address in our reading courses where our students learn to find elements of description, comparison, contrast, definition, classification, etc., where metaphors may appear to clarify an idea or make it more appealing to the senses of the reader, for example in the case of a newly created device.	ii
7	AW	Recuerdo en un texto llamado Biometheorology que había la siguiente expresión “Roll up their sleeves” para referirse a iniciar un trabajo.	ii
8	AW	Descriptive texts in science use plenty of adjectival forms or plain metaphors to achieve a rhetorical effect. People have misconceived ideas that scientific texts are alien to figurative use of language. They may be right if they compare it to literary texts, but when a writer uses language to address an audience of language users, he or she cannot deprive himself/herself of the pleasure -as language user- from using figurative language to some extent.	ii
9	AW	All the time. All languages use metaphor, and not just in informal conversational exchanges. The formal language of science and technology that we cover in our materials is no exception. Metaphor is a mechanism to express meanings that go beyond lexical denotation by exploiting lexical connotation. In other words, one uses a word or phrase not to mean what it actually says but rather what it implies.	ii
10	AW	Generalmente encuentro este tipo de lenguaje en textos que tratan temas de corte técnico-científico, de divulgación al público general. El estilo de redacción es menos formal y usa lenguaje metafórico para facilitar la comprensión de algunos conceptos.	ii
11	UAW	La metáfora es una figura muy usada en la literatura, pero los textos científicos generalmente no la usan. Quizás, al tratar de hacer alguna explicación de un fenómeno complejo se podría hacer uso de la metáfora para hacerlo más comprensible. Pero la ciencia se caracteriza generalmente por una neutralidad en el discurso.	i
12	AW	All the time. Even though metaphors are usually associated to literature or fiction, science and technology texts are full of them.	ii
13	AW	No recuerdo ejemplos concretos, pero es imposible no apelar a metáforas, aunque sea de manera generalmente inconsciente,	i

		cuando se habla o escribe cualquier lengua. Por lo tanto, forzosamente se hallan en la experiencia de lectura.	
14	UAW	I do not remember	iii
15	AW	I can´t remember exactly when or where, but I´m sure I´ve seen the odd one.	iii
16	UAW	I can´t remember because I haven´t taught this for about 5 years. But I suppose it does occur although this type of language is usually found in literary texts.	i
17	AW	I am not quite sure, but I think yes. Because metaphors are part of the language system, even if we are not poets, or writers.	i
18	AW	I could locate hundreds of examples in our instructional material. One example I could describe by heart is found in a text called "How to make ice in five minutes" which describes a refrigerator that uses chemical reactions to increase the temperature. In the text, it says "it will land on the shelves" meaning that the product will be available in the market or it will be commercialized.	ii
19	AW	I haven't been teaching EST for a long time now, but even though the language of Science and Technology tries to avoid metaphors, it is almost impossible to do so, because the main goal is communication, and if a metaphor is necessary in order to explain something, then we must use it.	i
20	UAW	DA	v
21	AW	Yes, I have. "When there's smoke, there's fire," "fiery volcanoes dominated the landscape (…) spewing gasses (…)"These are just some of the ones I read. They serve either to introduce a topic, or to define a concept.	ii
22	AW	WOW I don't really remember in EST but in ESP it is kind of common. And it is broadly used in literature.	i
23	AW	The use of metaphors is used in all contexts although is more common in fiction	i
24	UAW	I do not teach EST, but in my French courses, I usually find metaphorical expressions.	iii
25	AW	This is a difficult question to answer. We understand that to teach EST, metaphors have little place as we are supposed to work with what is completely factual.	i
26	AW	All language is metaphorical to some extent. In science and technology, each discipline and field has its own metaphors, so they are present all through the EST program. Yet, I think that the topic-centered course (ID1113) is the level that probably contains more examples of metaphorical language.	ii

Appendix P - Transcription Question 3 – MOMENTUM B

n			T
1	DAG	When there appears this kind of language they ask me to explain the meaning of the sentence.	iv
2	AG	Many songs and video clips use metaphorical and students are used to them.	i
3	AG	Me inclino a pensar que sí, porque en la vida cotidiana la utilizamos, pero quizás no lo hacemos de forma muy consciente.	i
4	AG	Yes, but the problem is the lack of awareness. During my teaching I encounter situations in which students took metaphorical language too literally. The problem is to make them understand that it is figurative language.	iv
5	DAG	Not in English	iv
6	DAG	I answered “no” because there was not a “maybe”. It will depend on the proficiency of English of the student and his ability to read in L1. I think figurative language should be addressed explicitly to double check if all students are able to recognize and understand these forms, the same way they have exercises to figure out complex noun phrases used in technical language.	iv
7	DAG	Si entienden el idioma, sí, porque ya ellos saben hacer la interpretación metafórica en español.	i
8	DAG	My short answer is No but it is a bit more complicated than that. There might be a good percentage of students who may fail to put their finger on precise metaphorical features simply because they cannot do much with language anyways. Also a good number of students who may know English well would be surprised to see how much figurative language texts contain. They may lack awareness of the existence of those features in our texts. The teacher has a role here then. Now, very few but sensitive and language gifted students both in their L1 and L2 are very much capable of detecting and understanding ML.	iv
9	DAG	We don’t train them explicitly. In fact, people don’t realize the use metaphors in their own language unless they are made aware of this fact.	iv
10	DAG	Por lo general, los estudiantes no tienen suficiente “background knowledge” en un área determinado ni cultura general para poder hacer las conexiones pertinentes.	iv
11	DAG	Sí, si el proceso mental de la metáfora no es demasiado abstracto, en caso contrario no creo que sea tan obvio para los estudiantes. Al hecho de la metáfora se le podría agregar las limitaciones que pueda tener el estudiante en su dominio de la lengua inglesa. Ahí, entonces sería muy difícil que un estudiante pueda llegar a entender.	iv
12	DAG	Our EST students barely reach the minimum lexical threshold to understand authentic texts in EFL. That is why it is difficult for them to understand expressions that do not mean what at first glance they seem to mean.	iv

13	AG	El inglés es una lengua indoeuropea y su sistema de metáforas no es tan distante del español. Si hay dificultades en entender no es por la metáfora en sí, sino por falta de vocabulario.	iv
14	DAG	It is a hard topic even in their native language, which is Spanish	iv
15	DAG	A student with a good level of English might, but a lot of our students at the moment don´t have the background.	iv
16	DAG	The have a hard time (as far as I can remember) understand plain, simple texts, but then again, I may be wrong. If they weren´t taught this in Spanish, they won´t be able to recognise it in English. It isn´t easy as first they have to decode and then work out the underlying meaning.	iv
17	AG	I think it is possible for our students to identify and understand this type because they have vocabulary training, besides we train them to interpret words in context, so I think it is possible.	ii
18	DAG	I answered “No”, because I think most students won’t identify or understand metaphorical language. First of all, they are probably unaware of the use of metaphorical language in their L1. Second, because their knowledge of English vocabulary—and proficiency in the language in general—they probably don’t even realize they are dealing with metaphorical language. I will use an example to try to explain what I mean. Let’s take the expression “in a nutshell”. Students who don’t know what a nutshell is (many of them!) maybe will try to understand the function of the expression in the text. If they deduce from the context, that it means something like “in brief”, “in short”, they will probably never know they are dealing with metaphorical language. Those who know what a nutshell is will probably make the connection!	iv
19	AG	I one gives them an introductory explanation and shows them some examples, then I certainly they would.	ii
20	DAG	They would need training for it.	iv
21	AG	In my experience I have seen that they can understand it very well, and they can discuss about the meaning of the message in question. So yes, they can. And with explicit instruction about it, they can improve their technical understanding of the term.	iv
22	DAG	Some of them do but for others it is kind of difficult and even impossible. Some students love literal translations, reason for which they neglect metaphoric language use.	iv
23	AG	It is more difficult for them but they can be taught to identify and understand it	iv
24	DAG	It is very difficult for them to identify these expressions. They do not use many metaphorical expressions in Spanish. But some students who like reading can identify figurative language, especially when they read short stories or novels.	iv
25	DAG	This kind of language is not emphasized in our classes.	iv

26	DAG	I would say “yes” and “no”. Sometimes, metaphors are transparent and need no explanation. In other cases, Spanish has borrowed a translation of the metaphor so for the student is clear. But there are of course phrases, words, etc. that they are definitely unable to grasp.	iv

Appendix Q - Transcription Question 4 – MOMENTUM B

n	CA		T
1	HAW	DA	v
2	HUAW	I am not teaching EST	iii
3	HAW	Me inclino a pensar que sí, aunque como dije antes, al no hacerlo en forma consciente no puedo estar tan segura. Me inclino a pensar que sí porque uno ayuda a los estudiantes a entender los significados de las palabras y expresiones, sean literales o metafóricas.	iv
4	HAW	I used to.	iv
5	HAW	Sure.	iv
6	HAW	When these structures came up in readings, I pointed them out, but I also used songs in class and figurative language is quite common in songs. My favorite groups which had songs with content were Metallica and Linking Park, which made students try to understand what the songs were really about, beyond the literal words.	iv
7	HAW	He tratado de que entiendan el significado de las palabras para que ellos mismos hagan la transferencia. Siempre lo logran.	iv
8	HAW	I used for many years the Spanish word “autobuses” as an example of metaphor in a small community. After some of my students responded that they had no idea of ML in they native language they could help but laughing when I mentioned the word “autobuses”. I also used titles in English, many of them, to see for themselves that science and ML are not that apart. I remember using complex noun phrases to show language creativity and figurative language.	iv
9	HAW	By using awareness activities that include references to Spanish. For example, in Focus on Reading (2012, p. 21), the last part of this sentence is a metaphor: “In the later stages, depression and aggressiveness—and, in the most severe cases, dementia and psychosis—take over, reducing a formerly healthy, vital family member, friend or co-worker to a miserable, bedridden shadow”. Clearly, no person can be physically reduced to a shadow. So this must mean something else, something negative in this context. WordReference.com says that a shadow is “5. a reminder of what was once present: ‘just a shadow of his former self’”. We may think that this is a denotation of the word, but actually this already long established meaning is a metaphorical connotation because it is based on the fact that a shadow is the dark, intangible projection of a body which blocks light. A reference to Spanish comes in handy, because we use the same metaphor: “La enfermedad lo redujo a una sombra”. By showing students that all languages use metaphor, you can make them aware that the vocabulary they learn is actually richer than they think due to word connotations.	iv

10	HAW	Les explico el contexto (cultural general o específico) requerido para entender la metáfora empleada por el autor del texto.	iv
11	HAW	Yo no dicto cursos de inglés en este momento. Sin embargo, sí dicté los cursos de Inglés Técnico Científico y he dictado en el área de Francés cursos de Francais à Objectifs Spécifiques (FOS), y en caso de encontrar esas figuras es lógico que el profesor las explique cuando el estudiante no las comprende.	iv
12	HAW	I help my students to deal with unknown lexical items while reading in English. I make them aware of what makes a word difficult, i.e. dealing with polysemy, idioms, phrasal verbs, irony, and—particularly—transfer of meaning (taking into account that a metaphoric expression may lie in a single word or be far more extensive). I explain to them that a metaphor always involves an implicit comparison between X and Y, and one way of handling it is to analyse what X and Y may have in common that is relevant to the context.	iv
13	HUAW	No particularmente, dado lo señalado en el punto anterior.	iii
14	HUAW	I do not remember seeing that on the reading guides	iii
15	HAW	I always try to help the students understand every aspect of a text.	iv
16	HUAW	Same as question 2.	iv
17	HAW	If nobody asks I try to ask them What does the author mean by....?	iv
18	HAW	I usually review the text to locate any expression, including examples of metaphorical language, which I believe students might have difficulties with. If they don't ask, I bring it up to them.	iv
19	HAW	I think it is extremely important that they distinguish metaphorical thinking from the rest, in order to know how far removed the language they are reading is from reality.	iv
20	HAW	If I encounter it, yes, of course.	iv
21	HAW	I try to elicit information from my students about the figurative language in the text, then raise awareness about the functions of metaphors, and then I just try to remind them to be aware of these concepts and how they work.	iv
22	HAW	I try to make them think of what it is that the author may be referring to.	iv
23	HUAW	I am not currently teaching	iii
24	HAW	I use metaphorical language in my courses and I also help them to understand metaphorical language in any text.	iv
25	HUAW	In some occasions, I might bring some extrareading that have this kind of language. I do not consciously teach them to pay attention to metaphors.	iv
26	HAW	Yes, but mostly "ad hoc" when the need arises, that is, if students ask or show problems understanding one of the metaphors. But it seldom something planned in advance or something I purposefully include in the class.	iv

Appendix R – Transcription Question 5 – MOMENTUM B

n	CA		T
1	AG	So they learn to recognize and understand this kind of language.	iv
2	AG	Metaphors are part of our life.	iv
3	AG	Porque les ayudaría a desarrollar habilidades para la comprensión del idioma.	iv
4	AG	Absolutely. It would be very useful in order to avoid confusion on their part.	iv
5	AG	Because many metaphors are language specific and they really need that help. They cannot infer the meanings.	iv
6	AG	Definitely. One should not take anything for granted. Exercises with samples taken from actual technical texts should be included in the workbooks and make students aware of these forms. I am sure metaphorical language is also included in one way or another in the freshman courses of the Language and Literature courses. Maybe something could be done to include them in the same trimester so that the transfer L1-L2 or even L2-L1 can be made. All the best in this interesting research study and I look forward to reading about its results.	iv
7	AG	Si, porque aunque la capacidad de metaforizar ya la tienen, no saben cuáles son los recursos léxico-gramáticos y culturales que se usan en una lengua especifica.	iv
8	AG	As you my sense by now, I believe that EST texts do contain ML and that is up to us, teachers, to find that particular way we all have to teach students to detect, smell (see what I am talking about), paraphrase, even translate to Spanish figurative language. The theory of language noticing may be useful here as us reading to learn other things. The author cannot be an uninvited guest to a reading session and neither is his/her creative accessories to construct a text. We often ask students to infer ideas from texts. Inference is a bit beyond factual language and a bit closer to Metaphorical thinking. We can take it from there. We are already teaching inference.	iv
9	AG	Learning a language without learning at least some of its many metaphors is unwise and also not so much fun. I also think that the sister concept of analogy can and should be included explicitly in the program along that of metaphor. Analogies can act as a bridge to metaphors since they are, in a manner of speaking, metaphors made explicitly clear.	iv
10	AG	Sería beneficioso instruir a los estudiantes en ello porque el lenguaje metafórico no es fácil de identificar por muchos factores, quizás entre los que se destacan más sería que su umbral lingüístico (inglés) no es suficiente; el bagaje cultural y específico tampoco es el idóneo.	iv
11	AG	Si se encuentran en los textos científicos este tipo de figuras, creo que sí es beneficioso para el estudiante. La metáfora es una figura, el tipo de relaciones que se hacen en una metáfora es a un nivel de mayor profundidad lingüística, cognitiva y hasta cultural. Pienso que estaría haciéndole descubrir al estudiante una relación a un nivel abstracto, hacer deducciones, inferir.	iv

		Permite analizar el idioma desde la forma de pensar de los hablantes nativos, de concebir mundo.	
12	AG	It is one of the ways we can use to help our students to develop higher-order reading-comprehension skills. They need to be aware that reading word-by-word will not let them “grasp” (a metaphor, by the way) the main ideas of a text.	iv
13	AG	Por supuesto. Pero también lo considero útil incluso para tomar más conciencia de la propia lengua materna.	iv
14	AG	I think it would help them to have a wider understanding of the target language.	iv
15	DA	It´s not that I don´t think they shouldn´t be aware of metaphors, but this kind of language is usually more associated with literature rather than with technical language.	i
16	AG	Writers use this type of language for a reason. That reason is important to the idea they are trying to transmit to the reader. By not pointing that out to the students, we are restricting the range of meaning the writer wants to convey.	iv
17	AG	Because as I said before metaphors are part of the language system therefore we must make them aware that sometimes the words can mean something different from their literal meaning.	iv
18	AG	1) Because they are commonly found in EST texts. 2) Because we should not assume they will realize that language is used metaphorically in EST texts. They might associate the idea of metaphorical language with literary texts. 3) Because we should make them aware of as many aspects of EST texts as possible.	iv
19	AG	The same answer holds from the previous question.	iv
20	AG	Because interpreting metaphorical language in English might be different to the same procedure in Spanish.	iv
21	AG	Because this kind of language is not only very common even in academic registers, but because the very analytical process in students can be beneficial in cognitive terms, and they can get familiar with particular ways of stating a point, for example, or they themselves can use them in their writing once they know their meaning.	iv
22	AG	It’d help them understand texts better.	iv
23	AG	It can be a very productive strategy to help them understand and perceive different options of expressing ideas	iv
24	AG	I think it is important in any kind of text.	iv
25	AG	Any type of reading that might serve to broaden the student’s view of the target language would bring certain advantage to the class. I would like to see what happens in our context.	iv
26	AG	Again, yes and no. I think it would depend on the text and the overall class goal. As I said before, Spanish texts also include metaphors and in science many metaphors have been simply translated (and some are even used in English words) so it could be easy for them to transfer. On the other hand, other metaphors would require explicit teaching and careful explanation. I think an analysis of the metaphors in the target texts could help determine in advance when and when not to emphasize metaphorical language.	iv

appear /əˈpɪə®/ verb [intransitive] [not usually progressive][39]

1. seem **2.** begin to be seen **3.** be on TV etc.	**4.** be in court **5.** start to exist **6.** be written or printed

1 to make other people think that you are something or feel something. **Appear** is a slightly more formal word than **seem**: *This job is not as easy as it may appear*. *Matt appears unaffected by all the media attention.* **appear to do something**: *No one appeared to notice me.* **it appears (that):** *It appears that she's changed her mind.* ***there appears to be:*** *There appears to be very little we can do about the problem.* **appear to have done something**: *The building appears to have been used as a place of worship. what appears to be: Gibbs was shot in what appears to be a gangland killing.*

2 if someone or something appears somewhere, you begin to see them suddenly or for the first time: *Cracks began to appear in the ceiling. One day a stranger appeared on my doorstep.***2a**. to arrive somewhere: *As soon as she appears, we can get started.*

3 to be on television or in a play, film, concert etc: *She appeared on television with the President. Tony is currently appearing in pantomime at Reading.*

4 to go to a court of law, committee, or similar institution, so that people can ask you questions and make decisions about what you say: *He is due to appear in court today*. **+ before/in front of**: *Mr Smith will appear before magistrates next month.*

5 if something new or different appears, it starts to exist or to be known about for the first time: Yet another boy band has appeared on the music scene. **5a**. to become available for the first time: *This was when sushi began to appear on restaurant menus in London. the latest personal computer to appear on the market.*

6 to be written or printed somewhere: *Jane's name did not appear on the list.*

cloud /klaʊd/ noun [countable/uncountable] [40]

1 a white or grey mass of very small drops of water in the sky: *A few white clouds drifted across the sky. There's more cloud than yesterday.*

2 [countable] a large amount of smoke, dust, steam etc. in the air: *a dust cloud.*

3 [countable] something unpleasant that spoils an activity, event, or situation: *a cloud of anxiety/misery/uncertainty.*

[39] p. 60
[40] p. 273

cradle 1 /ˈkreɪd(ə)l/ noun [countable][41]

1. swinging bed for baby	**4.** for supporting something
2. place where something began	**5.** part of telephone
3. for work on buildings	**+** PHRASES

1 a small bed for a baby that you can move gently from side to side 2 a place where something began = BIRTHPLACE: *a region that is regarded as the cradle of African culture* **3** British a piece of equipment for standing on while moving up and down the outside of a tall building, for example in order to clean windows **4** a structure used for supporting something that is being built or repaired, such as a ship **5** the place on a telephone where you put the receiver when you are not using it.

PHRASES **from/in the cradle** from or at a very early time in your life

from the cradle to the grave through your whole life

cradle2/ˈkreɪd(ə)l/ verb [transitive] to hold something carefully and gently in your hands or arms

existence /ɪgˈzɪst(ə)ns/ noun[42]

1 [uncountable] the state of being a real or living thing, or of being present in a particular place, time, or situation: *The tests confirm the existence of a brain tumour.* **in existence**: *the only copy of the book that is still in existence* **come into existence/go out of existence:** *The company came into existence at the end of the 1980s*

2 [countable] [usually singular] the way that someone lives their life, especially when their life is difficult: *Jones led a miserable existence in an isolated village for several years*. **a hand-to-mouth existence** (=having hardly enough food or money to live on): *He lived a hand-to-mouth existence in a poor area of London.* **out an existence** (=manage to live under difficult conditions): *Families struggle to eke out an existence in this harsh environment.*

graveyard /ˈgreɪvˌjɑːd/noun [countable] **1** an area of land where dead people are buried, usually around a church **2** a place where things that are old, broken, or no longer wanted have been left: *a graveyard of abandoned cars.*[43]

interstellar /ˌɪntəˈstelə/ adjective [only before a noun] between the stars: *interstellar space / travel.* Relating to the planets, stars and other objects in space.[44]

life /laɪf/ (plural **lives** /laɪvz/noun[45]

1. time from birth to death	activity/excitement in games life imprisonment

[41] p. 343
[42] p. 513
[43] P. 658
[44] p. 793
[45] pp. 869-70

2. way of living, experience
3. state of being alive
4. living things
5. time something exists/lasts

1 [countable/uncountable] the period of time from someone's birth until their death: *She devoted her life to helping others. He had a long and happy life.* **spend your life**: *Don't spend your whole life worrying about money.* **in (all) your life**: *I have never been so disappointed in my life.* **all your life***: She's lived in California all her life.* **early life** (=the time when you are a child): *He spent his early life in Malaysia*. **adult life** (=the time when you are an adult): *He lived most of his adult life in prison*. **in later life** (=towards the end of someone's life): *It was in later life that he wrote some of his best poems.* **late in life** (=at a time in your life that is later than usual): *She got married late in life*. **for life** (=continuing through your whole life*): The accident left her scarred for life.* →working life

2[countable] [usually singular] your particular way of living and the experiences that you have: *His life revolves around his children. It was an event that would change his life forever.* **lead a happy/normal/interesting etc life**: *I just want to be able to lead a normal life.* **a hard life** (=a difficult life): *She looks like someone who's had a very hard life.* **2a**. [countable/uncountable] the events and experiences that are typical of a particular place or group of people: *I had no idea what life with a baby would be like.* **city/village/prison/university etc life:** *Escape from the bustle and noise of city life for a while.* **the life of someone***: The life of a film star is not always a glamorous one*. **married life** (=the time when you are married or the life that you have): *How's married life suiting you?* **2b**. [uncountable] the events and experiences that happen to people in general He's a person who really loves life. His mother has a great enthusiasm for life. see life (=experience a lot of different things): *You really see life in my job.*

3[countable/uncountable] the state of being alive: *He believed his life was in danger.* **claim lives** (=kill people): *The disease is still claiming thousands of lives every year.* **risk your life**: *They risk their lives to protect the people they love.* **put your/someone's life at risk**: *They are putting lives at risk with their irresponsible behaviour.*

4[uncountable] living things such as plants and animals: *We are now beginning to believe that there may be life on other planets*. **animal/plant/insect/bird life**: *the great variety of bird life in the area*

5[singular] the period of time during which something exists or continues: **life of** *During the life of this government,*

unemployment has increased by 5%. **5a**. the period of time during which something is still good enough to be used: **life of** *The average life of a television is about ten years.*
6[uncountable] the amount of activity or excitement in a place: *There's not much life in this village.* **6a.** interesting or exciting qualities: *The early stories are full of life.*
7[countable] in a game, one of a number of times that you can lose but still continue to play: **lose a life** *When you've lost three lives, you're out.*
8[uncountable] LIFE IMPRISONMENT: **get life** *You'd expect him to get life for such a serious crime.*

Metaphor
Life is like a journey, and your experiences are like different parts of a journey. Dying is like travelling to another place.
The baby arrived just after midnight. He came into the world in 1703. I set out to become a doctor, but it never worked out. She went through life without ever knowing the truth. It's all been an uphill struggle. We seem to be at a crossroads. His life took an unexpected direction. He embarked on a new career. You've got to move on and forget about what's happened. Will they go the distance? She's well on the way to recovery. They're over the hill now. His grandmother passed away/on last year. They remembered the departed in their prayers.

struggle 1 /ˈstrʌg(ə)l/ verb[46]
1 to try hard to do something that you find very difficult: *He struggled a bit at first, but he reads well now*. **struggle to do something**: *She was struggling to cope with the demands of her work.* **struggle with**: *They've had to struggle with the painful process of modernization*. **struggle for**: *Andy was coughing and struggling for breath*
2 to use your strength to fight against someone or something: *She picked the child up, but he struggled and kicked.* **struggle for**: *They struggled for possession of the gun*. **2a**. to try very hard to move something or to move yourself somewhere: *struggle to do something*: *The sheep struggled to free itself*. **struggle with**: *Foster was struggling with the door in the wind.* **2b**. to manage with a lot of difficulty to move yourself somewhere: **struggle into/out of etc.**: *She struggled into her tight jacket*. **struggle free**: *He struggled free and ran to his car to call for help.*
3 to try very hard to defeat someone or to stop them having power over you: **struggle to do something** *We have to struggle to win our freedom.* **struggle for:** *Different factions in the movement are struggling for supremacy.* **struggle against**: *women struggling against oppression*
struggle 2/ˈstrʌg(ə)l/ noun

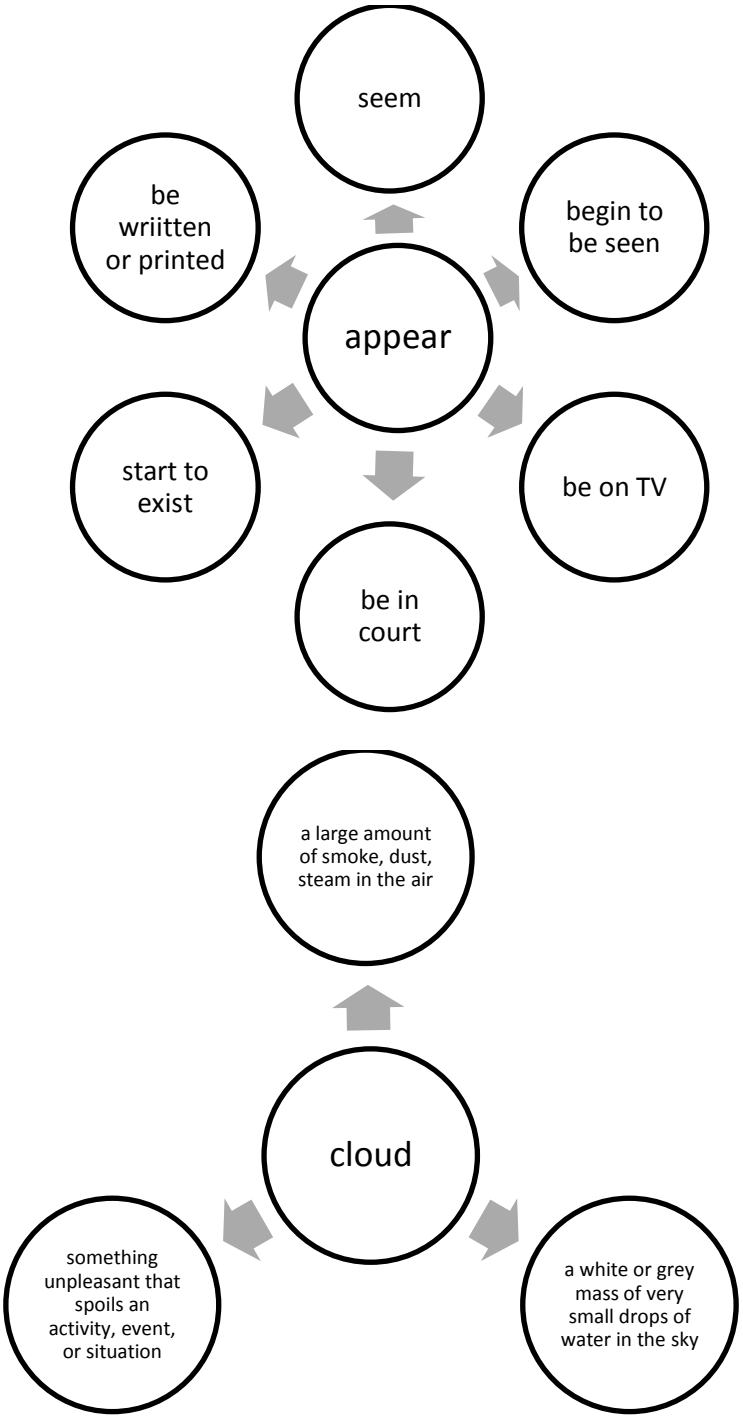
[46] p 1485

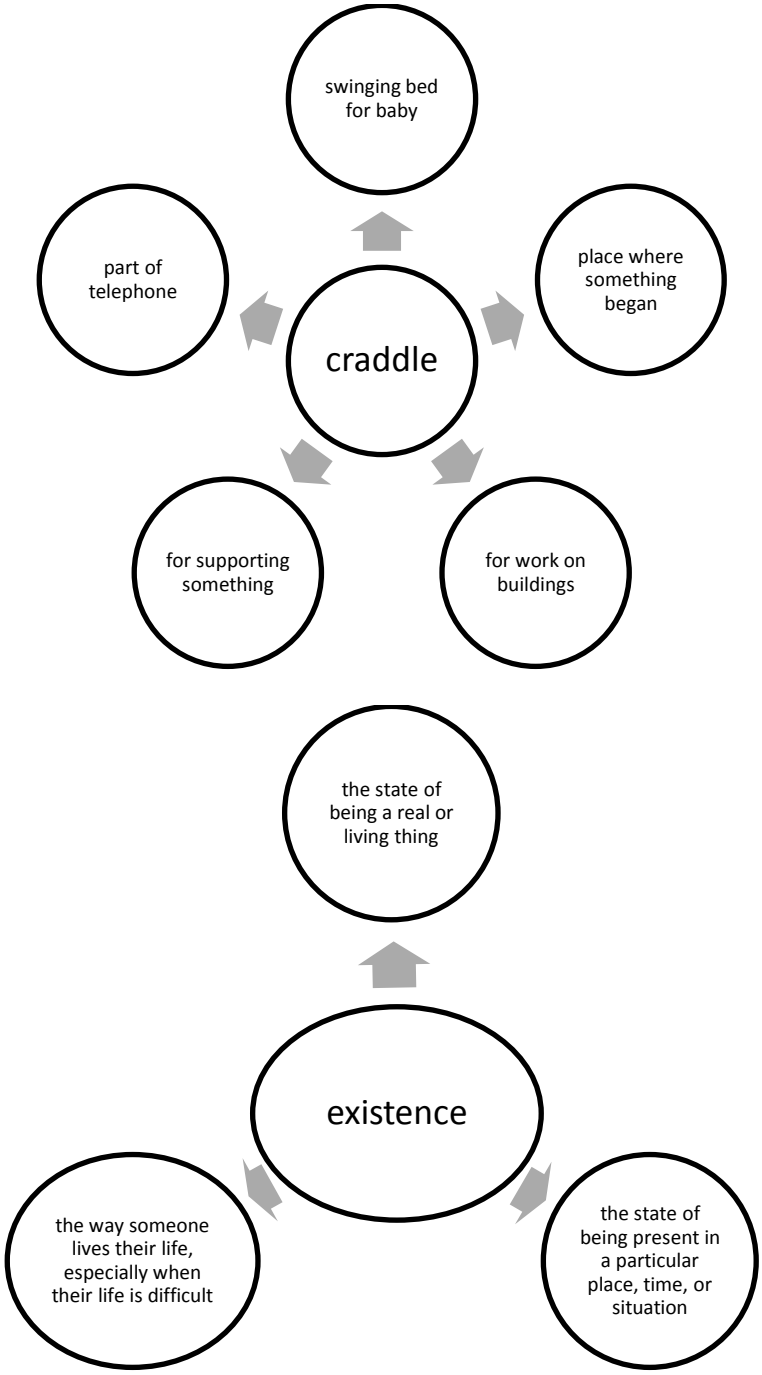
1 [countable] [usually singular] an attempt to do something that takes a lot of effort over a period of time **struggle for**: *his struggle for recognition as a poet* **struggle with**: *Her struggle with the disease lasted ten years.*
2 [countable/uncountable] a fight, or a war: *There was a brief struggle, then a shot was fired. a group involved in armed struggle against the government* **2a.** an attempt to defeat someone or something, or to stop them from having power over you **struggle against**: *the struggle against racism* **struggle for:** *her part in the struggle for democracy* **power struggle**: *Their marriage was a constant power struggle.*
3 [singular] something that takes a lot of physical or mental effort: *Foreign languages were always a struggle for him. It was a struggle to get up the hill in the snow.*
natural selection[47] [uncountable] technical
the process by which only plants and animals that are naturally suitable for life in their environment will continue to live and breed, while all others will die out [↪ evolution] ➔ survival of the fittest
struggle for existence[48]the automatic competition of members of a natural population for limited vital resources (as food, space, or light) that results in natural selection
struggle for existence noun[49]

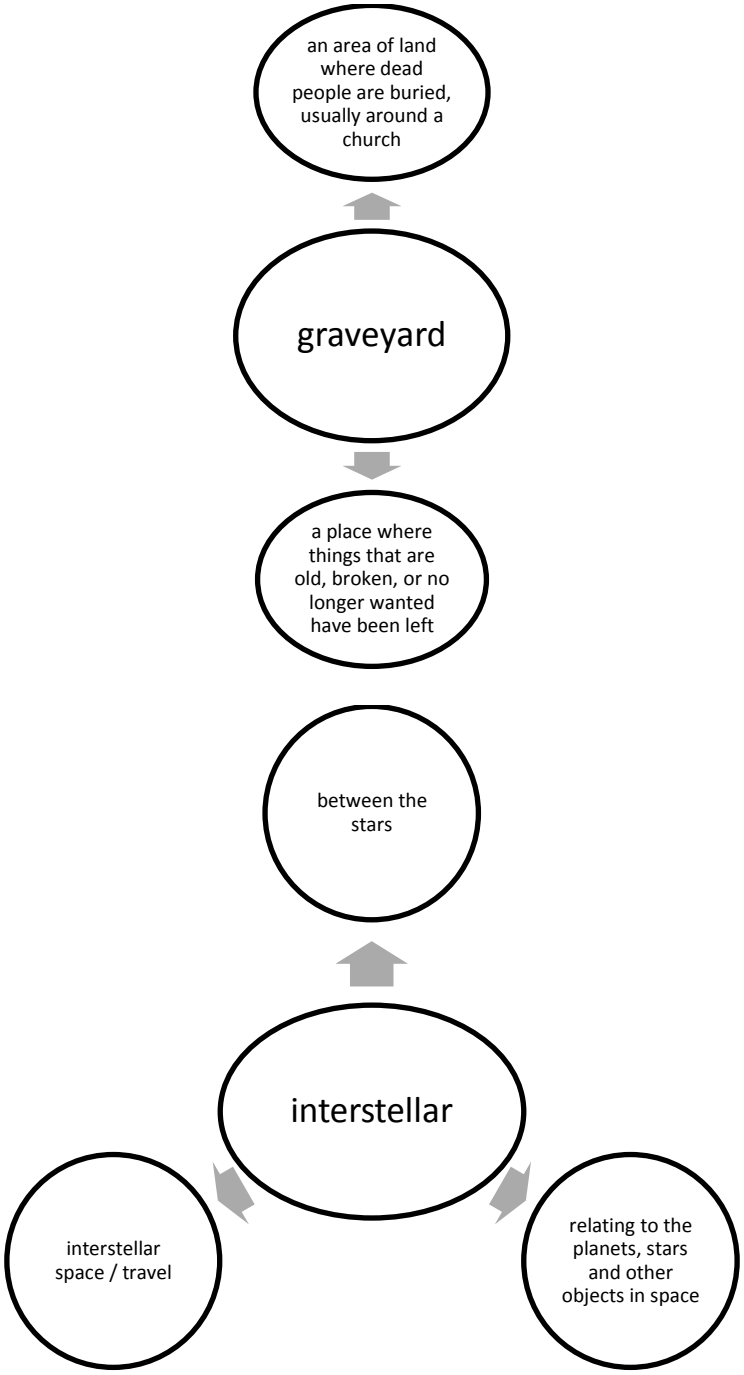
1. the competition in nature among organisms of a population to maintain themselves in a given environment and to survive to reproduce others of their kind.
2. (not in technical usage) competition between organisms of a population, especially as a factor in the evolution of plants and animals

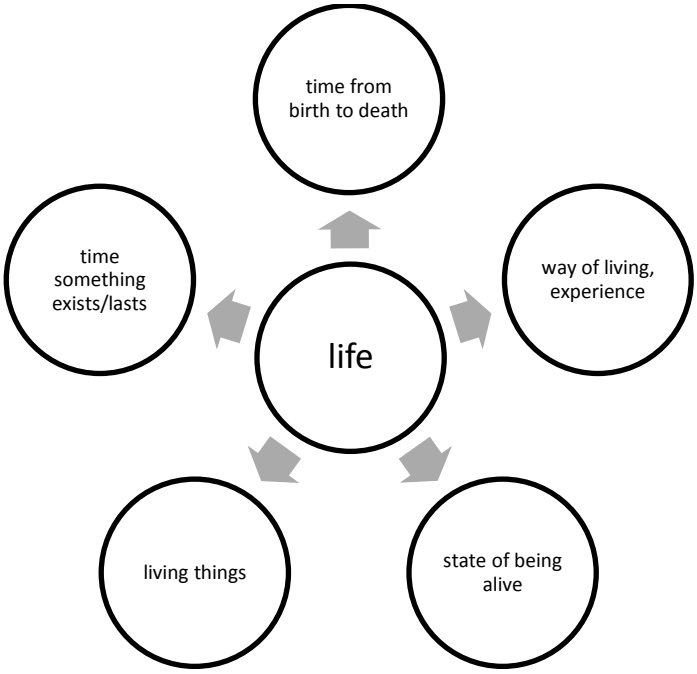
[47] http://www.ldoceonline.com/dictionary/natural-selection
[48] http://www.merriam-webster.com/dictionary/struggle%20for%20existence
[49] http://dictionary.reference.com/browse/struggle+for+existence

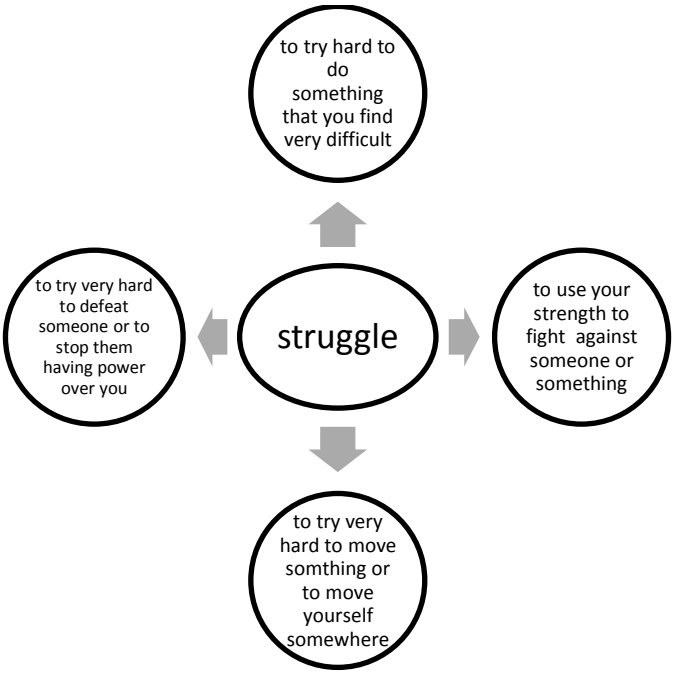
Appendix T – Semantic Maps




swinging bed for baby
part of telephone
place where something began
craddle
for supporting something
for work on buildings
the state of being a real or living thing
existence
the way someone lives their life, especially when their life is difficult
the state of being present in a particular place, time, or situation


an area of land where dead people are buried, usually around a church
graveyard
a place where things that are old, broken, or no longer wanted have been left
between the stars
interstellar
interstellar space / travel
relating to the planets, stars and other objects in space


time from birth to death
time something exists/lasts
way of living, experience
life
living things
state of being alive


to try hard to do something that you find very difficult
to try very hard to defeat someone or to stop them having power over you
struggle
to use your strength to fight against someone or something
to try very hard to move somthing or to move yourself somewhere

Appendix U - Transcription Question 1 – Momentum C

n		Category
1	Que las nubes de polvo son el sitio del fin de muchas estructuras cósmicas.	CUAW
2	Él dice eso ya que en las nubes intergalácticas hay otro tipo de vida (bacterias) que al ser puestas en contacto con los micro-organismos de los cometas las derrumba (mata) para que estas se vuelvan a formar.	CUAW
3	Que aparecerán nuevos sistemas interestelares en los cuales pueda surgir la vida.	CAW
4	Porque en realidad los microbios sobrevivientes se encuentran en los cometas y en la nube de polvo solo hay moléculas orgánicas (posiblemente sin vida).	CAW
5	Quiere decir que para que las moléculas puedan sobrevivir el viaje se contraen en una nube que se congela, lo cual hace un efecto de muerte temporal.	CUAW
6	Que las nubes interestelares son una especie de contenedor, no es donde comienza la formación de la vida.	CAW
7	Indica que para Wickremasinghe la vida no se forma en la tierra, sino en otros planetas. El planeta no es la cuna del universo.	CUAW
8	Sostiene que la vida en la tierra la vida orgánica que está en nuestro planeta provino de afuera en el espacio, no es originaria de nuestro planeta.	CUAW
9	Asombrado o dando a entender que es asombroso saber que hay vida en las nubes interestelares.	CUAW
10	----------	DA
11	Que las nubes interestelares parecen ser el cementerio de la vida, no su cuna.	MPAW
12	Quiere decir que las nubes interestelares no explican que haya vida, ya que a pesar gigantescas nubes de polvos de moléculas orgánicas sean esparcidas, algunas personas dicen que independientemente de esto se muestra vida emergente.	CUAW
13	Las nubes interestelares que muchas personas piensan o pensaban que de ahí se formó la vida, no lo son, en cambio son los residuos de las bacterias que no formaron vida en los planetas, es decir, un cementerio para microbios, no la cuna para la vida.	CAW
14	Que la creencia de la vida en otros espacios “interestelar clouds” no es el origen de la vida como tal.	CUAW
15	Eran nubes interestelares que poseían moléculas orgánicas, podrían ser las que trajeron la vida a la tierra, es por eso que él dice “no es una cuna”. No es la cuna de la vida, sino un cementerio de vida donde no hay nada vivo pero sin embargo pueden originar vida.	CUAW
16	Según él, la vida en los planetas inició por los microorganismos que venían en los cometas cuando golpearon los planetas. En las nubes interestelares se ha encontrado microorganismos congelados, es por eso que dice que es un cementerio.	CAW

17	El profesor Wickremasinghe quiso decir que en las nubes interestelares se desarrolló o sembró la vida pero estas no fueron su cuna o su lugar de origen.	CUAW
18	Dice que la llegada de las nubes interestelares con vida no son una coincidencia, insinúa que fue planeado.	CUAW
19	Wickremasinghe dice que el origen de la vida no es el que todos pensamos, sino que los “extra-terrestrial” fueron los que la originaron.	CUAW
20	DA	DA
21	Él se refería a que en las nubes interestelares se encontraban materiales orgánicos o bacterias, que en lugar de multiplicarse, morían. A esto se refería con que estas nubes son su cementerio y no su cuna.	CAW
22	A mi parecer quiere decir que las nubes interestelares no son los cementerios de la, sino que a través de ellas se transportan de planeta en planeta, es decir, como una incubadora o su cuna.	CUAW
23	Él quiere decir que las nubes interestelares no están acunando la vida, permitiendo que crezca, sino que por el contrario parecen ser su cementerio.	CAW
24	Ella cree que la vida no se origina en las “interestelar clouds”, al contrario cree que la vida llega a los planetas a través de microbios dentro de los cometas.	CAW
25	He means that interstellar clouds are some organic molecules and this are remainings of others forms of life, or a possible future organism.	CUAW
26	Que las nubes solo contienen residuos o algo muerto de algo que ya no existe más, que de allí no se puede generar vida.	CAW
27	Ella se refiere con esa frase a que existe un nuevo sistema planetario donde han sobrevivido microorganismos que llegaron golpeando el planeta y a su vez se ha seguido multiplicando a otros planetas y que estos microorganismos vienen desde afuera, es decir, de origen extraterrestre. Apoyando la teoría de la panspermia.	CUAW
28	Quiere decir que las nubes interestelares son un cementerio ya que están hechas de los restos de bacterias de las moléculas orgánicas que se han roto, ya que de ellas no nace nada.	CAW
29	Se refiere a que las moléculas orgánicas que hay en las nubes interestelares son en realidad restos de bacterias destruidas o muertas en vez de estar vivas, por eso usa la metáfora de que estas nubes son cementerios en vez de cunas.	MAW
30	He ment that in a way that those interstellar clouds are evidence of his theory, because they are full of organic molecules, which it is said that some of them shows life emerging.	CUAW
31	Wickremasinghe se refiere a que las nubes interestelares tienen bacterias muertas no bacterias en formación.	CAW
32	Los nuevos planetas forman bacterias que pueden llegar a otros a través de meteoritos.	CUAW
33	Apareció una nube interestelar donde las bacterias vivas que hay en el universo mueren.	CAUW

34	Se refiere a que no es el nacimiento de un planeta sino que el final del microbio que originó la creación del planeta, este proceso es cíclico los microbios toman caminos diferentes a través de los cometas para al final llegar y reproducirse.	CUAW
35	Dice que en la tierra hay vida por los cometas que golpearon la tierra de fuera hacia adentro.	CUAW
36	Prof. Wickremasinghe explica que las moléculas orgánicas que están en las nubes cósmicas son en realidad restos de bacterias que se están desligando.	CUAW
37	Ella dice que esto no es creíble, porque hubo interpretaciones de lecturas de espectro donde las nubes interestelares son un hecho de remanentes de bacterias. La evidencia hallada es inexorable, afirma ella.	CUAW
38	Habla sobre que las nubes interestelares aparecen en la tumba y no en la cuna, ya que habla sobre que cada planeta forma un poco supervivencia de microbio el cual se multiplica y le da vida a otros planetas.	CUAW
39	Lo que trata de expresar Wickremasinghe es que en estas nubes interestelares es a donde va a parar toda la materia y pequeños organismos que sobreviven en cometas, cuando se forma un ecosistema planetario. Por lo tanto las nubes interestelares son la tumba de lo dicho anteriormente.	CUAW
40	Ella quiere decir que las nubes interestelares eran el cementerio de las bacterias y no su cuna, ya que, en sus estudios ella notaba que las bacterias no se reconstruían sino que se desglosaban estando inmersas en dichas nubes.	CAW
41	El profesor Chandra quiere decir que las nubes interestelares no aparecen de casualidad, sino para ser los portadores de la semilla de la vida en otros planetas.	CUAW
42	Las nubes interestelares pudieran ser el origen de la vida en la tierra a través de microorganismos que vayan en los cometas.	CUAW
43	El profesor Wickremasinghe se refiere a que las nubes interestelares parecen ser de otros planetas y que la tierra no es su cuna. Los cometas tienen muchos microbios de otros planetas y estos se siembran en otros planetas gracias al cometa que lo traslada.	CUAW
44	Ella dijo que los microbios que sobrevivieron de las nubes interestelares se transforman a través de cometas a los nuevos planetas que se han formado.	CUAW
45	Que cada sistema planetario que se constituye se debe a los microorganismos que pueden llegar a sobrevivir a través de los cometas los cuales se mueven a través de los cometas los cuales al tener cierto tipo de contacto son expulsados en el planeta o nube de polvo.	CUAW
46	Las nubes interestelares han indicado son un factor de resto de bacterias y pueden romperse. El señala en esta frase que las nubes interestelares pueden ser un cementerio de vida no la cuna.	CUAW
47	En los cometas no nace la vida, sino, que viajan residuos o restos de vida microscópica arrastrados por choques contra planetas.	CUAW

48	Que la vida parece residir en las nubes estelares pero que la vida no se origina en esas nubes.	CUAW
49	Se refiere a que la vida está en todo el espacio y que luego fueron insertadas en este planeta.	CUAW
50	El solo quiso decir que en las nubes interestelares en vez de estar llenas de moléculas orgánicas con vida estas están es repletas de bacterias que están muertas, por eso fue que dijo eso.	CAW
51	“Nubes interestelares parecen el cementerio de la vida, no su cuna” Él dice esto con relación a que algunas personas creen que a partir de las nubes interestelares se creó la vida, y él dice que es todo lo contrario: que ahí mueren.	CAW
52	Donde se cree que no hay vida en realidad es la cuna de la vida porque gracias a los cometas los microbios pueden viajar por el espacio.	CUAW
53	Se refiere a que las moléculas orgánicas son restos de bacterias de otros planetas y por esto parece más un cementerio de la vida de planetas más que la cuna o inicio de vida de otros planetas.	CAW
54	Quiere decir que el polvo estelar se puede definir como un yacimiento de estrellas, es decir, cenizas de lo que alguna vez fue un organismo. En este caso planetas.	CUAW
55	Dice que son el cementerio de la vida ya que la materia orgánica entrada en estas nubes es sin duda restos de bacterias que han destruido en vez de construir.	CAW
56	Él lo que quiere decir que estas nubes son como un criadero donde está o donde nace la vida, sino más bien un lugar donde eran como revueltas.	CAW
57	Significa que “interstellar clouds” fue quizás el lugar de origen de microbios sobrevivientes y no el lugar donde morían o dejaban de existir.	CUAW
58	Que las nubes interestelares pueden llegar a ser mortales para la vida en un planeta o en una región.	CAW
59	Quiere decir que la vida no surge de los cometas sino que proviene de otros entes que ya poseen vida y esta materia orgánica se va adaptando y sobreviviendo en los cometas a través del tiempo hasta que choca con algún planeta en otro ente.	CUAW
60	Las nubes interestelares son el comienzo pero no la base de la vida. En ellas se encuentra bacteria muerta que muestra que quizá en algún momento salió del algún planeta pero terminó falleciendo.	CUAW
61	Se refiere a que las moléculas orgánicas chocadas con la tierra fueron el origen de la vida, y que se multiplican en otros planetas con las mismas condiciones.	CUAW
62	El Prof. que hace la investigación quiere decir con esa frase que las nubes interestelares no surgieron de la nada, sino que hubo algún elemento ya preexistente que le dio origen. Él afirma que todo en la tierra y en otros lugares viene una “sopa primordial” y que nada se inicia de la nada.	CUAW
63	Explica que la humanidad no inició de la “sopa primordial” como todos dicen sino que el origen de la misma fue por la llegada de materias hace millones de años luz, y fue esta quien la originó.	CUAW

64	La profesora Wickremasinghe tiene una hipótesis en la que se refiere que hace 3.800 millones de años fueron arrojados microbios sobre la tierra, por lo que los astro biólogos han desarrollado la teoría de la Panspermia la que sugiere an extraterrestrial origin for life que apoya que hay vida fuera de nuestro planeta.	CUAW
65	Wickremasinghe afirma en su trabajo que las moléculas orgánicas encontradas en las nubes interestelares son solo los restos de bacterias muertas. Por eso dice que son el cementerio de la vida.	CAW
66	Según el texto, las nubes interestelares se ha encontrado evidencia que indica que la bacterias que han sido movidas por los cometas han sido desglosadas en lugar de reconstruidas, por eso dice que “las nubes interestelares parecen ser el cementerio no la cuna de la vida”.	CAW
67	Wickremasinghe quiere decir que esto que las nubes interestelares son una cuna de vida. Que transporta organismos vivos.	CUAW
68	Dice que las nubes de polvo cósmico, las cuales parecen ser donde los microorganismos mueren, es realmente su cuna. Donde naces y se reproducen.	CUAW
69	Él se refiere a que las nubes interestelares no son el comienzo de la vida, más bien es el fin, ya que la vida proviene de cometas que impactan con un planeta y los microorganismos evolucionan en ese planeta. Y el espectro que el ve las moléculas orgánicas de las nubes interestelares son restos de material orgánico.	CAW
70	Porque las nubes de polvo se llenan de moléculas orgánicas.	CUAW
71	El cree que las moléculas que se encuentran en las nubes interestelares no empezaron a formarse ahí, sino en verdad están muriendo.	CAW
72	Se refiere a que las moléculas orgánicas encontradas en las nubes interestelares son los cadáveres de las bacterias que no han podido general vida.	CAW
73	Quiere decir que por su interpretación de la lectura del espectro de las moléculas orgánicas encontradas en las nubes interestelares, estas son de hecho, los restos de algo que se destruyó en vez de algo en construcción. Descarta la idea de que la vida pueda nacer de esas moléculas que parecieran más bien estar en un “cementerio”.	CAW
74	“Las nubes interestelares parecieran ser el cementerio de la vida y no su cuna” esto lo dice Wickremasinghe porque él no cree que hay vida emergiendo de estas nubes en realidad cree que muestran bacteria que ha sido destruida y no construida.	CAW
75	El profesor quiere decir que las nubes interestelares que contienen grandes cantidades de moléculas orgánicas, que son más que restos de bacterias que han sido desglosadas no construidas. Por eso lo llama cementerio.	CAW
76	Lo que quiere decir es que las nubes interestelares en vez de crear vida la matan.	CAW
77	Que las “interstellar clouds” son el final de la vida no el comienzo.	CAW

78	Él se refiere a que estos lugares no parecen ser los orígenes de la vida, sino más bien donde queda lo que no puede alcanzar un sistema donde desarrollarse.	CAW
79	Creo que con este enunciado, Wickremasinghe de alguna manera expresa su desacuerdo con la teoría de que la tierra fue originada por las nubes interestelares. De alguna manera él dice que en vez de ser el inicio de la vida, son el cementerio de muchas de las partículas que se encuentran en las galaxias.	CUAW
80	Wickremasinghe quiere decir con esto que dichas nubes interestelares no son las que arruinarían la vida sino, por el contrario, las que crearían más y más vida debido a que ellas poseen moléculas orgánicas que provienen de otros planetas y que desenvuelven el sistema solar y mandan vida a éstos.	CUAW
81	Wickremasinghe se refiere a que los planetas que cumplen con los requerimientos para fomentar la vida, como la tierra, son la cuna de los organismos, mientras que en las nubes interestelares no puede haber vida por las condiciones ambientales por lo que el hecho de arrojar vida al especio por la colisión de cometas o asteroides en un planeta huésped es equivalente a decir que eso es el fin de la vida. Sin embargo alguna parte de ella sobrevive.	CUAW
82	Que no generan vida pues, debido a que en un sistema planetario donde un microbio logra sobrevivir aborda un cometa como semilla y así multiplicarlos en otros planetas.	CUAW
83	Dice que los cruces entre cúmulos de galaxias aniquilan los microbios. Y luego lo que sobreviven se multiplican y se transportan en los cometas para llegar a los planetas.	CUAW
84	Para esta cita podemos decir que cada vez que se forma un nuevo sistema planetario es gracias a que los microbios que sobreviven, que fueron desglosados para que así encuentre su camino en los cometas, Estos se multiplican y se añaden, pues estamos en presencia de una cadena conectada que se extiende sobre un gran volumen de los cosmos.	CUAW
85	Habla de cómo unas “nubes de materia” en el espacio van sembrando si se puede decir, vida en otras galaxias y planetas. Refiriéndose a como la vida se va regando por el espacio a través de cometas.	CUAW
86	Él quiso decir que cada vez un nuevo sistema planetario forma una cantidad de microbios que encuentran su camino a través de cometas.	CUAW
87	Se puede interpretar como: los microbios que viajan a los cometas, cuando chocan con algún sistema planetario, son solo pocos lo que sobreviven. Los demás siguen viajando, multiplicándose y sembrándose en otros planetas.	CUAW
88	Porque la teoría que él defiende postula que la vida fue llevada de planeta en planeta, ya que la materia orgánica que se encontraba en el espacio viajaba de cometas en cometas. Entonces a lo que se refiere con un cementerio de vidas y no a una cuna es porque se encuentran todas en ese sitio y no se pueden desarrollar ya que no tienen los procesos necesarios para su crecimiento.	CUAW

89	Que cuando aparece una interstellar cloud no genera vida, lo contrario, es su cementerio.	CAW
90	Las nubes interestelares muestran bacterias en proceso de destrucción o descomposición así como los cementerios terrestres.	CAW
91	Las nubes interestelares están formadas por moléculas orgánicas que son en realidad bacterias, que no se han desglosado anteriormente. De aquí, que estas parecen ser un cementerio y no la cuna de la vida.	CAW
92	Que las nubes interestelares no sostienen la vida, son los microbios que sobreviven quienes pueden hacerlo.	CUAW
93	Lo que quiere decir que las nubes interestelares parece el cementerio de la vida, no es su cuna.	MPAW
94	DA	DA

Appendix V - Transcription Question 2 – MOMENTUM C

n		Category
1	El tener que hacer un esfuerzo extra para seguir existiendo tal y como es.	CUAW
2	Que las especies deberían luchar para vivir, para poder establecerse en el ambiente.	CAW
3	Problema para existir, se refiere a la selección natural y cómo se adaptan las especies a su ambiente.	CAW
4	Struggle for existence means that the offspring. La selección natural consiste en que una especie proviene de un ancestro en común, el cual puede ir evolucionando a lo largo del tiempo y su combinación genética puede cambiar por la contaminación	CUAW
5	No entiendo que se refiere con “struggle for existance”. El lenguaje se me dificulta.	MCUAW
6	Son las adaptaciones genéticas en el ser humano producido por los cambios en el ambiente.	CUAW
7	Mezclas para la existencia, una gran variedad de genes ayuda a la reproducción individual de las especies.	CUAW
8	El más fuerte sobrevive, si las mutaciones son beneficiosas para el entorno permanecerán para luchar por la supervivencia. Luchar por la existencia en eso se basa la selección natural.	CAW
9	Pelea o problema por existir (selección natural).	CUAW
10	The expression means fighting for live.	MPAW
11	Significa una lucha por sobrevivir, ya que cuando se haya alcanzado la mayor capacidad da la población solo los genes más fuertes serán los que sobrevivan, es una especie de “selección natural”.	CAW
12	Tiene la existencia o el futuro por un largo tiempo asegurado.	CUAW
13	Puede hacer referencia a la resistencia de los más fuertes ante unas condiciones de superpoblación en el área donde habitan. (Luchan por los recursos agotables.)	CAW
14	Que es un obstáculo para la evolución.	CUAW
15	Significa luchar para sobrevivir, esto es debido a que se crean más individuos de los que el medio ambiente puede soportar por lo tanto solo sobreviven los más aptos con mejores capacidades para sobrevivir hasta la madurez sexual y así poder reproducirse.	CAW
16	That expression means that the members of the population that have the best genes or adaptations to live in that particular environment are the ones who will survive, that means, the survival of the most capacitated organism.	CAW
17	I think that it means that the offspring is difficulting the reproduction and evolution nowadays.	CUAW
18	De que las especies que existen porque lograron sobrevivir y acoplarse en su medio ambiente modificando su genotipo biológico al ambiente donde pertenecen.	CAW
19	Sería algo como luchar para sobrevivir porque al ser cargado el ambiente, incrementaría solo los genes que pueden sobrevivir resultan parecido.	CUAW
20	No tengo idea.	MCUAW

21	Larger families will be favoured.	CUAW
22	Significa que pasamos por mucho para que continúe la especie, por lo que nuestra existencia ha sido difícil.	CUAW
23	Que la población está limitada.	CUAW
24	I think it means like our fight to preserve human life.	CUAW
25	Es como una capacidad de existir o sobrevivir en un ambiente.	MPAW
26	La lucha por la sobrevivencia.	MPAW
27	Que los genes a medida que pasa el tiempo va como evolucionando, teniendo mutaciones las que soportan todo esto son considerados. Struggle for existence.	CUAW
28	Como se maneja la selección natural, “La existencia” puede referirse a la supervivencia del más apto, como se producen menos genes y otros mueren.	CAW
29	Aunque en el resto no comprendo mucho lo que quiere decir. Creo que significa dañino para la existencia.	MCUAW
30	Condiciones para existir, es decir, todas aquellas condiciones que permiten existir y adaptarse a los seres vivos a un determinado ambiente.	CAW
31	Significa algo como la lucha por la existencia, o en este caso por sobrevivir.	MPAW
32	Supervivencia del más fuerte.	MPAW
33	El más fuerte es el que existe, quiere decir que el ambiente crea unas condiciones en la cual va matando las especies que no pueden soportar dichas condiciones, haciendo que sólo queden las que si, cambiando la genética de ellas.	CUAW
34	Esta expresión se refiere a la lucha por existir, a la cual están expuestas las especies.	MPAW
35	Una característica o condición para la existencia de los genes.	CUAW
36	La lucha por la existencia, o mejor dicho, la lucha por la supervivencia, lo cual implica la supervivencia del más apto a las adversidades naturales del entorno, también denominado “selección natural”. El hecho de que la naturaleza presente adversidades implica que solo los más aptos sobrevivirán a esta lucha.	CAW
37	Lo que es necesario que suceda para que vivan los que deben vivir, y desaparezca la población excedente que sobrecarga la capacidad del ambiente.	CUAW
38	This expression for me means that when the earth is full of people, we will have to fight for our existence.	CUAW
39	Cada vez que pasa una generación los genes van cambiando hasta que es un organismo nuevo.	CUAW
40	Supongo que se refiere al individuo más capacitado para sobrevivir, es decir, aquel más apto y fuerte capaz de adaptarse a las situaciones del medio ambiente.	CAW
42		DA
43	Ganas de vivir, cada especie desde su nacimiento se adapta a su entorno para sobrevivir.	CUAW
44	Indica lo que está apto o no para la existencia, que genes son más favorables en ciertos entornos.	CUAW

45	Quiere decir, tratar de hacer algo muy difícil para la existencia. Sobrevivir a la sensibilidad sexual, parientes de un animal, incrementar la familia.	CUAW
46	Se refiere a la selección natural, cuando parte la generación de relevo (jóvenes) de una especie utilizan los cambios genéticos favorables obtenidos desde su nacimiento para sobrevivir en su ambiente y dar paso a otra generación.	CAW
47	Se puede definir como la lucha por la supervivencia que tienen los organismos, uno de los pilares de la selección natural, sobrevive el más apto, el que se adapte mejor al ambiente, la especie que haya desarrollado mejor pool genético de manera que sus progenitores sean fértiles y puedan continuar evolucionando.	CAW
48	La batalla por la existencia, puede ser mejor definida como selección natural, porque todo se resume a que “el más fuerte sobrevive”, en este caso el que mejor se adapte sobrevive. Entonces ésta batalla es una pelea por quien evoluciona primero.	CAW
49	Esta expresión significa la adaptabilidad que tienen las especies de transformarse y cambiar su forma debido al constante cambio del medio ambiente, favoreciendo a unas especies y a otras no, es el “combate para la existencia”, la selección natural.	CAW
50	Esta expresión significa una lucha por la existencia, ya que los recursos del planeta son limitados solo puede vivir el más fuerte.	CUAW
51	La lucha por la existencia, ya que los organismos se van desarrollando a través del tiempo para poder enfrentar de una mejor forma el ambiente que los rodea.	CAW
52	Para mi significa la existencia del más fuerte, a que, en el texto hablan de la combinación de ciertos genes y de cómo estos se transmiten tras la selección natural.	CAW
53	“Struggle for existance” es básicamente la selección natural. Esto ocurre en ciertos ambientes para determinar cuáles genes o combinación de genes tengan más oportunidad de sobrevivir y procrear.	CAW
54	“Struggle for existance” significa que, basado en cualquier combinación genética que incremente “the likelihood” de un individuo, éste sobrevivirá a la maduración sexual, a los compañeros, y el incremente las familias largas se verán favorecidas.	CAW
55	Esta frase habla sobre como la descendencia de la población va a tener que luchar por existir ya que esta va a ser más que la necesaria para sustituir a la generación anterior por lo tanto actuará la selección natural y aquellos con genes más aptos son los que sobrevivirán a esta especie de lucha por la existencia que describe el párrafo.	CAW
56	Tiene que luchar para sobrevivir, también que va a tener dificultades para sobrevivir.	CUAW
57	El término “struggle for existance” (lucha por la existencia) significa que cada especie se aferra a la vida dependiendo de si sus genes lograron adaptarse a las circunstancias. En caso	CAW

	contrario, si sus genes no sufrieron modificación, será desfavorable en la selección natural y dejará de existir	
58	Considero que significa algo como “luchar para existir” y para dar paso al desarrollo de la selección natural y que el organismo más fuerte vive y procrea y que el menos fuerte muere.	CAW
59	Pelear por existir o sobrevivir del más apto.	MPAW
60	La expresión “struggle for existence” quiere decir que las especies deben tener una madurez sexual, reproducirse y procrear familias.	CUAW
61	Generación por generación debe ir aprendiendo a sobrevivir en su entorno. Los más adultos deben enseñar a otros para que las siguientes generaciones logren subsistir, esto es “struggle for existance.”	CUAW
62	Quiere decir que el medio ambiente actualmente está sujeto a sobrevivir a la gran producción que presentan los seres vivos, soportando toda la población posible.	CUAW
63	Mezcla parentesca para existir.	CUAW
64	Se refiere a que la existencia va a estar únicamente sujetada al medio ambiente, y poco a poco los individuos se van a ver afectados por un conjunto de cambios.	CUAW
65	En el futuro, la sobrepoblación hará que los servicios vitales sean reducidos y por tanto será más difícil la supervivencia, permaneciendo vivos los más aptos. Será algo así como una “lucha por la supervivencia.”	CUAW
66	“Struggle for existance” en el texto significa que mientras más grandes son las poblaciones en los ecosistemas, los descendientes de estas poblaciones están en peligro de existencia.	CUAW
67	Se refiere a la lucha que va a tener que soportar la prole, en la cual aquellos que posean los genes más aptos tendrán más posibilidades de existir.	CUAW
68	Sobrepoblado, la capacidad máxima de individuos se va a colmar.	CUAW
69	This expression means that in this case some living organisms have to survive as they can, even if some of them that are weak have to died, because only the stronger group which are better adapted to their environment can survive.	CAW
70	Esta expresión hace referencia a las constantes adaptaciones que deben hacer los seres vivos para garantizar su supervivencia y la de su especie; luchando con factores como la competencia, el clima, enfermedades, y reproducción. La supervivencia la tiene asegurada el más apto.	CAW
71	“Struggle for existance” significa la lucha por sobrevivir de los nuevas generaciones que se número superará a la población actual, y se verá sometida a problemas mayores.	CUAW
72		DA
73	Luchar para existir, pelear por tu existencia. Debido a la sobrepoblación la gente de clase pobre tiene que “luchar” constantemente para poder subsistir debido a que los recursos del ambiente yo no son suficientes para todos.	CUAW

74	“Struggle for existance” es la lucha entre individuos para sobrevivir en un ambiente determinado.	CUAW
75	Se refiere a soportar la carga, es decir, “the offspring” tendrá que soportar o tener fuerza para que perdura su existencia.	CUAW
76	Significa fuerza para existir, esta fuerza se basa en ventajas funcionales, como características físicas, o bien vivir en manadas para protegerse mutuamente. Son las formas en que un animal se hacer fuerte para poder sobrevivir. Da origen a la teoría de la selección natural, ya que los animales menos capacitados necesitarán evolucionar para poder sobrevivir.	CAW
77	It means that the young that is living now will replace the parental population and they would have problems to survive because they would be a lot people struggling for been the best.	CAW
78	Es una probabilidad a futuro.	CUAW
79	No existe probabilidad de que sobreviva un género en particular, y que familias salgan favorecidas, por el hecho de que se reproduzcan o tengan muchos hijos.	CUAW
80	Lo que la expresión quiere decir es que el más fuerte es el que vivirá, esto se refiere a la selección natural, donde el que tiene un gen dominante es el favorecido.	CAW
81	“Struggle for existance” se refiere al esfuerzo y la competencia a la que estarán sometidas las futuras generaciones para poder sobrevivir en la sociedad y forjar una familia.	CUAW
82	La expresión “struggle for existance” significa que solamente la persona puede encontrar a una persona siendo el mejor partido.	CUAW
83	El problema es la cantidad de personas que hay en el mundo de jóvenes, lo que quieren hacer solucionar esto con ideas anteriores.	CUAW
84	Significa que podría haber problemas de existencia por una sobrecarga de la población que el medio ambiente no puede soportar.	CUAW
85	Desastre para la naturaleza.	CUAW
86	“Struggle for existance” es lo que la descendencia está sujeta a defender individualmente, a través de sobrevivir a la madurez sexual, etc.	CUAW
87	“Struggle for existence” means the survival of the fittest, as it says, the environment is at full capacity to maintain a population, so if new members of the population are produced, they would have to fight between them for the resources, so the fittest would survive.	CAW
88	Que es como un apoyo a los ya existentes parentescos creados.	CUAW
89	“Struggle for existence”: luchar por la existencia. Las diferentes especies luchan entre sí, contra el entorno que las rodea para sobrevivir.	CAW
90	Quiere decir que el espécimen más fuerte es el que sobrevive, esto es parte de la selección natural, ya que “el más fuerte” es relacionado con mejores genes por lo cual procrearía mejores especímenes, etc.	CAW
91	Means that the species fight by his sub-existence.	CUAW

92	Significa que al haber una sobrepoblación en un determinado ambiente, surgirán problemas en el conjunto. Lo que conllevará a que sobreviva quien mejor se adapte.	MPAW
93	Es prácticamente decir que el animal para poder sobrevivir debe adaptarse.	CAW
95	El proceso de cómo crece una población de seres vivos para tener garantías de supervivencia. Mientras más jóvenes nazcan en la comunidad de especies, más oportunidades tendrán para adaptarse a nuevos cambios en el medio ambiente y poder seguir existiendo como especie.	CAW
95	That in the population of genes, each one will be fighting and surviving to be part of existence of the living thing.	CAW
96	Es como un apoyo o un “empujón” a la existencia, es decir, que “ayuda a que exista.”	CUAW
97	“Struggle for existence” quiere decir que los organismos deben luchar por sobrevivir y adaptarse a los cambios ambientales o evolutivos que se les presentan.	CAW
98	Que cada individuo debe “luchar por sobrevivir” y así poder transmitir sus genes a sus descendientes.	CAW
99	Es difícil existir, es decir, que una especie sobreviva igual.	CUAW
100	Lucha por la supervivencia, lo organismos que posean los mejores genes son los que sobrevivirán y tendrán descendencia.	CAW
101	It means that in some point the population will be more than the number that the environment could support and all the species would not have the where to live with all the natural things that they need.	CUAW
102	Se refiere a esa lucha por la existencia entre esa población joven, que peleará y reemplazará a sus progenitores, para seguir produciendo más de su misma especie y poder seguir esa relación parental de generación, en generación, eso sería la selección natural.	CAW
103	La frase “struggle for existence” se refiere a lo que sería un descontrol por permanecer vivo si no nos fuéramos adaptando al ambiente.	CUAW
104	I don’t know.	MCUAW
105	Se refiere al esfuerzo que hacen las especies para existir, en este párrafo es la reproducción.	CUAW
106	Que los genes luchan por sobrevivir y así poder sobrevivir y reproducirse para prolongar a las familias.	CUAW
107	Lucha por la existencia, es decir, las nuevas generaciones deben esforzarse para existir.	CUAW
108	Quiere decir que la naturaleza está soportando una sobrepoblación hasta un punto, ya que se está produciendo más bebes de población que la de los padres y esto origina una dificultad en la existencia de esas especies, ya que, se hace difícil su desarrollo.	CUAW
109	A fight to keep the existence on Earth.	MPAW
110	“Struggle for existence” means that the offspring of each species need to fight hard to survive in a world full of other species.	CUAW

111	Sobrevive el más apto.	CUAW
112	“Struggle for existance” se refiere a que las especies deben sobrevivir y dejar descendencia viable por medio de combinación de genes con otra especie (reproducirse), para poder existir en el tiempo.	CUAW
113	Hace referencia a que debido a un incremento de la población los recursos son limitados y comienza una lucha por la existencia dentro de una misma especia o interespecie.	CUAW
114	Se refiere a la “Lucha por existir”, es decir, que cualquier gene de una especie que haya adquirido características más favorables que los otros, tendría la oportunidad de sobrevivir y seguir evolucionando.	CAW
115	“Struggle for existance”: es la forma o manera de existir.	CUAW
116	The “Struggle for existence” means that only the strongest specie will survive, or the specie that can change in base of the needs will survive.	CUAW
117	Se refiere a una lucha para mantener los genes, en este caso, una lucha para reproducirse.	CUAW
118	Significa lucha por la supervivencia; que todos los individuos pertenecientes a una zona tratarán de buscar los medios para mantenerse con vida sobre los demás. Los más capacitados estarán aventajados.	CAW
119	“Struggle for existance” se refiere a la lucha por la supervivencia que tienen que llevar a cabo las especies. En el texto se habla de que los individuos resultantes de la procreación superan el número de individuos que la naturaleza puede acoger, por lo que se desarrolla una feroz competencia por sobrevivir.	CAW
120	La población cada día aumentó más, por lo cual los descendientes se verán involucrados en una lucha constante por la sobrevivencia.	CUAW
121	Cuando existe sobrecarga de población, sólo el/los organismo(s) más fuertes podrá sobrevivir subsistiendo -si es el caso- de las demás especies.	CAW
122	The mean of “Struggle for evolution” is the fight to survive because who try to life, adapt to any change will survive a differences who not adapted survive the strong.	CAW
123	El significado de la expresión significa “lucha o esfuerzo para la existencia” ya que cuando el medio ambiente presenta dificultades, tanto de adaptación, como de jerarquía de especies, muchos organismos tienen que luchar por su supervivencia para su permanencia.	CAW
124		DA
125	“Struggle for existance” es decir, debido a la selección natural y por ende a la sobrevivencia de muchas especies, el ambiente estará expuesto a la sobrepoblación de muchas especies, lo que causará la lucha entre esas especies que persistieron por mantenerse en el ambiente, es decir se originará una lucha por la existencia, donde sobrevivirá el más fuerte, el que posea mayores capacidades.	CAW

126	Quiere decir que por la rapidez en que se van reproduciendo y combinando se crea el conflicto existencia de que no se sabe hasta donde la naturaleza podrá soportarlo.	CUAW
127	“Struggle for existance” en este caso se refiere a aquellas especies que sobreviven y llegan a la etapa de la madurez sexual y pueden reproducirse, y continuar existiendo como especie.	CUAW
128	Se refiere en que en un ambiente donde haya sobrepoblación de la especie, van a quedar sujetos a una lucha entre quién sobrevive ya que por decirlo de alguna manera, no caben todos los organismos (sobrevivencia del más fuerte).	CAW
129	Que si el ambiente soporta más población de la que debe, ellos se enfrentan a un problema, un estrago para existir.	CUAW
130	“Struggle for existance” significa “la supervivencia del más fuerte”, los seres vivos deben tener las capacidades y aptitudes para prevalecer y para seguir viviendo, si un ser vivo no puede con las condiciones del medio ambiente o de su ecosistema, éste muere.	CAW
131	Significa precisamente a la supervivencia del más fuerte (selección natural), en un medio ambiente de una población.	CAW
132	Que los seres tienen que adaptarse a la fuerza para sobrevivir, ya que estas modificaciones le permitían existir debido a que estos cambios le proporcionan ciertas ventajas para su permanencia en el ambiente.	CAW
133	“Struggle for existence” mean…	CUAW
134	Significa una lucha por la existencia, la ley del más fuerte, es decir, donde los individuos más capacitados son los que sobreviven.	CAW
135	“La lucha por la existencia” quiere decir que las nuevas generaciones de una población normalmente están presentes en un número mayor que sus antecesores, sin embargo están en el mismo ambiente por lo tanto se ven forzados a luchar entre ellos para sobrevivir, de esta prueba solo sobrevive el más fuerte.	CAW

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Focus on figurative language

English for Science and Technology

Additional material

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Focus on figurative language

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Lesson 1 Focus on figurative language: metaphors and similes

It is important to understand how figurative language is used in reading. Figurative language, which is also known as metaphorical language, involves the using of comparisons between two things, different enough that when compared, they provide a more abstract or imaginative meaning in the mind of the reader.

Figurative language is the opposite of literal language; it uses words or expressions with a meaning that is different from the literal interpretation or most basic meaning of the phrase to show or create a picture in your mind.

Figurative language is very common in poetry and prose, but it is also used in nonfiction writing and science and technology texts. Becoming aware of figurative language may be very useful to increase and organise your vocabulary knowledge, to improve your reading comprehension in science and technology texts, and to understand better some cultural aspects of the English language.

Some of the most common types of figurative language are *metaphors* and *similes.*

What is a metaphor?

A metaphor is a form of figurative language that compares two objects or ideas in order to emphasise a particular quality they have in common despite their essential differences. It is a comparison made between things that are essentially not alike.

For example, the sentence ***The atom is a miniature solar system*** compares the atom with the solar system. As the picture below shows, the solar system consists of a sun in the middle with smaller planets rotating around it in their orbits. Similarly, an atom consist of a nucleus with a number of electrons in orbits around that nucleus. Therefore, some of the characteristics of the solar system are transferred to the atom.

The following image will help you to illustrate this relationship.

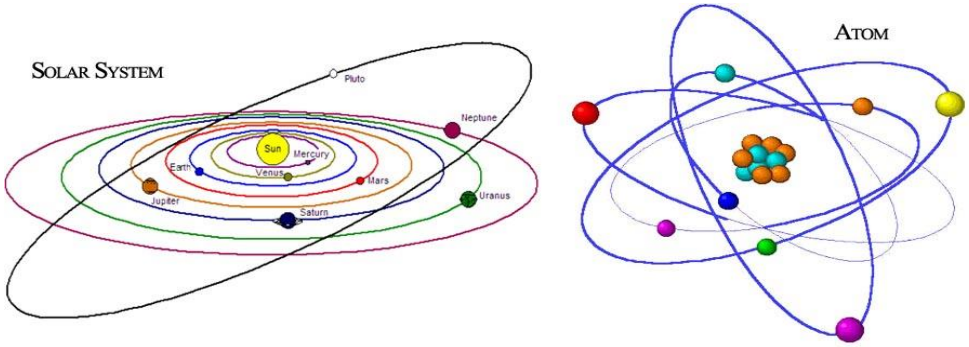

DIAGRAM OF THE SOLAR SYSTEM AS COMPARED TO THAT OF AN ATOM

What is a simile?

Like a metaphor, a simile is a comparison between two situations, processes or concepts that are similar in a few ways. A simile describes something by comparing it to something else. In a simile the words *as* and *like* are used to explicitly make the comparison as in the following example:

The atmosphere is like a blanket of gases that surrounds the earth.

In this case, the *atmosphere* is compared to a *blanket*.

The literal meaning of **blanket** is a cover made of wool or another material that you use to keep you warm in bed. In the example however, a **blanket** has a metaphorical connotation as it is seen as a **layer** of something, for example snow or cloud, that completely **covers** an area, in this case the earth. Therefore, different meanings must be understood in their context.

Summarising

A metaphor compares two things without using like or as, for example:

The brain is a machine.

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A simile compares two things using like or as, for example:

A computer works like the brain.

Exercise 1. Identifying metaphors and similes

Read the following sentences and identify if they are metaphors (M) or similes (S). Circle your option as you read. Explain what each one means.

a. The clouds are marshmallows in the sky. M S

_____

b. The sea is as blue as the sky. M S

_____

c. The atmosphere is like an invisible shield of air. M S

_____

d. The light is as bright as the sun. M S

_____

e. The earth is keep warm by the sun´s heat. M S

_____

Now, in pairs, write down a metaphor and a smile that you can think about in English. Discuss them with the rest of the class.

_____

_____

_____

_____

What have you learnt from this activity?

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Lesson 2 Focus on figurative language: literal vs metaphorical meanings

In lesson 1, the concepts of metaphor and simile were introduced. You were also encouraged to identify metaphors and similes, to create your own metaphors, and to reflect about your learning experience.

Remember that a metaphor is a direct comparison between two or more seemingly unrelated subjects. Its essence is to understand one thing in terms of another; for example: *Time flies.*

A simile is a figure of speech that compares two unlike things by the use of *like* or *as*.: for example: *A feather is as light as the air.*

As a result, it may be said that a metaphor equates two items whereas a simile compares them.

Exercise 2. Metaphor Hunt

1. These short texts are written to define or describe something. All of them contain at least one word that is used metaphorically. Read them and try to hunt all the metaphorical words you can find. Underline the words in the text.

A. Parasitoids, organisms that are parasitic but kill the host, albeit gradually, are, however, usually included in predator-prey discussions.

B. Some nutrients build and repair body tissues and help control different processes of the body like the absorption of minerals and the clotting of blood.

C. Vitamin A in the diet comes from deep yellow fruits and vegetables, dark green leafy vegetables, and whole milk.

D. Vitamin D is called the "sunshine" vitamin. When people sit outside, ultraviolet rays from the sun change a fat in their skin to vitamin D.

E. Certain plants, like the popular *sansevieria*, need very little water. Other plants, called succulents, need even less. They store their water in their leaves.

Use the space below to write the words that you underlined in the texts.

_____

_____

_____

In the following chart, there are some words taken from the texts. Match each word with both its literal meaning in column A and its metaphorical meaning in column B.

Words	C. Literal meanings	D. Metaphorical meanings
build (Text B)	6 to make a building or other large structure by putting its parts together	f. used for talking to someone or something who you are annoyed with
deep (Text C)	7 going a long way down from the top or the surface	g. a dark and strong colour
host (Text A)	8 someone who invites people to a meal or party, or to stay in their home	h. a plant or animal that has another plant or animal
store (Text E)	9 to keep something in a particular place	i. to increase, or to make something increase
sunshine (Text D)	10 the light from the sun	j. to save information in electronic form, for example in a computer's memory

 Can you think of other uses of the word host? In which areas? You can find some of them in your dictionary.

_____

_____

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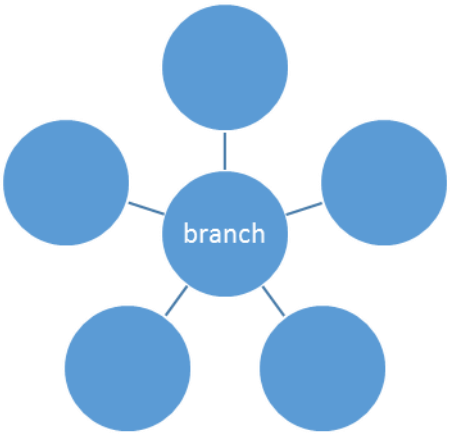
In lesson 2, we learnt that in science and technology texts we could find words that can have both, a literal, or more common meaning, or a metaphorical, or more abstract one. These words are also known as polysemous words because they have more than one meaning. The meaning of these words can change based on the context in which their appear.

The title of the text you are about to read is ***The branches of mathematics.*** What does the word *branch* mean in this context? Can you think of any other meaning for the word *branch*? Use the balloons to write your ideas or key words.



The Branches of Mathematics

Mathematics is an essential and fascinating branch of human knowledge. It has important uses in many areas of modern life, including science, industry, and business. Mathematics can be defined simply as the study of quantities and relations. It uses numbers and symbols to do this. This definition, however, does not explain that mathematics can be divided into many different branches. There are at least eight areas of math generally studied by elementary, secondary, and college students: arithmetic, algebra, geometry, trigonometry, analytic geometry, calculus, probability, and statistics.

Arithmetic can be divided into four basic operations: addition, subtraction, multiplication, and division. It is the simplest branch of math and is usually studied in school. After arithmetic, students usually study algebra. Algebra is more general than arithmetic. It uses letters such as "x" and "y" to find unknown numbers. One interesting invention of algebra is logarithms. They are usually found by referring to a logarithm table.

Geometry is generally learned in secondary schools. This branch of math deals with lines, angles, planes, and solids. For purposes of teaching, geometry is often divided into two branches, plane geometry and solid geometry. Plane geometry deals with shapes, such as circles and squares that lie on a flat surface. Such shapes are in two dimensions. Solid geometry deals with shapes that have three dimensions. Such shapes are spheres, cubes, and pyramids.

The branch of math that deals with the relation between the sides and angles of triangles is trigonometry. Trigonometry also is often divided into two branches: plane trigonometry and spherical trigonometry. Plane trigonometry deals with triangles on a flat surface. Spherical trigonometry deals with triangles on the surface of a sphere. Trigonometry is very useful to navigators, astronomers, and surveyors.

Analytic geometry is the branch of math that applies algebra to geometry. It is often used by engineers and physicists. An example of analytic geometry is the drawing of a curved line to represent an algebraic equation (e.g. "$y = x^2$").

The branch of math that deals with changing quantities is calculus. Calculus has many applications in all areas of science. Without calculus, the calculations necessary for landing on the moon could not have been made.

Two final subdivisions of mathematics are probability and statistics. Probability is used to make predictions about whether something will happen, and has a wide range of applications. Statistics is used to analyze large bodies of numbers. It is used in all the sciences to organize and analyze masses of facts and draw conclusions from them.

Taken from: Drobnic, K., Abrams, S., & Murray, M. (1981).
SCI Tech. Reading and writing: The English of science and technology. ELS Publications, p. 74.

Exercise 3. Polysemous words.

Choose the best dictionary meaning for the words found in **bold print.**

1. This **branch** of math deals with lines, angles, planes, and solids.
    a. part of a complex body as an area of knowledge that may be considered a part from related areas
    b. a natural subdivision of a plant stem
    c. a division of an organization

2. This branch of math deals with lines, angles, **planes**, and solids.
    a. powered heavier-than-air aircraft that has fixed wings from which it derives most of its lift
    b. flat or level surface
    c. level of existence, consciousness, or development

3. Plane geometry deals with shapes, such as circles and **squares** that lie on a flat surface.
    a. a person who is conventional or conservative in taste or way of life
    b. the product of a number multiplied by itself
    c. a rectangle with all four sides equal

4. Plane geometry deals with shapes, such as circles and squares that lie on a **flat** surface.
    a. an apartment on one floor
    b. a deflated tire
    c. a level part

 Can you think of any other polysemous words in English? Write them in the space provided. Why are they polysemous? Discuss them with your classmates.

Lesson 4 Focus on figurative language: the Greenhouse metaphor

Many times scientist use metaphors to try to explain scientific events. The greenhouse metaphor is one of those cases. It is used to explain a climate change phenomenon called the **greenhouse effect**.

What do you know about the greenhouse effect? Why do scientist refer to a ***"greenhouse"*** when talking about climate change aspects?

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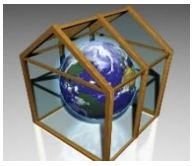

WHAT IS THE GREENHOUSE EFFECT?

A greenhouse is a glass or plastic building in which the temperature and humidity are controlled so plants have the best possible conditions. The glass or the plastic keeps the warmth of the sunlight inside. The Earth is kept warm by the atmosphere. The atmosphere acts very much like a glass of a greenhouse. Some natural gases in the atmosphere are warming gases. These gases form a blanket which allows sunlight to enter but does not allow all of the heat in the atmosphere to escape back into outer space. They prevent the Earth from reflecting solar heat back into space. This result is called the greenhouse effect. Planets that do not have greenhouse protection may be much colder than the Earth. Without the greenhouse effect, the earth would be 33 degrees cooler, and it would be covered by ice. Human activities have increased the amount of natural gases in the atmosphere. Modern developments have also created synthetic gases. The atmosphere is now holding in more heat than it is used to. This added heat is known as global warming. Global warming has changed the heat balance of our planet.

Reading prepared and adapted from http://climatekids.nasa.gov/greenhouse-effect/

Exercise 4

Match the terms found in column **A** with their definition in **B**.

A	B	Matching
1. atmosphere	a. a building made of glass that is used for growing plants that need protection from the weather	
2. blanket	b. the slow increase in the temperature of the Earth that increase the amount of carbon dioxide in the atmosphere	
3. global warming	c. the process in which heat is unable to escape from the atmosphere and causes the temperature of the Earth to rise.	
4. greenhouse	d. the air round the Earth or round another planet	
5. greenhouse effect	e. a thick cover made of wool or another material that you use to keep warm in bed	

Identify the terms being defined in the passage and write them in the space below. Circle in the text the signal words that correspond to each definition.

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Identify one figurative expression found in the text. a) Write it in the space provided. b) Why is it figurative? c) Is it a metaphor or a simile? Explain your answer in Spanish using your own words.

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 What have you learnt from this exercise? You can answer in English or in Spanish.

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Appendix X - Transcription 1 pre-test – Didactic Unit

n	Answer	Category
1	DA	DA
2	Aprendí a diferenciar la metáfora del símil.	AW
3	Aprendí metáforas como *It is raining cats and dogs* y *Greenhouse effect* y que al traducirlas no se puede hacer literal porque cambiaría por completo la intención de la oración.	MAW
4	Todas las cosas tienen diferentes maneras de definirlas comparándolas con otras cosas.	UAW
5	Aprendí que tanto en la vida cotidiana como en la científica se usan metáforas y símil para comparar casi todo y son importantes para describir cualquier cosa.	MAW
6	Aprendí la diferencia entre un símil y una metáfora.	AW
7	Aprendí la diferencia entre metáfora y símil y como diferenciarlos.	AW
8	Aprendí a diferenciar las metáforas y como se expresa el lenguaje figurado.	
9	DA	DA
10	El aprendizaje es que siempre usamos metáforas describir sucesos de gran magnitud y el símil para hacer comparaciones.	AW
11	Aprendí a diferenciar la metáfora del símil y viceversa.	AW
12	DA	DA
13	DA	DA
14	A distinguir bien tanto en inglés como en español cuando es una metáfora y cuando es un símil, ya que siempre me confundía, en especial el símil.	AW
15	Pudimos aprender que en cada oración en inglés podemos encontrarnos con metáforas que a simple vista uno no reconoce.	MAW
16	Aprendí primeramente que una metáfora o un símil son frases no literales que comparan un objeto o persona con otro por las similitudes. Además también aprendimos a diferenciar uno de otro.	AW
17	Aprendí a diferenciar el lenguaje figurativo que está separado en las metáforas y símiles y su forma en inglés.	AW
18	DA	DA
19	Aprendí a diferenciar el símil de la metáfora y que la metáfora se usa incluso en inglés científico.	MAW
20	Aprendimos a diferenciar entre un símil y una metáfora	AW
21	Aprendí que inglés, incluso en el inglés científico, las metáforas están presentes aunque a veces no lo sabemos y esto nos puede ayudar a entender mejor los términos. También aprendí a diferenciar los símiles de l metáforas.	MAW
22	Aprendí a diferenciar el lenguaje figurativo que está separado en las metáforas y símiles y su forma en inglés.	AW
23	Aprendimos a diferenciar entre un símil y una metáfora.	AW
24	DA	DA
25	DA	DA
26	DA	DA

Appendix Y - Transcription 2 post-test – Didactic Unit

n	Answer	Category
1	DA	DA
2	“Blanket” Ya que la atmosfera trabaja como una cobija o manta para mantener caliente la tierra. Relacionan la función de la atmosfera con el de una manta.	AW
3	“The atmosphere acts very much like a glass of a greenhouse”. Hace una comparación de la función de un invernadero con la de la atmosfera. Es un símil.	AW
4	“This result is called the greenhouse effect.” Es una expresión idiomática porque compara el uso del greenhouse (invernadero) con el calentamiento global. Ya que el invernadero atrapa el calor del sol y eso mismo pasa con los gases de la atmosfera.	AW
5	“Greenhouse effect” porque usa la comparación con los invernaderos.	AW
6	blanket: es figurativo ya que “blanket” se usa frecuentemente para señalar que una persona se ha cubierto con una manta o ropaje, pero en este sentido es usada para demostrar que existe una capa que recubre la tierra.	AW
7	“The greenhouse effect” porque esto puede verse como “el efecto de la casa verde” y en realidad es “el efecto invernadero”.	AW
8	“The atmosphere acts very much like a glass of a greenhouse”. Es figurativo porque está comparando el vidrio protector delos invernaderos con la atmosfera de la tierra ya que cumplen con funciones iguales, como un escudo protector.	AW
9	The atmosphere acts very much like a glass of a greenhouse. Es una expresión figurada ya que está comparando dos elementos utilizando el conector like. Por ello es un símil.	AW
10	“The greenhouse effect” es una expresión figurativa porque su significado literal no corresponde con lo explicado en el texto ya que en el texto se refieren a esta expresión como el efecto invernadero.	AW
11	Blanquet es una metáfora. Se refiere a que los gases pueden servir como cobija de la atmosfera.	AW
12	“These gases from a blanket”. Se usa la palabra “blanket” para referirse a la capa que cubre a la atmosfera por completo al igual que una sábana cubre a una persona.	AW
13	Cuando se refiere a que la atmosfera actúa de una manera similar como un vidrio del efecto invernadero.	AW
14	“The atmosphere acts very much like a glass of a greenhouse”. Se compara el vidrio de in invernadero con la atmosfera ya que esta cubre la tierra como lo hace el vidrio en ese caso.	AW
15	Greenhouse effect: greenhouse es figurativo porque esa palabra en inglés se refiere a invernaderos que son estructuras para controlar la temperatura con el motivo de mantener la adecuada temperatura para las plantas que están ahí. Por eso se le dice así a este efecto de la tierra.	AW
16	“The atmosphere acts very much like a glass of a greenhouse”. En mi opinión lo es porque no es literal. Solo puede compararse pues tiene propiedades similares. Cuando hablamos de un lenguaje figurativo nos referimos a algo no literal pero se puede utilizar por la similitud que tiene a algo de lo cual queremos hablar y este es el caso.	AW

17	“These gases form a blanket which allows sunlight to enter but does not allow all of the heat in the atmosphere to escape back into outer space”. Esta expresión es figurativa porque compara algunos gases de la atmosfera con una cobija que arropa o envuelve a la tierra para mantenerla protegida permitiendo que entren los rayos del sol para calentarse un poco.	AW
18	“The atmosphere acts very much like a glass of a greenhouse”. Es figurativo porque la atmosfera es una capa gaseosa de la tierra y en esta expresión se señala que actúa como un vidrio.	AW
19	Greenhouse effect, es figurativa porque tiene un significado metafórico. Se denomina efecto invernadero por la similitud de las características entre este efecto y el invernadero, en donde la temperatura y la humedad es controlada debajo de un plástico. De esta misma forma la atmosfera controla la temperatura y otras características de la tierra.	AW
20	DA	DA
21	“Some natural gases in the atmosphere are warming gases”. Es una metáfora porque se está explicando que existen gases que acobijan a la tierra o la protegen. A pesar de que en un sentido literal un gas no puede acobijar a un planeta. Se expresa así para explicar que lo protege.	AW
22	DA	DA
23	“these gases form blanket”. It´s gases figurative because there is not a blanket, the gases only act like a blanket.	
24	DA	DA
25	Esto se refiere a una especie de jardín botánico en la cual se conservan plantas.	UAW
26	“The atmosphere acts very much like a glass of a greenhouse”. Aunque la atmosfera no tiene un vidrio que proteja la tierra ya que mantiene una temperatura adecuada.	AW