DEVELOPING READING COMPREHENSION IN ENGLISH IN SCIENCE CLASSES THROUGH CLIL METHODOLOGY

PROYECTO DE GRADO

ANGÉLICA MARÍA YUSTY GARCÍA

Research advisor:
LEONOR CRISTINA PEÑAFORT CAMACHO

MASTER'S PROGRAM IN TEACHING ENGLISH AS A FOREIGN LANGUAGE

UNIVERSIDAD ICESI
ESCUELA DE CIENCIAS DE LA EDUCACIÓN
SANTIAGO DE CALI
2017

Table of Content

List of tables

List of graphs

Dedication

I dedicate this research to my family, that supports me in every step of the way; my loving husband, who never gives up on me; my mother and father, and all of those who believe in me.

Acknowledgement

I want to thank my supportive tutor, Cristina Peñafort, who was a very important referent for me and whose support and commitment have been incredible; all the professors in my master's program who help me to grow as a teacher; Aspaen *Liceo Tacurí* for their continue support and faith in me. Thank you from the bottom of my heart.

Abstract

This action research study explored the effects that reading strategies had in developing reading comprehension competence in English of a group of 6th graders in their Science class in a private school in Cali Colombia, associated with a Cambridge International Program. Data collected through skills charts filled with exams results and the information collected through a rubric assessment adapted from the reading continuum (Christopher-Gordon Publishers, 2001) showed evidence of advance in most learners of the group according to their individual abilities, learning styles and development. The assessment rubric allowed to categorize the developmental stages of learners, most learners were in bridging and fluent developmental stages, which could be linked to the scaffolding process done through the strategies. Although results showed these advances, deeper analysis of the rubric categories evidenced lack of language structure and awareness of language use. A possible explanation is, as research has stated before (Mariño, 2014; Nikula, 2015), that integration between language and content in areas like Science using Content and Language Integrated Learning (CLIL)[1] methodology can be challenging because there is usually a focus on content, while language becomes secondary. Also, scaffolding language in a communicative methodology can be difficult for teachers without the proper training, which should be continuous and innovative. Therefore, this research feedbacks the teachers' practice in schools that use methodologies like CLIL, that requires a proper adaptation to the context taking into account learners' needs in a monolingual country like Colombia. Language scaffolding training, grammar in context and strategies to develop skills should be part of teaching trainings to improve their classroom practice.

[1] Content and Language Integrated Learning methodology will be further explained in Theoretical framework section 4.3

Introduction

Reading comprehension is one of the most critical academic skills because it has a direct connection to the academic writing ability, then it is expected that students comprehend what they have read and use the information to apply it to written tasks, debates, and the development of critical thinking. It is key to develop reading skills since young age.

Considering the fact that this reading process takes place in a bilingual education institution in Cali, Spanish as the mother tongue is privileged from the beginning of pre-school. From first grade, learners start taking some subjects in English. Hence, they develop skills with both languages through a reading model that is an interaction between decoding and reading for meaning.

Nonetheless, learners need to practice reading strategies to relate with texts. This would help to stimulate cognitive activation and development of high thinking skills in reading tasks. Beyond the models of processing reading information (top-down; bottom-up), all teachers should promote active, meaningful, and guided reading tasks to make learners aware of their reading styles.

After the teacher found difficulties in the reading comprehension of a group of students in 5th grade during the last school year, her aim was to provide them with reading strategies in 6th grade to foster the development of their reading competence in English. Therefore, to achieve this goal, CLIL reading strategies were used supported by other strategies that line up with the methodology to promote an active reading environment.

The teacher expected that by the end of the school year the students could cope cognitively with the reading of texts, solving problem situations and tests by using information appropriately. Also, it was expected to support their language learning process by providing enough vocabulary for comprehension. To achieve this purpose, an action research approach helped the teacher to find in every day practice the opportunity to apply the strategies and vocabulary scaffolding necessary to improve learners' results in tests. Through a rubric assessment and self-assessment, the teacher could develop a formative assessment type that provided more information about learners' needs.

Reading strategies were necessary and learners recognized advancements in this field, but the research aided the teacher to identify a deeper root of the problem since strategies for building language structure were also necessary. Both a good structure for decoding and reading for meaning will become essential to improve the CLIL lessons in this institution.

1. Research Problem

1.1 Background of the Study

Aspaen *Liceo Tacurí* is a private school located in Cali. This institution focuses on the development of competences to be proficient in English as a second language. It belongs to a group of schools from ASPAEN Colombia, which gathers co-education schools in Bogotá, Medellín, Cali, Manizales, Cartagena and Bucaramanga. The school population is around 220 students, all of them female, and a group of 25 female teachers.

To accomplish its objectives, *Liceo Tacurí* has integrated the Cambridge International Education program (CIE) into its curriculum during the last 4 years. The CIE program promotes teaching English through content in subjects like Math, Science, Arts and English. Science curriculum is divided in four cores: Biology, Chemistry, Physics and Scientific Enquiry that goes through the other three. Each school year Science teachers decide the order of these cores according to the previous year diagnostic that describes the topics studied and the topics missing.

Because of this, *Liceo Tacurí* continuously assesses students in both language and content using Cambridge progression tests and checkpoints but also assesses content in Spanish with *Pruebas Saber*. These assessments reveal that reading comprehension plays an essential role in improving students' language and proficiency in different tasks. Understanding questions and problem situations are necessary to solving workshops, class tasks, examinations, and homework.

During school year 2015-2016, an analysis of Science and Math results in international examinations and *Pruebas Saber* showed that students exhibited difficulties comprehending what they read even when they know the concepts or procedures. Also, after each period evaluation in 5th-grade Science class, the teacher filled in a skill chart (reading, writing, listening and speaking) which showed difficulties in reading tasks. After implementing reading strategies according to CLIL methodology used in the institution, learners did better in their results but they still had difficulties identifying the main ideas and using the texts properly for the tasks.

The strategies were based on the CLIL methodology because this allows language and content integration, providing the students with a context to use language and developing it stage by stage. Reading comprehension skills in a CLIL classroom are related not only to vocabulary but thinking skills which allow students to infer, analyze and be critical towards a text.

Because the evaluations are done through the local and external examinations, one of the school's objectives during the year 2016-2017 was to improve students' reading comprehension, particularly to obtain better results in the examinations. To achieve this objective, the school planned a training for students where they could learn about the examination style, the types of question and the strategies to approach them. However, these strategies did not have as an aim to develop the reading comprehension competence beyond examinations.

Therefore, the purpose of this research was to find out how, following the school's methodology, the application of CLIL strategies in the Science class might help the aforementioned sixth graders to develop their reading comprehension competence in English.

1.2 Problematic Situation

During the school year 2015-2016, the students of fifth grade were divided into two groups, both of which had the same Science teacher and studied the same topics in class. Because this was the teacher's first year she realized that Science exams included the four language skills (Reading, writing, speaking and listening). Therefore, it was important for her to develop these skills during lessons but that was not done at the beginning, the focus of the lessons was in content and not in language. The first improvement was to balance these four skills in every class with content.

The results after the second term continued worrying the teacher because the learners showed knowledge of concepts but struggled with reading comprehension, particularly, when questions were beyond concrete parts of the reading and asked for analysis, comparison, contrast or inference. Also, they developed writing activities with some spelling mistakes. Listening and speaking scored highly in exams

The second improvement the teacher did was to apply readings with similar characteristic like topics, structure and length in the class and in the exam, but learners keep struggling with comprehension, inference and main ideas. Basically, students read the texts trying to understand each word but not the whole gist of the text. Lack of vocabulary then blocked the comprehension process because students focused in word by word translation instead of meaning construction.

Therefore, it became important to introduce a second change by providing learners with reading strategies that aided them to comprehend the texts instead of trying to comprehend each word in them or translate them.

1.3 Research Question

According to what has been presented the research will explore:

How does the use of CLIL strategies help to construct the competence in reading comprehension in English of the 6th grade students of a private school in Cali in their Science class?

1.4 Importance of the Study

According to Mera's article in El País (2012), Colombian students can read but they cannot use the information in a critical and creative way. The results of 2009 *Pruebas Saber* showed that 57% of fifth graders cannot achieve the minimum in critical reading. These results urged the Colombian government to find a way to lead these students to improve reading. One of the first issues is the access students have to a meaningful material, this a reason why the *Plan Nacional de Lectura y Escritura "Leer es mi cuento"* (PNLE) was implemented during January 2012. The program focused on infrastructure and material and training for teachers to provide pedagogical strategies to approach reading in their classrooms and share reading activities (*Ministerio de Educación* (MEN), 2016).

A similar situation was noticed during the analysis of Math and Science in *Pruebas Saber* 2014-2015 in this private school from Cali. Results evidenced that students could handle mathematical procedures and recognized scientific concepts but the tasks related to problem-solving and comprehension scored less than expected by the school standards. Also, the results of exams of Science for 5th graders during the school year 2015-2016 evidenced that students required approach reading guided by strategies.

The strategies used and proposed in this study are part of the CLIL methodology repertoire, which has been implemented in this particular school during 3 years. It is important to evaluate how successful these strategies were to develop the reading comprehension skills of the learners connecting language and cognitive activation.

2 Objectives

2.1 General Objective

To develop the reading comprehension competence in English of the 6th graders in their Science class.

2.2 Specific Objectives

- To identify the reading comprehension competence level in English of 6th-graders in Science class after applying CLIL strategies.
- To apply CLIL reading strategies that develop the reading comprehension competence in English of 6th -graders in Science class.
- To determine the effect in the reading comprehension competence in English of 6th-graders in Science class through CLIL strategies.

3 Justification

Education has been changing through the years moving from content to skills development. Reading and writing academically is a challenge in a country where national and international exams evidence difficulties in comprehension and high thinking skills.

That is the particular case for this research, where poor results in exams ignited the teacher's reflection around the possible causes of failure in Science exams during school year 2015-2016. The teacher was learning to use a new methodology as part of the international program ran by the school. CLIL methodology focused in skills more than in content was an exercise of change of mind. The teacher had to make an exercise to redefine her position in the classroom and to promote reading skills if there was going to be an assessment for them.

The study began then as an action research because it was an exercise executed during 2 school year periods, reflecting on what was going on in the process changing strategies, adapting the questions that guided the research and finding, more problems to the course of it. Finally, this methodology helped the teacher to apply reading strategies in her classroom and to discover that a language structure issue was affecting learners' comprehension.

Therefore, this study provided an opportunity of growth for the teacher's practice adapting strategies to a methodology she was learning and building the awareness about the differences between teaching content and promoting skills. Also, the research produced results that made the teacher aware of other difficulties with language besides vocabulary, leading to a reflection about the role of language in content areas when CLIL is involved. Teachers need to have all the strategies necessary to enrich their methodological process inside the classrooms, they need training to really promote skills development and go beyond content.

4 Theoretical Framework

4.1 Reading Instruction: Models and Classroom Practice

Reading comprehension proficiency starts when we learn how to read, but since this is a complex process there are several models to introduce it; those models have ended in what has been known as the “Reading Wars” a political confrontation between the models (Flippo, 2012).

Historically, there have been two recognized models of the reading process and a third derived from them. The bottom-up model, which starts by decoding words/sounds, transforms them into syllables to build words and finishes by understanding a whole text or doing meaning construction. This process is also known as the traditional model, and it can be considered as a student passive process. The Top-down model is a process where the reader’s role becomes active and he/she constructs the text from the meaning and not from its parts. Flippo, (2012) calls it the whole language process because the reader searches for specific or meaningful information using prior knowledge. Finally, there is an interactive model that combines bottom-up and top-down models, where lower-level processing is the main base to comprehend texts, particularly because they are the first step for comprehension. Then the higher-level processing where the reader builds meaning through text information and his own interpretation of the text (Skoguen, 2013; Khanam, Zahid & Mondol, 2014).

According to Mraz and Vacca (2012), political issues and media encouraged what was known as “Reading Wars” between the reading models in the United States. Reading policies defend or attack the models without really considering the research about the topic. Societies move back and forth through the models induced by media, as a result, the reading comprehension issue is not being considered from the expert point of view. The fact is that beyond the models, reading comprehension can be affected by positive and negative class practices; in Flippo, (2012) different experts, from different models, gather to conclude that contexts and practices can become facilitators of or can affect the reading process and therefore the reading comprehension.

Flippo, (2012) gathered 5 clusters of agreement related to positive practices, such as: “´Combining Reading with Other Language Processes’, ´Contexts, Environments, and Purposes for Reading’, ´Developing (or Shaping) Students’ Perceptions and Expectations’, ´Materials’, and ‘Reading Instructions’” (p. 13). These 5 clusters would demonstrate that the reading issues are not affected by the model of teaching reading but by the strategies and practices to promote it. A positive reading comprehension process results from making the reading meaningful, combining it with the other language skills, accepting mistakes as part of the process, providing positive expectations, using different materials, and providing clear

instruction. Therefore, teaching reading strategies and promoting an environment towards it can have a positive influence in developing this skill, because the strategies have to promote not only decoding, identification and several lower thinking skills but also to promote inference, meaning, and analysis (higher-thinking skills).

On the other hand, taking into account this study is done with a content area, Ness, (2017) presented important evidence about the limited instruction for reading strategies in areas like math, science, and geography, which supports the fact that without proper instruction reading skills cannot improve (Flippo, 2012). According to the evidence, the main issue is the absence of teacher instruction on reading strategies; thus teachers limit reading strategies to identify main ideas through questions and summaries. Another relevant fact is that “teachers are likely to see their major instruction responsibility as covering their particular content in preparation for state test” (Ness, 2017, p. 230). Content areas, like science in the case of this study, have to obtain results in state and internal tests and this can mislead the reading objective. Actually, in the case of this study, the reading comprehension issue derived from test results; therefore, reading became such an important objective. Students who improve their reading comprehension proficiency can be more effective in their national and internal tests.

4.2 Reading Comprehension Strategies: Definition and Findings

In order to comprehend what kind of strategies would be adequate to accomplish this task, this study will consider those that promote higher thinking skills and fit into the school methodology to have coherence with its model.

First of all, a reader does not achieve proficiency since the initial process. The reading models mentioned above show that cognitively there are several ways of processing information; aside from cognitive processing, strategies have an effect on the reading development. Skoguen (2013) (citing Bråten, 2007; Koda, 2014; Stangeland & Forsth, 2001) highlights strategies as an active and conscious act that will help students to gain knowledge and to organize the text. Then, students require strategy reading instruction in order to process text information.

Since reading models and strategies belong to cognitive processing, students require activating their prior knowledge. Once they have managed to relate meaningful information stored in their memory with the text, they can decode and fill in information with assumptions. These assumptions known as schemata help to identify familiar information, reorganizing it according to relations established among them; this means they interact in a dynamic way with the text (Khanam et al 2014).

Hence, findings demonstrate that when texts or activities done with them do not activate prior knowledge, it is difficult for students to comprehend readings. Khanam et al (2014) conclude that “teaching L2 students to read is not achievable by simply choosing any text or reading materials and expecting the students to make sense of it” (p. 91). It is essential for a teacher to recognize there is a prior construction of knowledge in their students. Accordingly reading should take place within meaningful constructions. Enhancing cultural background around several cultures, enriching schemata through different reading or writing styles, promoting prediction, establishing relationships between schemata and new content would help learners to obtain the most from their readings.

On the other hand, Yen-Hui (2016) using the think-aloud technique compared the use of reading strategies in more successful and less successful readers. Students provided an external evidence of their thinking while developing a reading task. Evidence supports the role of schemata in reading comprehension, even though schemata are not the objective of this research. The proficient readers showed they had enough content knowledge and language proficiency to relate with the texts. They also had an active metacognition process to monitor their comprehension, learning, and meaning construction, while the less proficient readers showed gaps in the information about language and content. Therefore, this affected the way they related with the text, leading to poor reading strategies to cope with the lack of information.

In summary, reading comprehension strategies become an important objective of research because students have to be aware of their reading process. The reading comprehension boosts the use of higher-thinking skills to grasp meaning, constructing opportunities for critical analysis and use of problem-solving strategies. All of these elements can be found on different approaches and methodologies coherent with the CLIL methodology used in the school where the study took place.

4.3 CLIL Methodology

CLIL means “Content and Language Integrated Learning. It is an approach that teaches the content of curricular subjects through a non-native language” (University of Cambridge. ESOL Examinations, 2011, p. 3). With this in mind, CLIL makes the second language use meaningful for learners because they have to use language to achieve content knowledge. Consequently, they require building a specific content language to be productive in class. The reading assignments have to be planned considering the specific content language.

Usually, a CLIL lesson is founded on four essential pillars or as Coyle (1999) called them the 4 C’s. Every lesson plan has to have a content that, as mentioned before, uses specific language structures and vocabulary. Another essential element is the role of scaffolding in building the language, so students can start using their L1 and

then increasing L2 knowledge. The notion of prior knowledge goes through all the 4 C's. Therefore, content is connected to communication because specific language, content-compatible language, and everyday language are necessary to communicate in the classroom. Cognition is also essential because learning both content and language depends on a set of skills; students on a CLIL classroom will start activating lower processes known as LOTS, or lower order thinking skills such as identifying, naming, describing, comparing. After this, learners will take their skills and language to the next level HOTS, or higher order thinking skills, developing critical thinking, analysis, and problem-solving strategies. Finally, the cultural element connects everything because learners have to activate prior information linking their own context with other cultural backgrounds. Then culture provides the meaningful context to talk in English about one's culture and others too (University of Cambridge. ESOL Examinations, 2011).

Once CLIL pillars have been described, several convergent points can be linked with the research on the importance of reading strategies. Both Wang (2016) and Khanam et al (2014) highlight in their research the activation of prior knowledge as a significant part of reading strategy activation; at the same time CLIL methodology commands activation of prior knowledge as an important part of each class. There is also a continuous work in scaffolding and L1 use to build the target language, as Yen-Hui (2016) found the lack of language background can lead to poor strategic action to deal with gaps in the information. But, not only in the language component there are linking points.

Reading comprehension is essentially a cognitive process, that goes from decoding to constructing meaning (Skoguen, 2013), while CLIL methodology moves from lower skills in communication and content towards critical thinking skills to use a complex language to communicate ideas (University of Cambridge. ESOL Examinations, 2011). When learners predict, it is because they can construct schemata from what they read, every category stored in long-term memory will help to build schemata prediction (Khanam et al, 2014). The cognitive challenge in CLIL increases through the spiral model, while content is visited and revisited language and cognitive challenge increase, and for science, this implies biology, physics, chemistry and scientific inquiry. Thus, schemata prediction changes through time (University of Cambridge. International Examination, 2011). Learners use their communicative skills to produce knowledge, which is an important step in methodologies based on content like CLIL because they provide a rich environment to promote different forms of communication inside the classroom.

4.4 Skills Improvement

As mentioned before, CLIL gathers several procedures from different approaches, which allows a possible relation between CLIL findings and the strategies mentioned above because both rely on a cognitive process. Both target high thinking skills and support cultural background construction to change schemata, providing a contextual setting.

All of these elements demand from the teacher a continuous training process. In the Colombian context, CLIL methodology training becomes urgent to use it properly. As Mariño (2014) introduces in her article, teachers require ongoing instruction and training to apply CLIL methodology according to standards. One of the contradictions about CLIL is that content can be more relevant because of the internal and state tests, leaving language behind. This is not the purpose of the methodology that attempts a balance between language and content; hence, a key difficulty with CLIL is that even when it promotes a meaningful context for using language, it becomes difficult to keep the balance between language and content. The remaining question is up to what extent is this balance possible? Ness, (2017) presents this issue in her article, concluding that as long as a teacher has a qualified training, it is possible to achieve a balance between both elements.

Nevertheless, CLIL has proven to have a positive effect on English learners and its student-centered philosophy may have to do with it. CLIL prepares students for internationalization. There is also an important emotional component, and a high level of intercultural communication (Lasagabaster, 2008). Cambridge program counts with the assessment to observe the progress in learners' language level. Hence most of the studies reviewed here used in their methodology Cambridge Test to assess students' progress. But, in other cases, exams' results are not enough, then analysis of classes and language use are also important (Mariño, 2014; Nikula, 2015).

In early stages of learning English in a bilingual context like the Basque community, CLIL has proven that learners have a better language performance than students in non-CLIL contexts. Language aspects like vocabulary, fluency and writing shows a better performance even in groups with early exposure to CLIL compared with non-CLIL learners. These results support communicative and sociocultural advantages of CLIL (Lasagabaster, 2008).

In spite of these results in English classes, other results contrast in content areas. Nikula (2015) observed language use and scaffolding in hands-on science activities; she found that content area classes are mostly content oriented, while language is subject-specific focused. Then, the objective of developing language through content seems unbalanced, particularly with science, where everyday language

seems to be undervalued, prioritizing the scientific language. This is not a negative issue, but CLIL's goal is to promote language and content at the same time; hence, both of them should have the priority. These results do not mean CLIL learners cannot do better than EFL learners in several skills, although it is very important to have clear CLIL criteria if teachers want to achieve successful results. Mariño (2014) found similar results in Colombia, where content and language are taught in an isolated way, though content areas are taught in English using language support. These results would support the fact that reading strategies used in this study help learners to use language for comprehension, and to use prior knowledge to build new knowledge. Language and content should have an important balance in reading texts and in the strategies used.

Several studies did research in classes or periods of time during school year. Perez-Vidal and Roquet (2015) designed a study in a CLIL science program for a whole academic year and a pre- and post-test analysis showed that CLIL students performed better than Formal Instruction (FI) learners. Though CLIL learners do not do better in all language domains, it is important to highlight that they performed better in the science class in reading, grammar, and writing than in communicative skills like listening and speaking. These results compared with Nikula's would show that language focus is the scientific language and that in the science tasks reading and writing have an important role in cognitive skills development.

5 Research Methodology

5.1 Research Design

This research started exploring possible strategies that would help students to cope with reading in a second language, therefore, the most suitable design was an exploring action research (Cohen, Manion, and Morrison. 2007).

Action research is a real life intervention that can impact practice by testing models, methods, assessment and learning strategies (Cohen et al. 2007). Teachers are able to do their everyday job in the classroom by systematizing the information they can recollect from their experience. One of the advantages of action research is that feedback allows to change the path and try new strategies, becoming a cyclical process (Cohen et al. 2007). During the process of these intervention strategies, assessment and information recollection changed through feedback and continuous analysis of the situation.

At the beginning of this research the data collection was focused on quantitative information since the skill charts in each exam were an important indicator of advance. Measuring learners' performance in each test provided statistical information to compare their achievements during the school year. Also, the descriptive rubric used to analyze the reading stages provided qualitative information about the reading developmental level of learners.

But, there was also a necessity to engage learners with the process because reading is also a personal experience and they needed the motivation to find a goal in these exercises; besides, previous tasks to the exam required a qualitative recollection of the experience instead of an indicator of success. Because of this, the analysis would use the quantitative data collection to describe how strategies helped to construct the learners' reading comprehension. Patterns discovered through quantitative data would be later observed under the context of the situation.

5.2 Participants

The subjects of this study were 22 girls from 6th grade from a feminine private school in Cali. These students were around 11 and 12 years old. Most of the students that had been in the school during their whole process, had acquired a good level of English proficiency and were able to communicate their ideas. They, however, required scaffolding for vocabulary and structure to comprehend written texts.

In these group only two students were new but came from bilingual schools. The other 20 students were part of the research process during their 5th grade school year. In this stage of the research the participants started working with skimming and scanning of texts, there were strategies to scaffold language of learning (content area language) and improving the validity of the exams using appropriate texts in the reading part of the exam.

This particular group of learners showed important characteristics to take into account. Most learners showed artistic and sports interests, lacking the motivation towards academic tasks making difficult to engage them in reading and writing tasks. Therefore, the teacher decided to make the participants aware of the process and how they could help to the process. Once this was done the attitude of some students changed positively. Also there were specific learners who showed cognitive and emotional difficulties treated by the school with their Psychology and Family Departments.

5.3 Instruments

The instruments used were:

- A rubric to measure the performance in reading activities applied in science class.

The process for the rubric construction started with the assessments done by the teacher and the learners with the Reading Continuum chart (Christopher-Gordon Publishers, 2001). Once the teacher analyzed the information obtained could decide which elements were essential for the rubric.

5.3.1 Reading Comprehension Rubric

Criteria	4 Proficient	3 Fluent	2 Bridging	1 Expanding
Types of text and reading	1. Reads complex texts related with science concepts 2. Develops criteria for selecting reading material independently	1. Reads challenging texts related with science concepts 2. Begins to develop criteria for selecting reading material	1. Reads medium level chapter books related with science concepts 2. Expands criteria for selecting reading material independently	1. Reads easy chapter books related with science concepts 2. Expands criteria for selecting reading material with guidance.
Attitude	1. Reads silently for extended periods (35-45 minutes)	1. Reads silently for extended periods (35-40 minutes)	1. Reads silently for longer periods (20-35 minutes)	1. Reads silently for longer periods (15-30 minutes)
Reading strategies	1. Uses several resources to gather information and increase vocabulary independently 2. Gathers, integrates and analyses information from multiple sources including graphs, charts and tables with guidance	1. Begins to use several resources to gather information and increase vocabulary independently 2. Begins to gather, integrates and analyses information from multiple sources including graphs, charts and tables with guidance	1. Uses several resources to gather information and increase vocabulary with guidance 2. Gathers information from multiple sources including graphs, charts and tables with guidance	1. Uses cues to gather information and increase vocabulary independently 2. Uses reading strategies to gather information from graphs and tables with guidance.
Comprehension and response	1. Discusses text purposes and elements. 2. Uses reasons and examples to support ideas and conclusions.	1. Begins to discuss text purposes and elements. 2. Uses reasons and examples to support ideas and conclusions with guidance.	1. Discusses just some text elements with guidance 2. Begins to use reasons and examples to support ideas and conclusions with guidance.	1. Retells some text elements in a sequential order 2. Identifies examples in the text.

Adapted from Christopher-Gordon Publishers, 2001.

5.3.2 Skills chart

- Skills chart is a school document that provides information about the development of language skills through content. During each mid-term and final term exams teachers upload the points obtained in writing, reading, speaking and listening and makes and action plan accordingly.

  During 5th grade the final exams skill chart was filled in, but mid-terms were not. On 6th grade both skills charts were filled in. Below the chart format used at the School is shown:

CIE* DEPARTMENT
MID TERM TEST REPORT
FIRST TERM
2016-2017

Test: SCIENCE **Grade:** 6 **Teacher:** ANGELICA MARIA YUSTY **Date:**

STUDENT'S NAME	SPEAKING 1 Point	LISTENING 2 Points	READING 2 Points	WRITING 2 Points
1. XXXXXX				
2. XXXXXX				
3. XXXXXX				
4. XXXXXX				
5. XXXXXX				
6. XXXXXX				
7. XXXXXX				
8. XXXXXX				
9. XXXXXX				
10. XXXXXX				
11. XXXXXX				
12. XXXXXX				
13. XXXXXX				
TOTAL PER SKILL				

*** Cambridge International Examinations.**

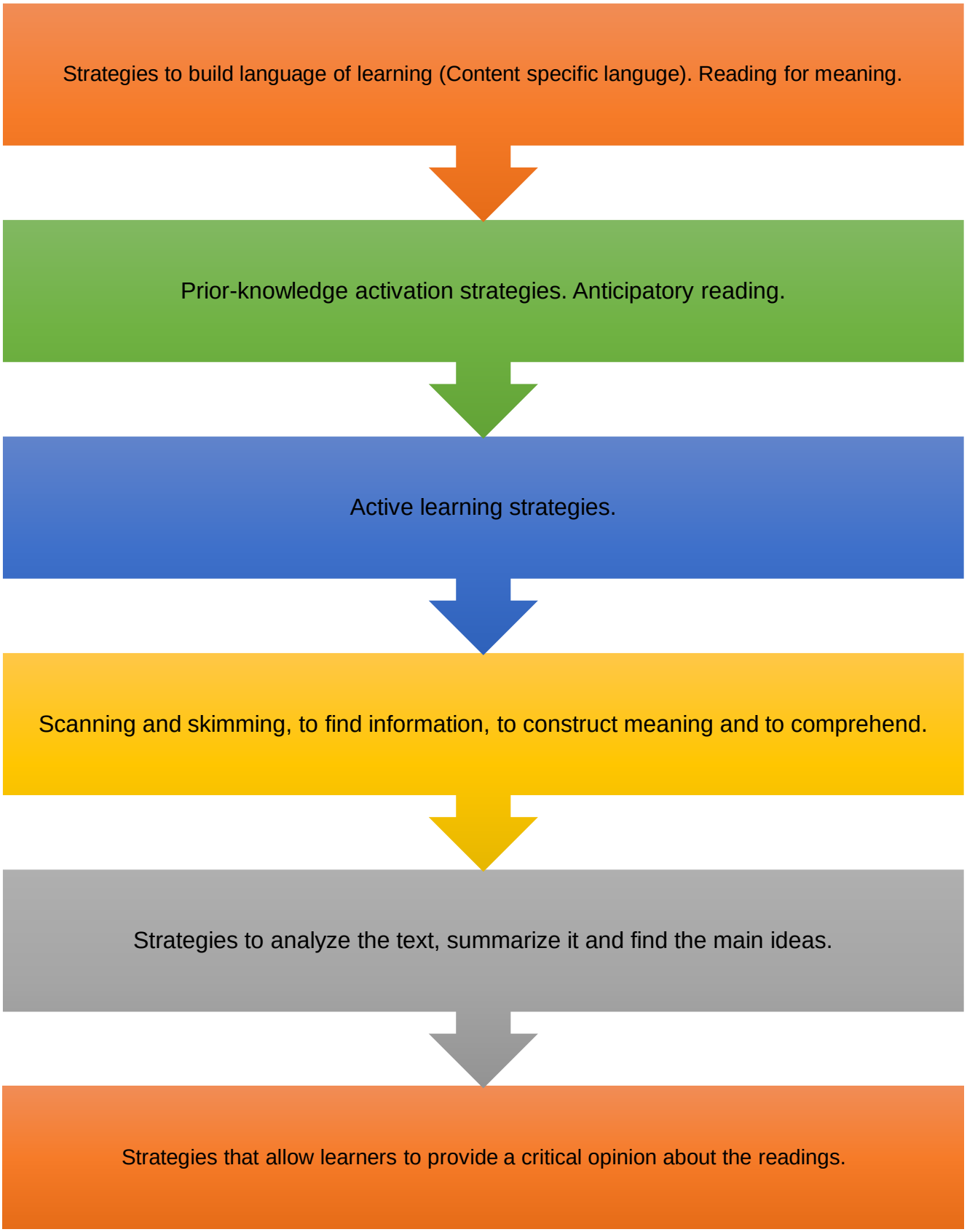
5.3.3 Reading Strategies

Developing high thinking skills through all four language skills and developing science inquiring abilities required specific reading strategies. The reading strategies had to be applied with specific content topics according to each term focus as it follows: first term biology, second term physics and third term chemistry. The teacher applied CLIL reading strategies and a set of general reading strategies for reading in a second language[2].

The teacher decided to apply the strategies according to the needs learners showed during the process. The first topic required very specific language, also learners needed to identify the importance of certain content language over other words that were not needed for comprehension. Regardless, the teacher would have had to enhance language for learning, which is the language related with the structure required to operate in English (University of Cambridge ESOL examinations, 2011). After working in language the teacher decided to use strategies to organize information from the texts. This strategy first focused in activities with concrete words (descriptors) and simple sentences. Then, text organization moved to making inferences, re-writing the texts in charts and making summaries.

The following are the type of strategies that were selected:

[2] The references of those lists are found in webography page 49


Strategies to build language of learning (Content specific languge). Reading for meaning.
Prior-knowledge activation strategies. Anticipatory reading.
Active learning strategies.
Scanning and skimming, to find information, to construct meaning and to comprehend.
Strategies to analyze the text, summarize it and find the main ideas.
Strategies that allow learners to provide a critical opinion about the readings.

At the beginning of the school year 2016-2017 the objective was to aid the learners to improve their language of learning (content area language) by using dictionaries, providing key words or obtaining these key words through reading before doing the practical activities like labs or map organizers. Even before having the results of the rubric the teacher realized learners lack a scientific language (language of learning). So during the first part of the **first term**, there were not a full scope of strategies. Instead they built language and focused on key words, concepts and content as recommended by CLIL.

The first topic was Microorganisms. Then the first aim was to build language around this topic.

5.3.3.1. Reading for meaning (e.g. bacteria and viruses)

These strategies help learners to construct language vocabulary, identify concepts and find specific information on a text.

- Scanning
- Using dictionaries
- Using subject words with appropriateness
- Understanding definitions
- Giving evidence of understanding through questions and group debate
- Giving a copy of the text to each students and ask them to read it, then underline 5 words they don't understand and ask for the meaning to a partner or look them up in a dictionary.
- Asking the student to fill in the gaps when the definitions of the key-words are clear.

In this case, learners were asked to read a text to find a new vocabulary, they made a list of key words for the topic according to the aim of the class. Then by the end, they had to develop a graphic organizer with the most important trades of bacteria and viruses. Once vocabulary input had been provided, it followed providing strategies to organize information, which lead to the next set of strategies.

5.3.3.2. Scanning the text (e.g. body systems)

Learners go deeper in texts finding main ideas. The objective is to help learners to recall the main ideas of the texts.

- Reporting back the comprehension of the texts
- Introducing a text
- Continue working skimming and scanning
- Continue giving language input
- Putting the students in groups of 3/4. Give a copy of the text to each student. Tell them to skim the text for general meaning.
- Reading a slip of paper, you show to one member of the group, who holds the information in their head, and report the group what they read.
- Scanning the text until they find the word/sentence and underline/color and number it.

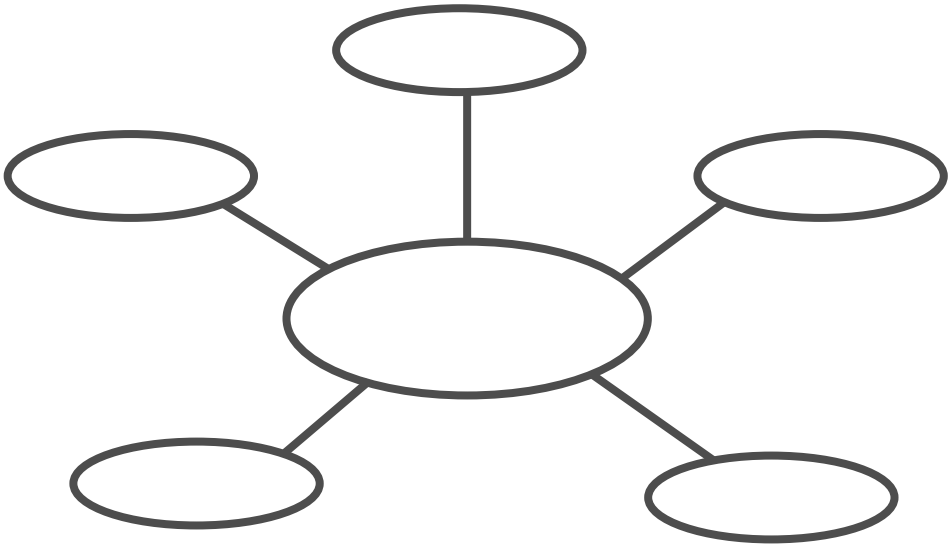
- Taking the texts away and asking the groups to write down everything they can remember.

Variation: you can use pictures, diagrams, charts and graphs instead of written texts only.

This strategy was used with the activities developed with the body systems topic, students found important information in the texts and re-organized it presenting a report of it with different sources. Learners presented a video describing the body systems' functions. Also filled in a map organizer with essential information about the body systems.

Name _____

Use this map to organize your thoughts and make connections to your topic. Write the main idea in the center, and add supporting ideas or related topics in each surrounding oval. Continue to expand on your thoughts by adding more spokes to the map.



Then during **second and third terms** students received feedback about their performance in reading and how to improve it. The teacher explained to them that besides identifying key words and language, they needed to use reading strategies to identify the purpose of the text and respond to it.

The strategies applied during these terms moved to the purpose of the text and the parts students could use from it. First, it started with activating prior knowledge:

5.3.3.3. Active learning / incorporate higher thinking skills (Environmental project)

Giving constant EVIDENCE OF LEARNING by doing some observable action or behavior that the teacher has requested. Learners discussed the reading in a debate and provided arguments using evidences from the text. The groups built their environmental project after constructing the sustainability concept through the reading/debate process.

The activation of prior knowledge did not end with the environmental project, learners also used it to make inferences about the texts previous to the reading. The objective was to show the learners that they could construct the meaning of texts before reading them and adjusting this meaning according to the information obtained.

5.3.3.4. Anticipatory reading guides (e.g. Microorganisms, energy)

The objective is to activate prior-knowledge to establish relationships between concepts and predicting the type of information the reading could provide.

- Activating prior-knowledge
- Predicting the content of a text
- Facilitating the reading of a text
- Skimming and scanning
- Deciding whether statements about a text are true or false, putting a tick in the appropriate column.
- Checking if their predictions where right or not.

Using the anticipation guide template allowed learners to check their own previous knowledge. Also during this activity teacher started applying a co-evaluation process where learners checked their peers' work and provided feedback. This allowed learners to follow their reading process, which made them aware of how to use the chart properly.

Name _____

Topic _____

Read each statement below. Respond in the left column whether you agree (A) or disagree (D) with each statement. Think about why you agree or disagree, and be prepared to share.

Before Reading Agree/Disagree	Statement/Question	After Reading Agree/Disagree
	1.	
	2.	
	3.	
	4.	

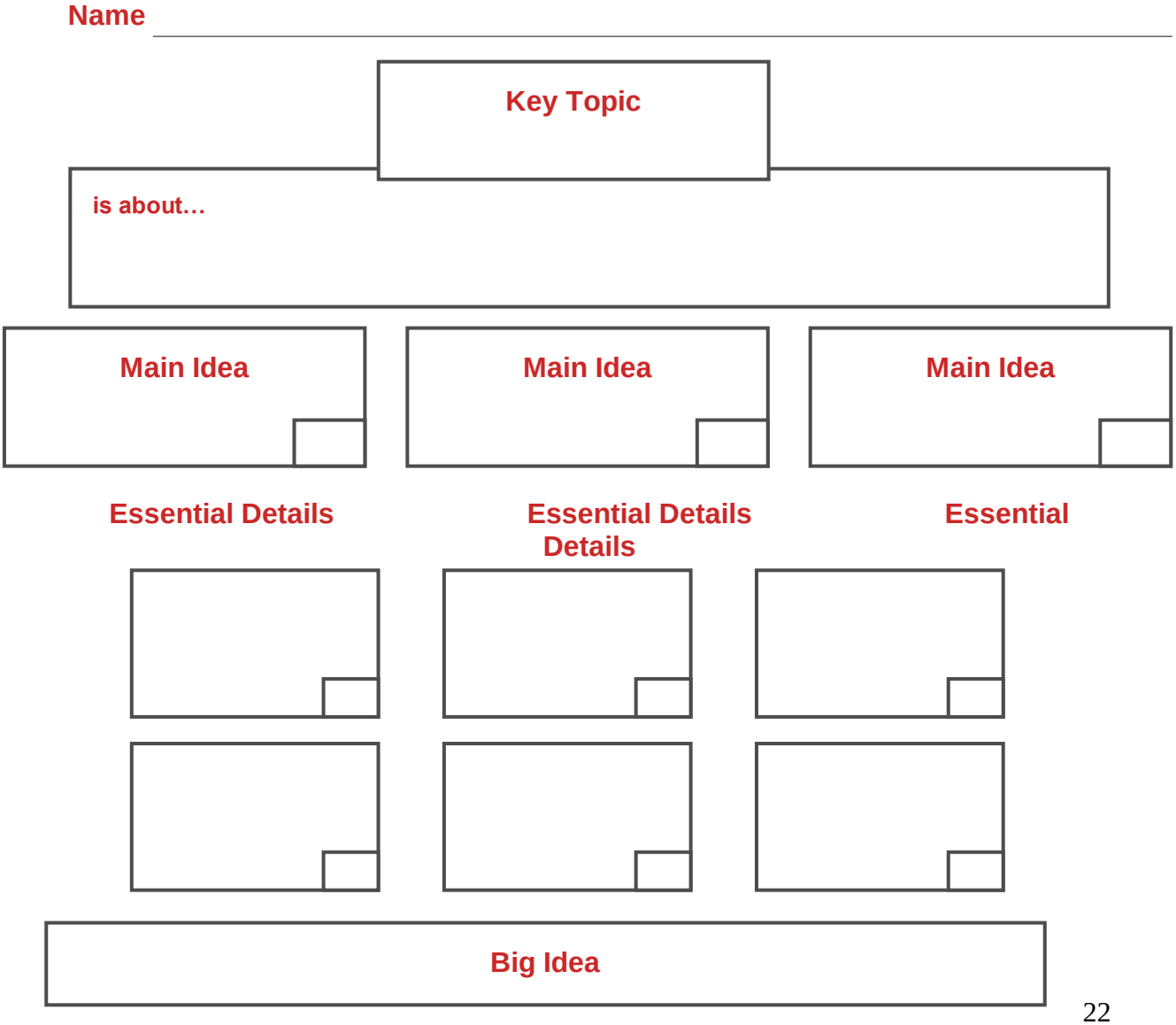
5.3.3.5. Frame routine and jigsaw charts (e.g. energy, rocks and minerals)

The objective was to learn how to re-write ideas adding secondary information that enhance the main idea. These charts aided learners to summarize texts.

- Reading the text
- Discussing in groups
- Identifying the gist and secondary ideas

Once learners had identified what they knew and contrasted with a text, the last part of the second and third term the work was focused on deconstructing the text and identifying its parts. This was one of the hardest strategies for learners and they had to repeat the activities several times. They showed difficulties using language to re-write the text because the chart was filled with incomplete parts of the original reading.

Frame routine



Jigsaw chart

Name

Topic

As you read and discuss with your group, write down important facts about your topic. After you have become an expert on your own topic, you will share your findings with a group of classmates, and learn about their topics as well.

Important Ideas 1. 2. 3.
Summary
Other Facts

5.3.3.6. Double entry journal (e.g. energy, rocks and minerals)

Finally, closing the third term, the last strategy used concluded with the opinions that students developed from texts. Unfortunately, the third term was affected by several extracurricular activities and time for lessons and deeper use of strategies was not possible. Also, the teacher had a long period of sick leave and making the process as planned was impossible.

Name _____

Topic _____

As you read the text, select a few phrases that you find meaningful or interesting. Write each phrase in the first column below, then write your reaction (a comment, question, connection made, or analysis) to each quote in the second column.

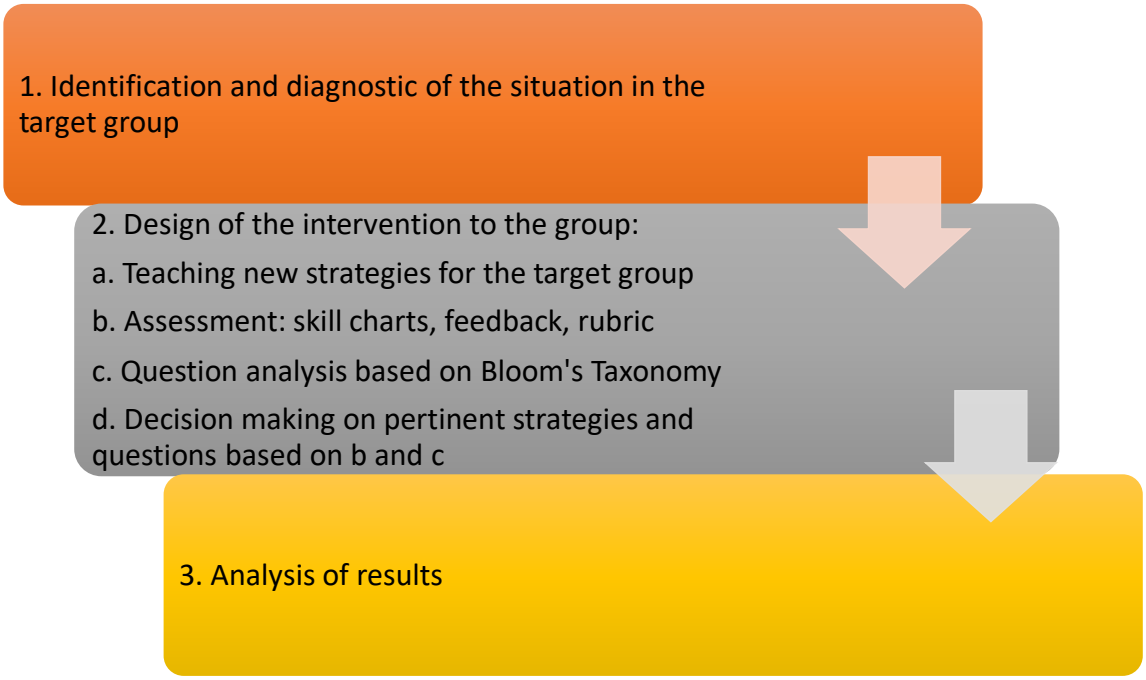
Page in text	From the text	My thoughts

Taken from http://www.adlit.org/strategy_library

To provide validity to the assessment, the strategies applied in lessons activities were the same strategies used in the exams; texts were also similar in length, vocabulary and topic. Actually, the same text could be used in different moments of the class for working a whole group of activities with it and using it in the exam to go further.

5.4 Procedure

This part describes the general procedure before, during and after applying the strategies mentioned above.



1. Identification and Diagnostic of the situation in the target group

The teacher started in this school in the 2015-2016 school year. One of the groups she taught was 5th grade, at that time because of the number of students they were divided in two groups. The science lessons under the CLIL model required the use of language and content, therefore it was important to develop the language skills in class. Even though, skills were not divided in the class, reading comprehension was part of the elements of an active learning class where students transformed information in a useful resource.

When the teacher started planning the assessment, she realized that exams were divided into skills, a division that did not occur in the learning process. Results showed that some skills were more difficult for the learners than others. Skills like listening and speaking scored better than reading and writing. At the beginning, language scaffolding focused in the vocabulary because learners expressed lack of understanding, but beyond that, reading comprehension was still an issue starting by comprehension of the instruction and concluding with lack of inferential abilities.

After the first test, the teacher started using more readings in class to identify how learners read, the vocabulary they could not recognize and to make a fair test because learners could practice in class before tests. The teacher also worked skimming and scanning strategies with the learners helping them to find important information and constructing meaning.

2. Design of the intervention to the group

a. Teaching new strategies to the target group

The use of new strategies with CLIL methodology started at the beginning of the new school year 2016-2017. Some changes had occurred and both 5th grades became one group in 6th grade, including two new learners with previous bilingual education. The strategies started focusing in searching information through students skimming and scanning strategies used the previous school year, as well as organizing information using graphic organizers and searching vocabulary.

Then, the second period focused in activating prior knowledge to infer what the readings were about. Afterwards, they identified the structure of the reading and learned to summarize, organized the main ideas, discussed the gist of the text and they could paraphrase it.

The third period was a sensitive one because many extracurricular activities took place at that time and many of the lessons were affected and also the assessment. Some of the reading strategies provided by CLIL methodology in science classes were given to students with vocabulary and scaffolding in order to improve reading comprehension.

Students were measured in their performance both in class and in the internal test, to observe if there was any improvement in their ability to comprehend and use reading text information to solve science-related tasks.

b. Assessment

Once strategies were applied in class, the second step was to assess adequately and providing feedback. There were two ways to assess learners: one was Formative which was qualitative by giving the opportunity to students to improve their work in class. Learners received verbal feedback instead of a grade, which allowed them to follow instructions, comprehend the text and interact with it beyond decoding.

The second type of assessment, the summative, was a quantitative recollection of data which provided the statistical information required to measure the learners' improvement. The summative assessment was done twice during the term. After the first two weeks of each term learners had a mid-term exam and at the end of the term a final exam.

Measurements were divided in a skill chart allowing to have a pattern of performance in each, but this external division in the assessment was not coherent with the integrationist model of CLIL methodology. It is still a concern the fact that lessons integrate language and content with skills, while assessment separates them Nevertheless, it was an advantageous way to collect the data and analyze it.

c. Reading comprehension questions developing LOTS (Lower Order Thinking Skills) and HOTS (High Order Thinking Skills)

In CLIL lessons developing first LOTS questions and then HOTS questions becomes key for developing comprehension (University of Cambridge ESOL Examinations, 2011). It was significant for this research to rule out the possibility that learners had not developed their LOTS yet and struggled with HOTS affecting their comprehension.

The lessons developed in science class were divided in 4 stages: first there was always a warm-up, the questions for this stage looked for prior-knowledge activation so they usually asked students for their opinion about a topic, asking them to write a prediction or a hypothesis, or expecting them to identify a particular concept through videos or pictures.

The questions of this stage were between the range of knowledge and comprehension according to Bloom's taxonomy (University of Cambridge ESOL Examinations, 2011). Ex. Predict why the unit is called brick on the wall? Collect one of the cardboards with a body system, gather in groups and make a role play to represent the main function of that system, in groups observe the different pictures of living things and create as many food chains as you can.

Then the lesson continued with the main activity. During this stage, learners had to construct the concepts required for the topic, the teacher could help guiding the concepts but the main role belonged to learners.

The activities for this stage included matching information with definitions, learners read from the book or other resources and took specific information using graphic organizers, drawings, skimming for specific concepts. Also these activities could be done with videos or pictures. Since the objective was to build comprehension about the topic and its concepts, most of the exercises used reading comprehension through written texts, but also videos, audios, and previous lab planning (University of Cambridge ESOL Examinations, 2011).

The questions in this stage were comprehension questions through activities such as reading different source to fill in a chart, read a text or categorize the information. Afterwards, students could compare concepts, provided definitions or used information to solve real life situations.

Usually these two steps went together and were developed during two-hour classes of 45 minutes each. Then it came the other half of the class, practice and review. The objective was to challenge students' knowledge and their ability to "use" what they had learned.

The questions for these two stages belonged to application and analysis. Most of the activities asked them to plan their lab practices: first, they had to write a hypothesis (prediction); then, they would list materials and wrote the procedure (planning). Then, they would write the results and did the correspondent analysis; with this analysis they would confirm if their hypothesis was accurate (contrasting, explaining what happened, analysing fair test).

When the topic did not consider a lab practice they would use the comprehension from the previous stage to contrast it with other situations or examples. E.g. use the information collected to draw the chicken bone or wing and a human arm comparing the labeled parts, do they work the same? Do they share the same parts? What does it tell you about the joints? Another example would be to use a reading to obtain information and then using that information in a creative way instead of just only presenting: design and present the video with the main facts about their system: organs involved, function, relations with other organ system, diseases.

d. Decision making on strategies

Since this was an action research investigation during the information recovering the teacher was able to make decisions about the strategies and the tasks applied in class. Though, different situations existed during the

course of the research the focus on reading strategies remained without ignoring those situations aiding learners with special needs to cope with the assignments.

It became a key factor to involve the learners in the research which was essential for this kind of investigation but also because learners needed the motivation to find in these strategies a path for learning. Then, strategies were selected according to exams results which evidenced the importance of aspects like organizing the texts to find main ideas, using organizers to locate specific content information, providing an opinion, inferring or predicting real-life situations based on information obtained through reading.

As mentioned in the point 5.3.3. strategies were applied through the course of the lessons according to the learners' needs. First doing language scaffolding, then reporting text to check comprehension, after that identifying main and secondary ideas, activating prior-knowledge to infer aspects about texts, finally summarizing the texts identifying their main parts.

6. Results

This chapter presents the data obtained through the assessment from the exams during the whole year process. The results presented were obtained through the reading part in each exam which receives two points. Deductions occurred because the answer was not as expected. The terms had two exams: one midterm and one final exam. The midterm exam covered one to two topics studied up to that time, while the final covered all the topics studied during the term.

During 5th grade, the first school year for the teacher, she was not aware that Science exams were divided in the 4 language skills because in the lessons the skills were combined. It can be challenging to have all 4 langue skills in one class according to the aims. The teacher had a learning process using the appropriate readings and helping students with reading tasks during lessons. Then, the readings used in the exams were very similar to those from the lesson to guarantee the validity in the exams. During this period the teacher filled only final term assessment chart skills.

During 6th grade strategy was different. The teacher planned carefully the texts used in lessons and exams, filled skills charts for mid-term and final exams, and assessed using the same strategies used in each lesson.

This section also presents the contrast between the teacher assessment of the students' reading process and the students' self-evaluation, which would allow identifying the developmental process during the time where strategies were applied. The teacher marked the abilities she felt students have developed in a reading continuum assessment rubric. The learners did the same in their self-assessment rubric.

Following there will be tables and graphs showing the average results obtained during 5th grade in the reading part during final exams only because at that time mid-term skill charts were not filled in. Also, the number of students and groups changed because the 5th graders where mixed to form 6th grade and the number of students increased.

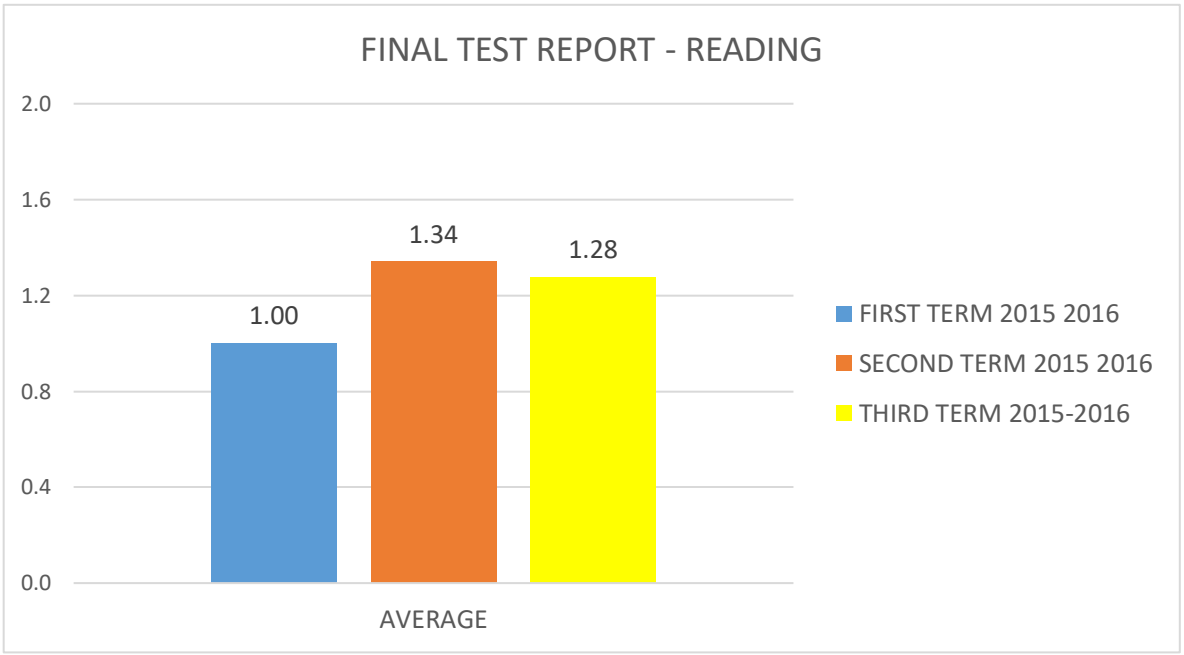
Therefore, the 6th grade table and graphs will evidence the average results obtained by the learners during the first mid-term and final exams where they worked mostly with skimming and scanning strategies and the results obtained during the second and third term where CLIL and reading strategies were applied.

Table 1. Results of reading assessment Final terms 5th grade

	FINAL FIRST TERM 2016 – 2017	FINAL SECOND TERM 2016 – 2017	FINAL THIRD TERM 2016 – 2017
	Reading points 2	**Reading points 2**	**Reading points 2**
1	1.4	1.4	1,2
2	0.7	1,40	0,7
3	0.6	1,30	1,4
4	1,00	1,00	0,5
5	0.4	1,60	1,8
6	0.4	1,10	0,75
7	1.6	1.8	1,8
8	1.3	1.3	1,2
9	1.4	1.7	1,8
10	0.2	1.7	0,1
11	1.4	1.9	2
12	1.2	1.8	2
13	1.5	1.9	1,8
AVERAGE	1,00	1,34	1,28

This table shows the results obtained in the reading comprehension tasks during final exams in 5th grade. These results made the teacher aware of the difficulties presented by the learners.

Graph 1. Average final exam 3 Terms 5th grade

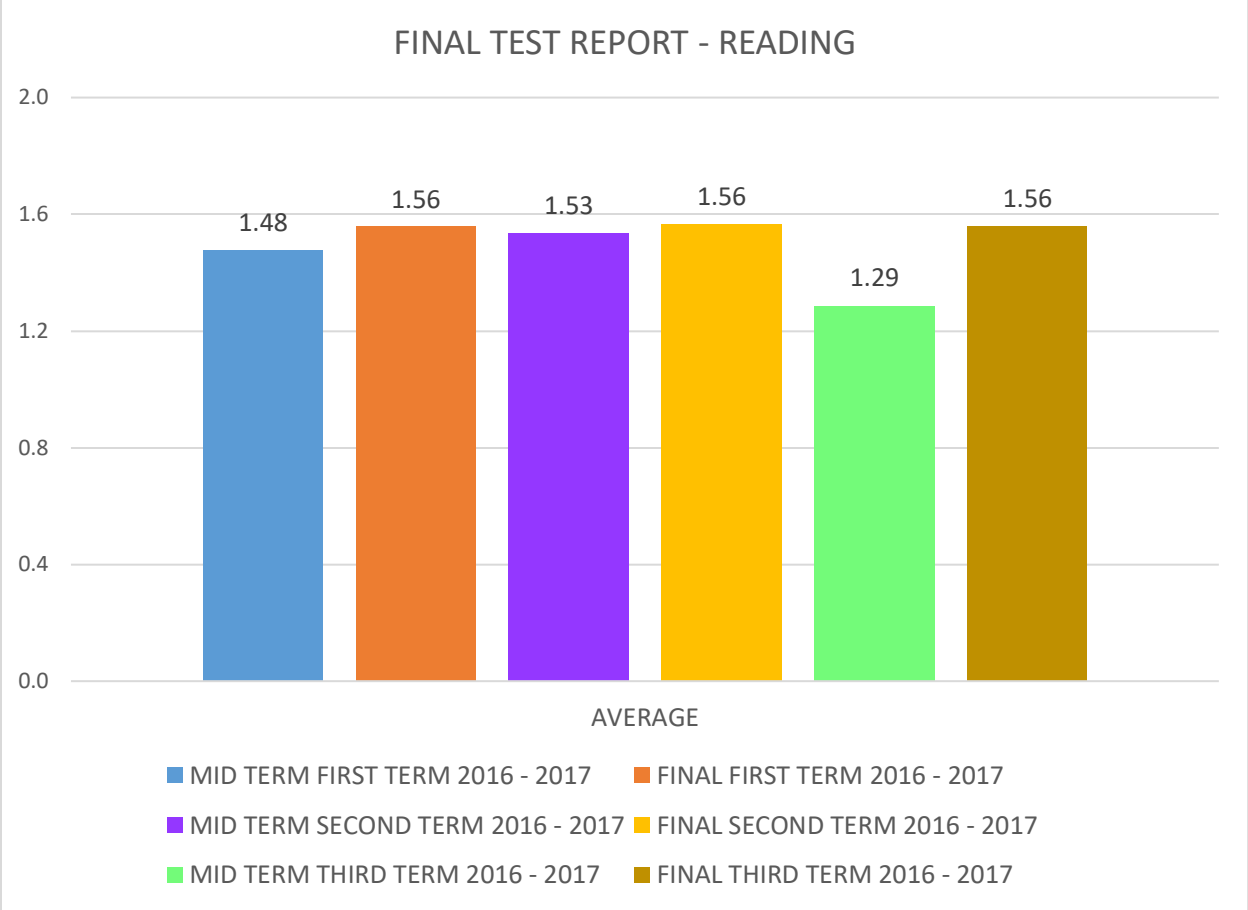


Comparing these results with those from 6th grade would demonstrate that an advanced occurred during the application of the reading strategies.

Table 2. Results of reading assessment per Term. Mid-Term and Finals

	MID TERM FIRST TERM 2016 – 2017	FINAL FIRST TERM 2016 – 2017	MID TERM SECOND TERM 2016 – 2017	FINAL SECOND TERM 2016 – 2017	MID TERM THIRD TERM 2016 – 2017	FINAL THIRD TERM 2016 – 2017	AVERAGE
	Reading points 2	Reading points 2	Reading points 2	Reading points 2	Reading points 2	Reading points 2	Reading points 2
1	1,30	2,00	1,00	2,00	1,30	1,10	1,45
2	1,70	1,90	1,90	1,81	1,50	1,50	1,72
3	1,44	1,80	1,30	1,10	0,90	1,80	1,39
4	1,70	1,30	1,80	1,60	1,00	1,80	1,53
5	1,90	1,15	1,40	1,70	1,40	1,50	1,51
6	0,45	0,90	0,25	0,20	0,90	0,90	0,60
7	1,68	0,90	1,60	1,30	0,90	0,90	1,21
8	1,70	1,90	2,00	1,80	1,60	1,90	1,82
9	1,40	1,50	1,90	1,50	1,30	1,90	1,58
10	1,20	1,70	1,75	0,90	1,20	1,40	1,36
11	1,02	1,25	1,25	1,30	1,00	1,60	1,24
12	2,00	1,75	1,50	1,80	1,20	1,80	1,68
13	1,90	2,00	2,00	1,40	1,30	1,90	1,75
14	1,70	2,00	2,00	1,90	1,70	1,90	1,87
15	1,21	0,65	2,00	1,90	1,20	1,20	1,36
16	1,70	1,90	1,75	1,80	1,60	2,00	1,79
17	0,89	1,75	0,60	1,70	1,30	1,70	1,32
18	1,70	2,00	2,00	1,80	1,60	2,00	1,85
19	1,80	2,00	2,00	1,80	1,40	1,90	1,82
20	1,40	2,00	2,00	2,00	1,70	1,80	1,82
21	1,86	1,30	0,50	1,40	1,10	0,90	1,18
22	0,84	0,60	1,25	1,70	1,20	0,90	1,08

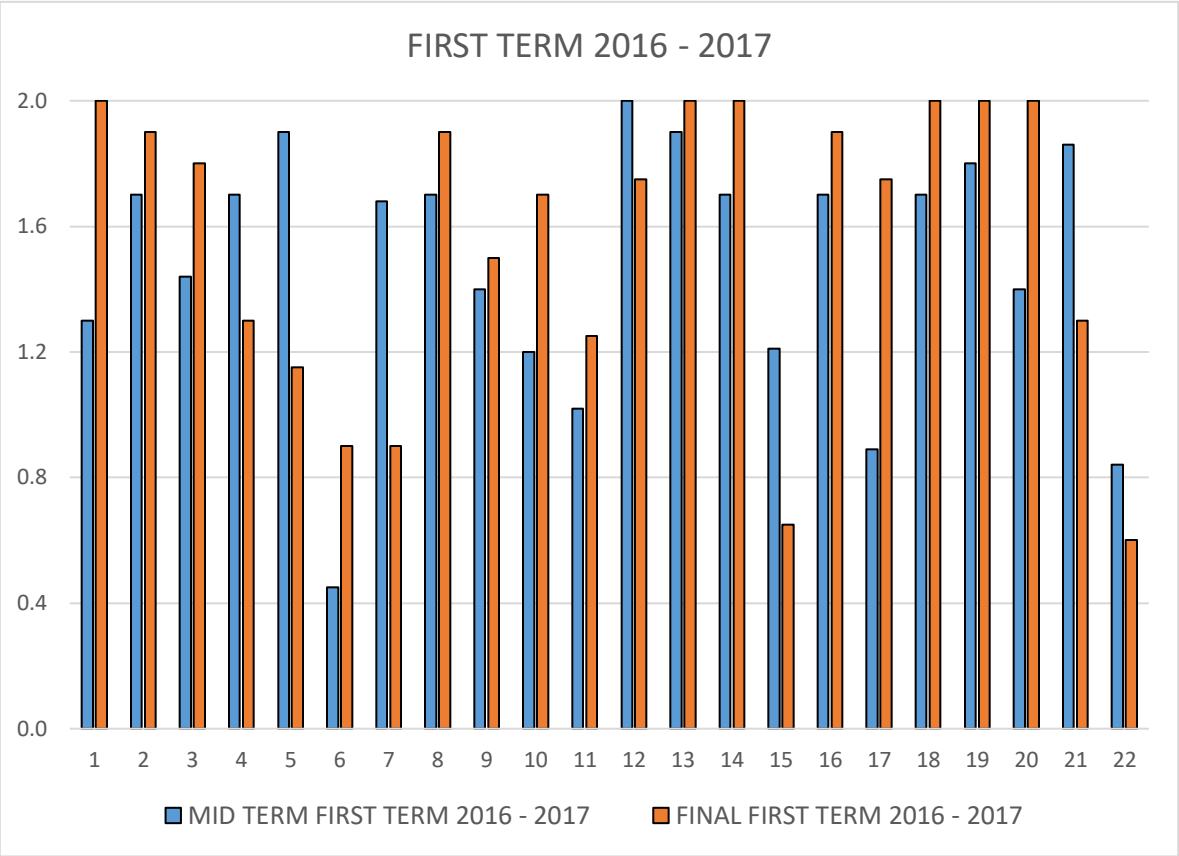
Graph 2. Average mid-terms and finals 3 Terms 6th grade



The comparative of the average per grade shows a better performance during the time of reading strategies application. Although, the comparative only in 6th grade shows better results usually in the final terms, there is not a statistical prominent advance in the results of the students. This could show they are developing better reading strategies but still lacks more domain in the reading process.

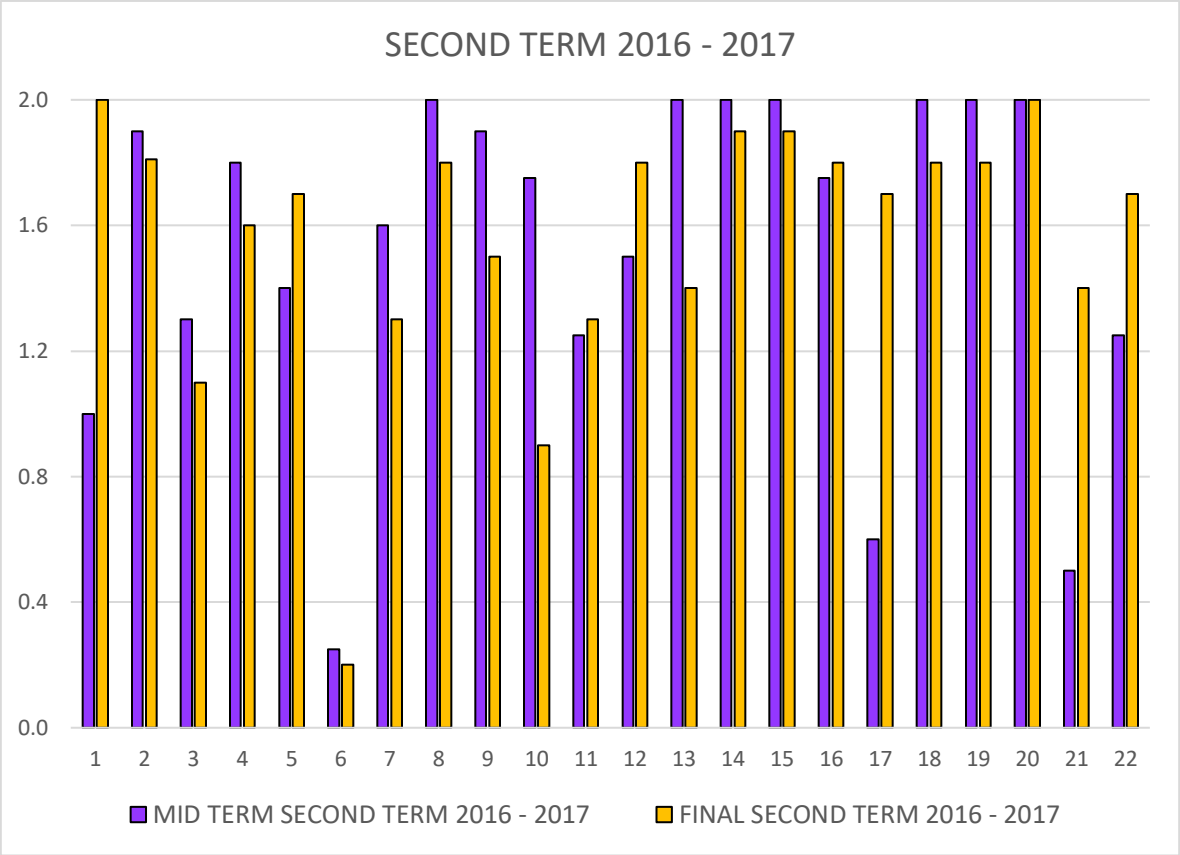
Also, the following graphs show the performance of each student in each period during the mid-terms and finals in 6th grade. The graphs evidence advances in some students and difficulties in others. It is worth to mention that strategies are not going to have a positive effect in all students since their cognitive processes and learning styles could require a different approach. Some students require the guidance of psychology department. In general, the group evidenced lack of motivation toward academic challenges.

Graph 3. Mid-term 1 and Final 1



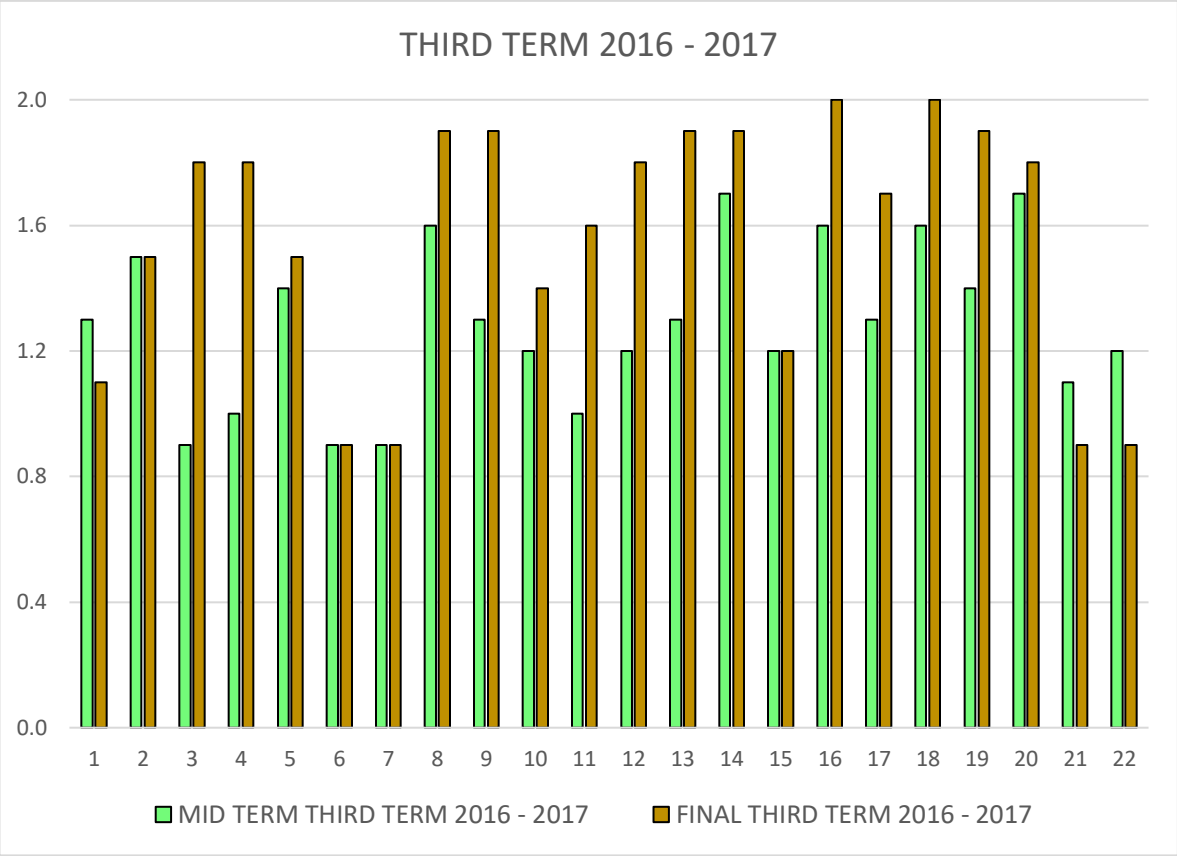
In this graph, the results obtained in the final exam were superior to those obtained in the midterm exam. Midterm exams took place 3 weeks after the term had started, while for final exams students had more time to develop concepts, knowledge and activities, this could be a factor that influenced the results.

Graph 4. Mid-term 2 and Final 2



The second graph shows mid-term and finals in the second term, during the term learners were aware of the reading process and the strategies that they were going to use. Mid-term results were slightly better than finals. The reason could be on the adjustment that means using new strategies, learning something new and using new strategies can imply a cognitive re-organization.

Graph 5. Mid-term 3 and Final 3



During the third period, most students diminished their performance during mid-terms, though in this period they were using more reading strategies than before. Regardless, during this term, several activities took place in the school and some lessons were missing affecting the continuity of the process. But then some strategies were used continuously and worked in class with several topics, providing more practice time, which could help to explain the improvement in final exam results.

During the application of the strategies a reading comprehension rubric was adapted from Reading Continuum's Christopher-Gordon Publishers (2001). The teacher assessed the reading comprehension abilities of the learners during class activities that were not assessed only by grades but by taking into account the skills developed. The following is the adapted rubric, taking into account that the original Reading continuum is designed for general reading, while the adaptation takes into account science reading types only.

The following is the result of the assessment done during the application of the reading strategies in class, then in the middle of the process, finishing the second term, learners did their own self-assessment, the results are below.

Table 3. Reading Comprehension Rubric

Criteria	4 Proficient	3 Fluent	2 Bridging	1 Expanding
Types of text and reading	10 students are able to select text when finding information about a particular topic. These learners can comprehend challenging tests. 45%	12 students these students require help to select information or texts. Also require help to comprehend challenging test. 55%		
Attitude		20 students can read during 30 minutes or more. 91%	2 students can read during 20 minutes or more, they resent some difficulty to keep their attention for a long period of time. 9%	
Reading strategies		3 students although they do not use frequently dictionary to increase their vocabulary. 14%	19 students require guidelines and help to gather information and identify what is required to solve tasks. Leaners do not use the dictionary properly and it was not included in their school appliance. This will change during the next school year. 86%	
Comprehension and response		14 students have developed the ability to discuss and use resources from the text. 64%	3 students still require guidance to gain information that helps them explain their arguments, they have difficulties understanding vocabulary. 14%	5 students still provide concrete information about texts, mostly examples and few arguments and reasons using the information obtained from the text. 26%

Adapted from Christopher-Gordon Publishers, 2001.

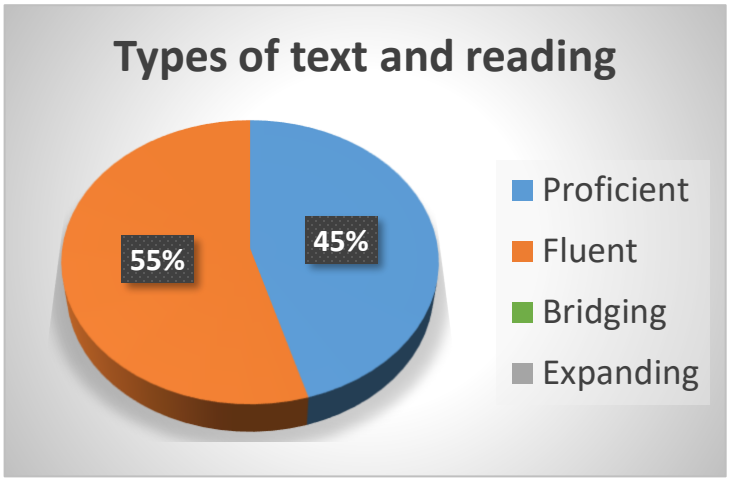
The following chart and graphs show how students assessed themselves in the process, this self-assessment took place after starting with the strategies during second term.

Table 4. Learners' self-assessment rubric

Criteria	4 Proficient	3 Fluent	2 Bridging	1 Expanding
Types of text and reading		10 students 45%	9 students 41%	3 students 14%
Attitude		12 students 55%		10 students 14%
Reading strategies			22 students 100%	
Comprehension and response		13 most of them recognize their ability to use reasons and examples to support their ideas but they have difficulties to discuss texts and reference them. 59%	3 are able to use examples and reasons with help. 14%	6 some are able to discuss but some other show more difficulty in the comprehension part, particularly because of the lack of vocabulary. 27%

Adapted from Christopher-Gordon Publishers, 2001.

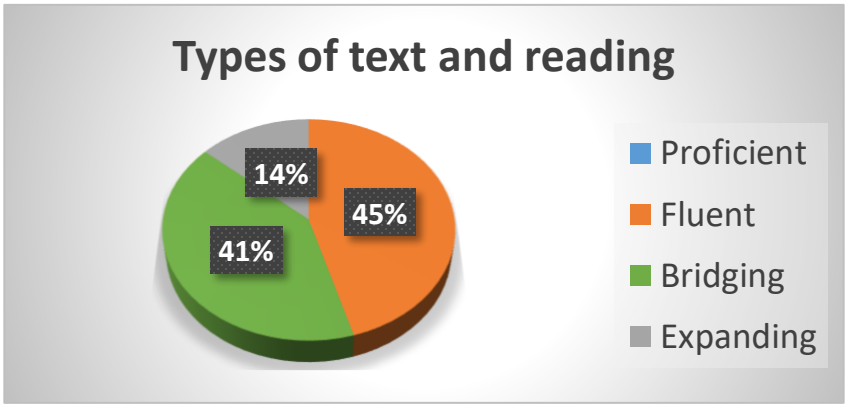
Graph 6. Rubric Criterion 1



This category relates to the ability of choosing texts or parts of a text in an independent way. This means that learners were able to find specific information, being aware when a text is scientific, identifying if it is describing a process, giving evidence about investigation results or showing a prediction.

Although learners usually did not choose the texts read in class, they had to find information, organized it and used it in tasks. The learners that showed proficiency in this category were the ones that identified in the texts what they needed to solve a task. The fluent learners also could do it but needed the guidance of the teacher.

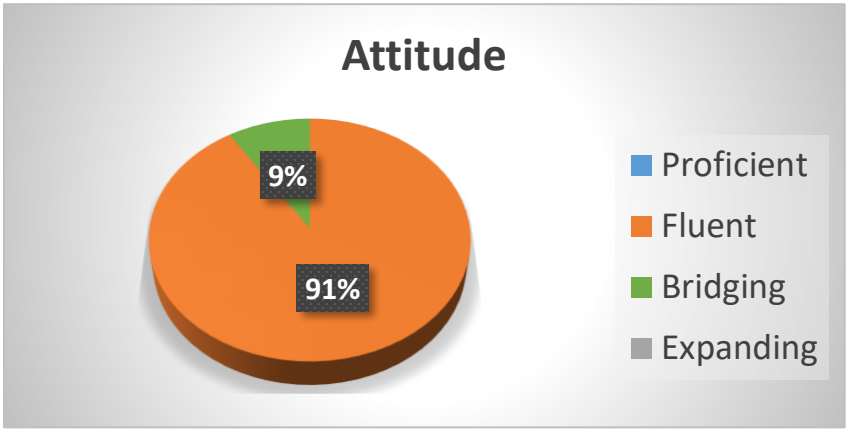
Graph 7. Learners' assessment. Criterion 1



Learners felt their performance was different. 45% of learners pointed out a proficient performance. The rest of the group located itself in bridging and expanding. The answers given by the expanding group was that they did not recognize different types of texts and they felt unable to identify the characteristics of texts.
The strategies used during the third term to identify the parts of the texts like the Jigsaw chart could be a tool that made learners aware of the structure of texts.

Though the teacher could not develop more strategies or variations to focus on each criterion presented for this research, she could apply in the future these variations according to the learners' needs.

Graph 8. Rubric analysis Criterion 2

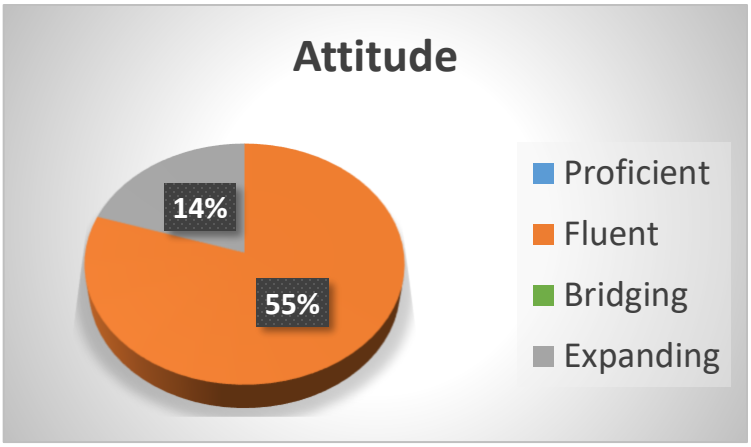


This category refers to the attention span a learner can dedicate to reading. Learners read during 30 minutes or more, but for some learners it was difficult to keep track of their reading, even they could dedicate 20 minutes to a reading they tended to lose track of the ideas. Training the group to read longer periods in each part of the terms was a challenge.

The first part of the term the teacher read with the learners to do the scanning and then skimming process. Then the teacher used longer readings with key points and graphs to provide visual aid to those learners with a visual learning style.

After that, the teacher tried using tables and graphs organizers that provided specific information, to provide then full texts. During the process the learners coped better with shorter versions with visual aids that they did with full texts.

Graph 9. Learners' assessment. Criterion 2

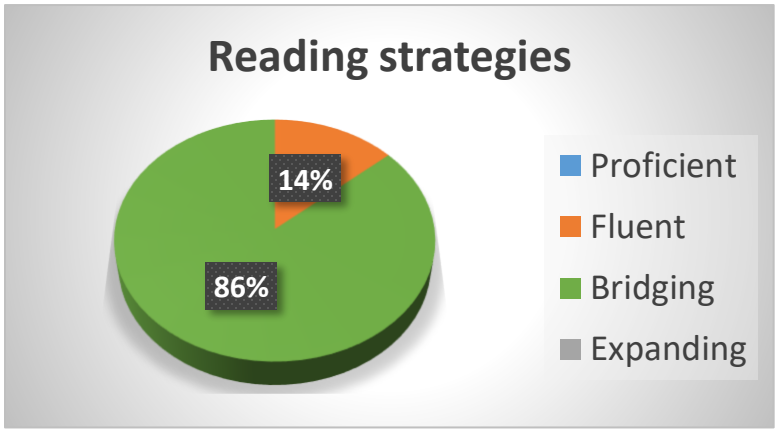


Learners also identified themselves as fluent readers, but there is a 14% of learners that worryingly set themselves as 15 to 30 minutes' readers, which highlights the importance of the attention span of these learners.

These results would explain why full texts with academic information were more difficult for them than those with specific information presented with visual aids.

In this case learners would need a training to focus in the reading during longer time periods.

Graph 10. Rubric analysis Criterion 3



This is the most important analysis category for this research, since the rubric was applied after the first term and learners were aware of the reading strategies work.

The teacher could identify that learners used skimming and scanning strategies to gather information, but learners still needed guidance to increase their vocabulary, to organize information and to integrate all with the tasks done. Only 14% use

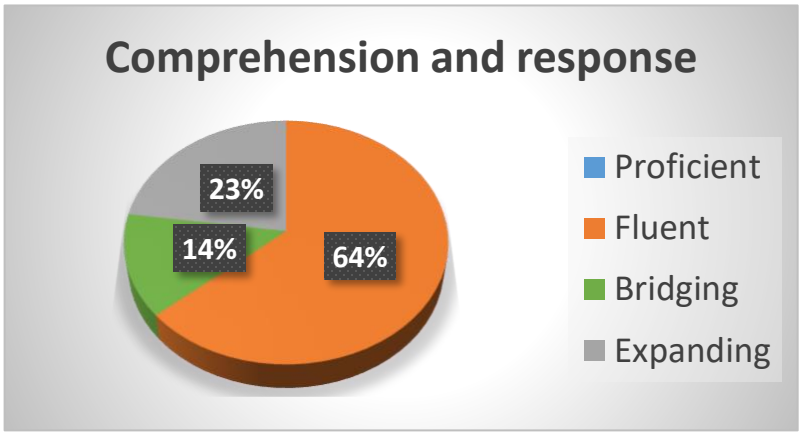
dictionary to gain vocabulary, had strategies to organize information and evidenced a process of information through texts.

The learners and the teacher agreed that the reading strategies were still in process. 100% of the learners identified themselves in bridging stage, while the teacher identified that 3 (14%) students had developed the fluent stage because though they did not use properly the dictionary as a tool, they used the strategies practiced in class to identify the information required. They also adapted successfully the strategies to their learning process according to their exams results.

Graph 11. Learners' assessment. Criterion 3

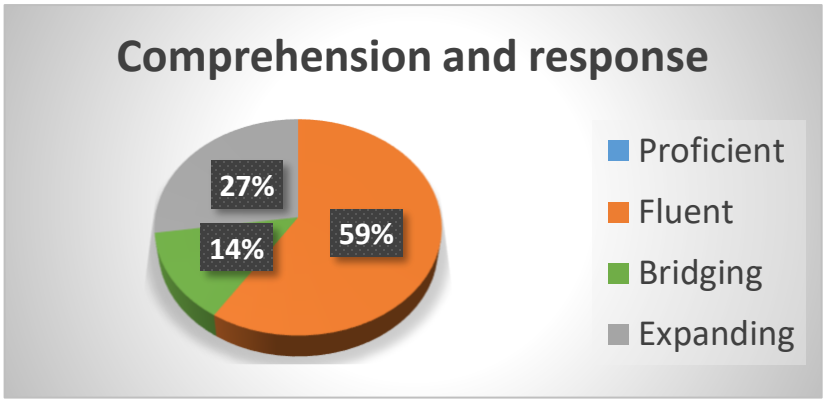
As mentioned before learners assessed themselves in bridging level. Although the teacher recognized the ability of 14% of student to increase language and integrate that knowledge with the text. Most learners manifested they were not independent when using strategies, they needed help either to organize the information or to integrate it with other tasks. Therefore, the strategies applied following the modeling of the teacher and the constant feedback provided could be the guidance required in their process. The challenge that remains is to move them towards an autonomous use of these strategies.

Graph 12. Rubric analysis. Criterion 4



This criterion shows an aspect that the teacher did not take into account during the analysis of the problem, the comprehension and response, the students were in different language levels because of this and their development of autonomy to learn language comprehension could be affected and results show different stages.

Graph 13. Learners' assessment. Criterion 4



Both results, evidenced that learners had issues dealing with their ability to explain the text and use concepts in it to develop thinking skills like inference, prediction, explanations and so on. It is important to consider that besides reading strategies having a better input in language, the whole concept of CLIL is providing enough input to learners so they can cope with their tasks. Previous researches have proven that in content areas teachers tend to focus more on content than on language, except for the language of learning specific to the subject (Mariño, 2014; Nikula, 2015, Perez et al, 2015).

7. Analysis and discussion

According to the results obtained, this chapter will explain their significance for the research and since this is an action research how can improve the teacher's practice.

One of the objectives of the research was to identify the reading comprehension level of learners through this process. The first set of results attempt to approach this aspect. Reading strategies provided learners with a clear aim to read. Every set of strategies had a clear objective related with learners' needs. The teacher started with specific content language and key words, closing with the comprehension of the text. When these learners had a specific aim to achieve through the reading, the activities became meaningful. Texts were tools learners used to explore the topics, build the scientific concepts and establish relationships among them. As mentioned before in several researches, students need a meaningful reading environment with enriching activities that promote more than just decoding (Flippo, 2012; Skoguen, 2013).

Nonetheless, the lack of specific content language that learners showed during the process demanded the teacher focused in the key words to decode successfully the text and to construct the meaning. The exercise of decoding and constructing meaning at the same time is one of the models in reading instruction found as a theoretical discussion of importance around the world (Flippo, 2012). In the case of this particular research the reading comprehension in English seems to require equally a language and meaning comprehension process.

Once aims and difficulties were identified allowing to choose the set of strategies appropriate for learners, the teacher assessed those strategies with formative and summative assessments highly used in CLIL methodology (University of Cambridge. International Examination, 2011). The first set of results obtained during 5th grade evidenced reading comprehension in English was difficult for learners, who scored lower than in the other skills. A comparison of the results obtained in 5th with those of 6th grade showed learners performed better in their reading assignments during the time of application of reading strategies to these tasks. This is the first piece of evidence of the potential positive effects of reading strategies in reading comprehension competence.

But results by themselves are not enough because they are only part of a summative assessment at the end of each term. The rubric used to collect information during the formative assessment process provided further information that could support these results. The teacher found that learners achieved different developmental levels in their reading comprehension competence in English. Most of the learners achieved bridging and fluent stages in different criteria, with a small percentage of learners in expanding stage. The learners that assessed themselves in the

expanding stages had also difficulties at emotional or learning level that were accompanied by the school team.

The rest of the group advanced accordingly their language level, which was going to be a critical aspect because beyond the language of learning (specific content language), learners manifested through the rubric assessment that they lacked language to provide evidence of their comprehension. In CLIL methodology this is known as language for learning or the language used to communicate ideas, knowledge and reporting comprehension. The group in particular described that they were able to report examples and information from the text but had difficulties using a complex vocabulary to report their own understanding of the readings.

This research found that language is a critical point because as a content area teacher, she focused in the language used in Science assuming that learners had the language structure to report their comprehension. Also, the research found that language scaffolding cannot be restricted to the language required to work on the subject. Research before this one had stated the difficulty that represents the content and language integration because teachers tend to focus in content but not equally in language (Mariño, 2014; Nikula, 2015).

Although CLIL methodology does not forbid grammar teaching, it is expected to have student centered lessons and grammar has to be used instead of explained. Grammar should be part of language scaffolding through chunks, modeling or reflection around the language on a text (Coyle, 1999). But the results in this research evidenced that these tools would not be effective if learners simply do not know how does chunks of structures work. Also the strategies focused in reading comprehension because understanding the concepts of the reading was important for the content area. Here relies the difficulty found in previous research about language in content subjects because in this case scientific language structure is widely used in lessons (as Nikula, 2015 found in his research). The question remains on how to help learners to develop a language construction process when besides prompts and chunks of sentences students require explicit grammar.

Mariño (2014) did a reaserch in the Colombian context finding that lack of proper training to comprehend de methodology derives in teachers giving content areas in a second language, which does not represent the principles of CLIL. Training around teaching language structure in content areas has not been wide in the case of the school where the teacher did the research. Herself as a new teacher made several mistakes because of the lack of competence to use this methodology.

Therefore, the research did not provide a further solution for the language structure aspect. The research helped the teacher to identify that besides the reading strategies language use appropriation is key to promote reading comprehension. In this respect, research has stated that learning to decode does not mean immediate comprehension neither decoding without constructing meaning (see Skoguen, 2013; Yen-Hui, 2016). The strategies applied in this research started with the decoding process because learners had to focus in specific key words and their meaning. Increasingly the strategies approached the meaning of the texts and the information they contained. Prior-knowledge was an important strategy for learners to relate with the content of the readings because in the previous year learners read without connecting the information with the aims of the class.

The strategies had a positive impact on the learners because they recognized in their self-assessment that in the bridging stage they could find information and use it with guidance to comprehend better the meaning of what they read. They could organize information through maps and charts with help, and they could discuss the texts read. However, they needed to support facts, concepts and opinions using the texts, what requires language and cognitive skills (Khanam et al, 2014; Yen-Hui, 2016). Unfortunately, the strategies applied during the third term aimed to achieve the first step of this process but activities inside the school affected the time to develop this part of the research.

There is another aspect that could be considered in this discussion because CLIL methodology develops cognitive and language skills, which require certain time to be achieved. Time to develop these skills is a matter of reflection because summative assessments used in the school showed that these learners did better when they had the whole term to develop the skills required, while during mid-terms results were not positive because time was not enough to give feedback and make improvements.

Since this is a school policy it would be important to discuss if a formative assessment during mid-term would be more positive in terms of skills development. Otherwise, assessment could become a futile exercise done to obtain a grade. Developing skills instead of memory is one of the challenges in CLIL methodology but evaluations still asked for content, like Ness (2017) has indicated teachers need to cover content because is demanded in the tests. This is the case of the school where *Pruebas Saber* and Cambridge examinations take place, though skills are part of the planning and tests are becoming skill-based they still require content. Therefore, teachers need to master the ability to teach skills through a particular content.

Finally, this research provided a tool of assessment that focuses in the skills and that could be used during the school year to give feedback enriching summative assessments. The rubric developed for this research also provided the teacher with an opportunity to reflect on her teaching practice because language structure is now a task she has to develop in the future. Fortunately, the school realized the importance of these aspects planning training and accompaniment with experts in the methodology and the strategies for language and cognitive skills.

8. Conclusions

This chapter summarizes the findings from the previous analysis. These findings can be classified as it follows: first, results that evidence the positive effects in the reading comprehension competence of sixth graders. Second, conclusions around the importance of language scaffolding. Third, the discussion around the importance of the awareness the teacher developed around the methodology. Finally, the conclusions around the reflections done through this research.

1. The reading strategies applied in this research showed positive effects both in formative and summative assessments. The 6th graders learners are in bridging and fluent stages according to the reading continuum rubric (Adapted from Christopher-Gordon Publishers 2001). They were applying the reading comprehension strategies in tasks during the assessment showing that they recognized some advance in their use with guidance. They still need to develop autonomy in the use of these strategies. Also, they need to improve their reading time increasing their attention span. Quantitatively, learners improved their competence in evaluations from one school year to the next one.

2. However, the learners manifested they had a difficulty reporting comprehension of texts when they have to support facts and use an extensive language. Language structure required to report comprehension, debating and sharing ideas has to be taught more explicitly so they can build language structures to communicate academic information. Language use in CLIL is based in a pragmatic view of language but this research showed that using language structures is not enough to understand how they work.

3. As results of these reflection, the teacher realized that previous research have discovered an unbalanced integration of content and language, particularly because teachers feel more demand from the content than the language (Mariño, 2014; Nikula, 2015). The teacher used language of learning to improve the decoding process because she felt these group of learners required specific content vocabulary. The teacher used language scaffolding as the methodology advised to increase the level of the reading strategies. But the language structures were not taught because the pathway on how to teach grammar structures with CLIL was not clear for her. Also, because as the research has proven content is essential for national and international examinations demanding content teachers to focus in them.

4. The methodology provides elements to develop thinking skills, language skills and even cultural awareness but it is important to help new teachers in this school to comprehend how this tool can improve their lessons. The school has the objective to bring better training programs around the use of strategies to develop skills, language and to assess learners.

5. This research was a learning path for the teacher who reflected on her practice and discovered important tools for formative assessment that could enrich the evolution of learning, which in this school is very attached to academic success through the grades.

9. Recommendations

The challenge of the teacher in her practice is now to share with her team the experience recollected in this research. Now as a Coordinator of the International Program Cambridge Assessments in the school is her duty to train the teachers in the use of strategies, assessment for learning and academic language development, which are the goals of the school for their bilingual program.

Bibliography

- Cohen, L., Manion, L., Morrison, K. (2007). Research Methods in Education. New York, United States. Routledge.

- Christopher-Gordon Publishers (2001). Reading and Writing Continuum.

- Flippo, R. F. (2012). About "The Expert Study" Report and Original Findings. In Flippo, R. F. Reading Researchers in Search of Common Ground: The Expert Study Revisited. (pp 3 – 23). New York: Routledge.

- Khanam, M. S., Zahid, M. H., & Mondol, M. S. (2014). The Role of Schema for Effective EFL Reading Comprehension. ASA University Review, 8(1), 83-93.

- Lasagabaster. D. (2008). Foreign language competence in content and language integrated courses. The Open Applied Linguistics Journal, 1, 31 – 42.

- Mariño, C. M. (2014). Towards implementing CLIL at CBS (Tunja, Colombia). Colombian Applied Linguistics Journal, 16 (2), 151 – 160. DOI: http://dx.doi.org/10.14483/udistrital.jour.calj.2014.2.a2

- Mraz M. and Vacca, R. T. (2012). A Focus on Policy-Drives Literacy Practices, the Media and the Work of Reading Professional. In Reading Researchers in Search of Common Ground: The Expert Study Revisited. Flippo, R. F. (pp 229 – 242). New York: Routledge.

- Nikula, T. (2015). Hand-on tasks in CLIL science classrooms at sites for subject-specific language use and learning. Elsevier, System, 54, 14 - 27. DOI: http://dx.doi.org/10.1016/j.system.2015.04.003

- Perez – Vidal. C. and Roquet. H. (2015). The linguistic impact of a CLIL programme: an analysis measuring relative gains. Elsevier, System, 54, 80 – 90. DOI: http://dx.doi.org/10.1016/j.system.2015.05.004

- Skogen, M. (2013). Reading in CLIL and in regular EFL classes: to what extent do they differ in reading proficiency and strategy use? Reprosentalen, Universitetek I Oslo. (pp 1 – 28). http://urn.nb.no/URN:NBN:no-37884

- Yen-Hui, W. (2016). Reading Strategy Use and Comprehension Performance of More Successful and Less Successful Readers: A Think-aloud Study. Educational Sciences: Theory & Practice, 16(5), 1789-1813. doi:10.12738/estp.2016.5.0116

- University of Cambridge ESOL Examinations (2011). Teaching Science Through English- a CLIL approach. Cambridge. United Kingdom
- University of Cambridge International Examinations (2011). Teacher Guide

Science Cambridge Primary 1 and Secondary. Cambridge. United Kingdom

Webography

- http://www.adlit.org/strategy_library/

- MEN, Ministerio de Educacion Nacional (2012). Plan Nacional de Lectura y Escritura (PNLE). Taken from http://www.mineducacion.gov.co/1759/w3-article-325387.html

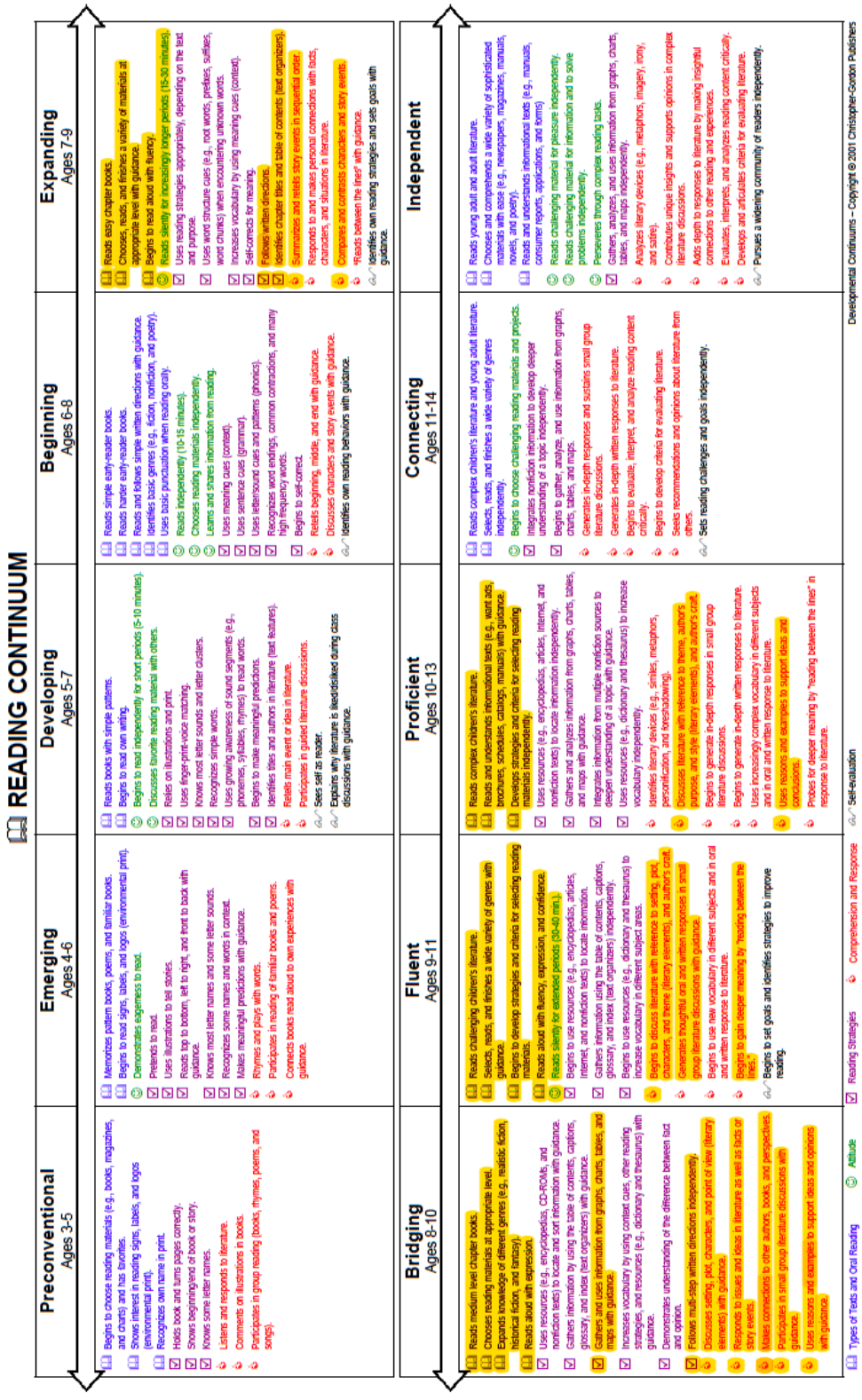
- Mera, A. (Febrero 5 de 2012) Alumnos en Colombia leen pero no entienden. El País. Tomado de http://www.elpais.com.co/elpais/colombia/noticias/alumnos-en-colombia-leen-pero-entienden

- Shopping List CLIL strategies http://icmontaltodicastro.gov.it/files/emanuela/STRATEGIES_FOR_CLIL.pdf

Appendixes

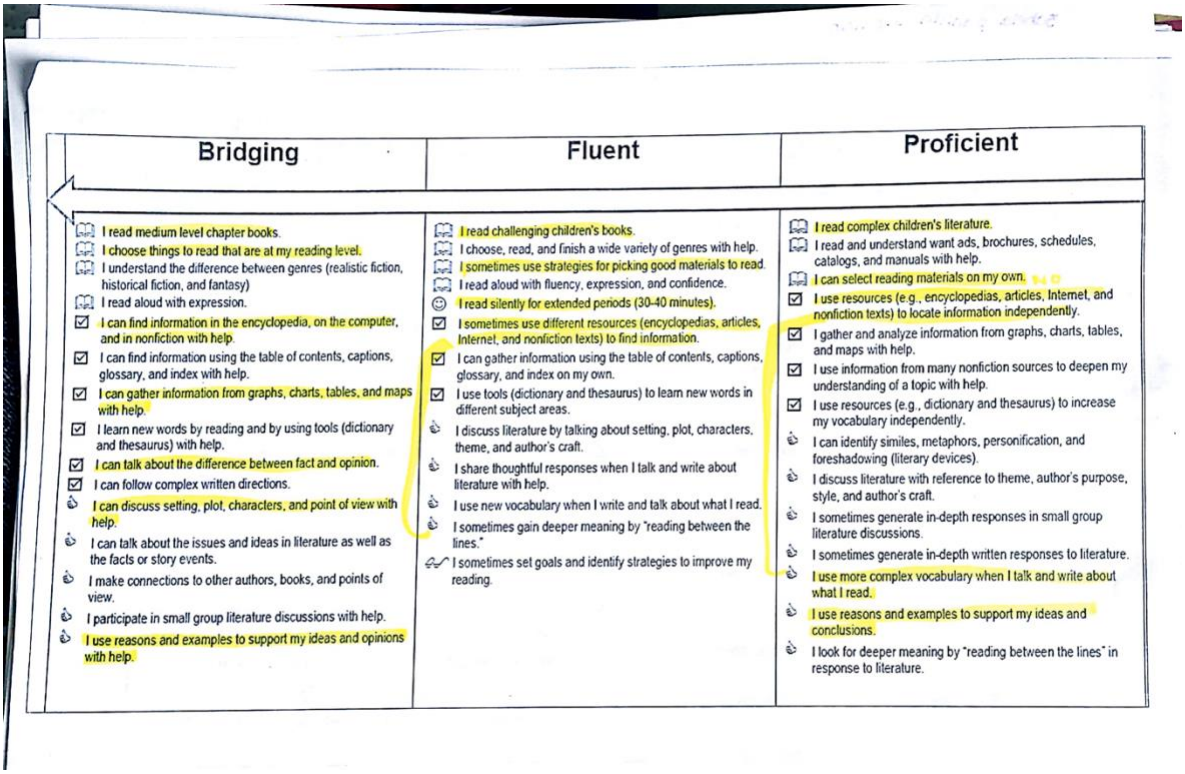
Appendix 1

Reading continuum chart to adapt the rubric. The teacher used it to do a diagnostic of the learners and define the categories of the rubric.

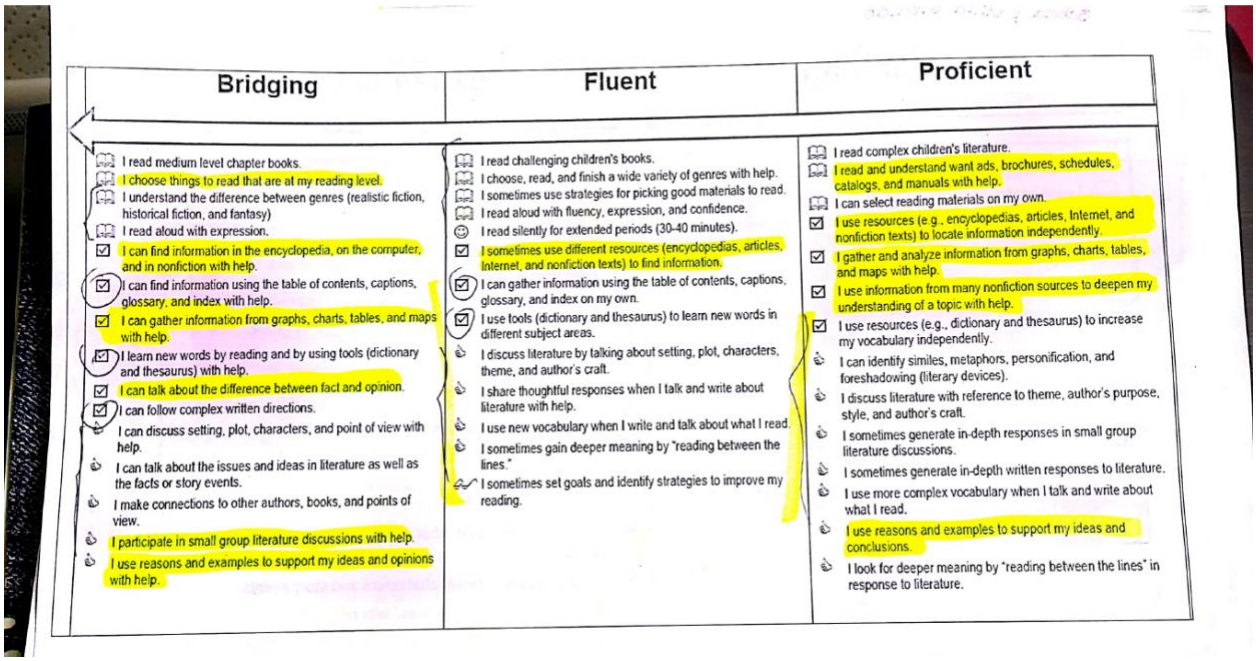


Appendix 2

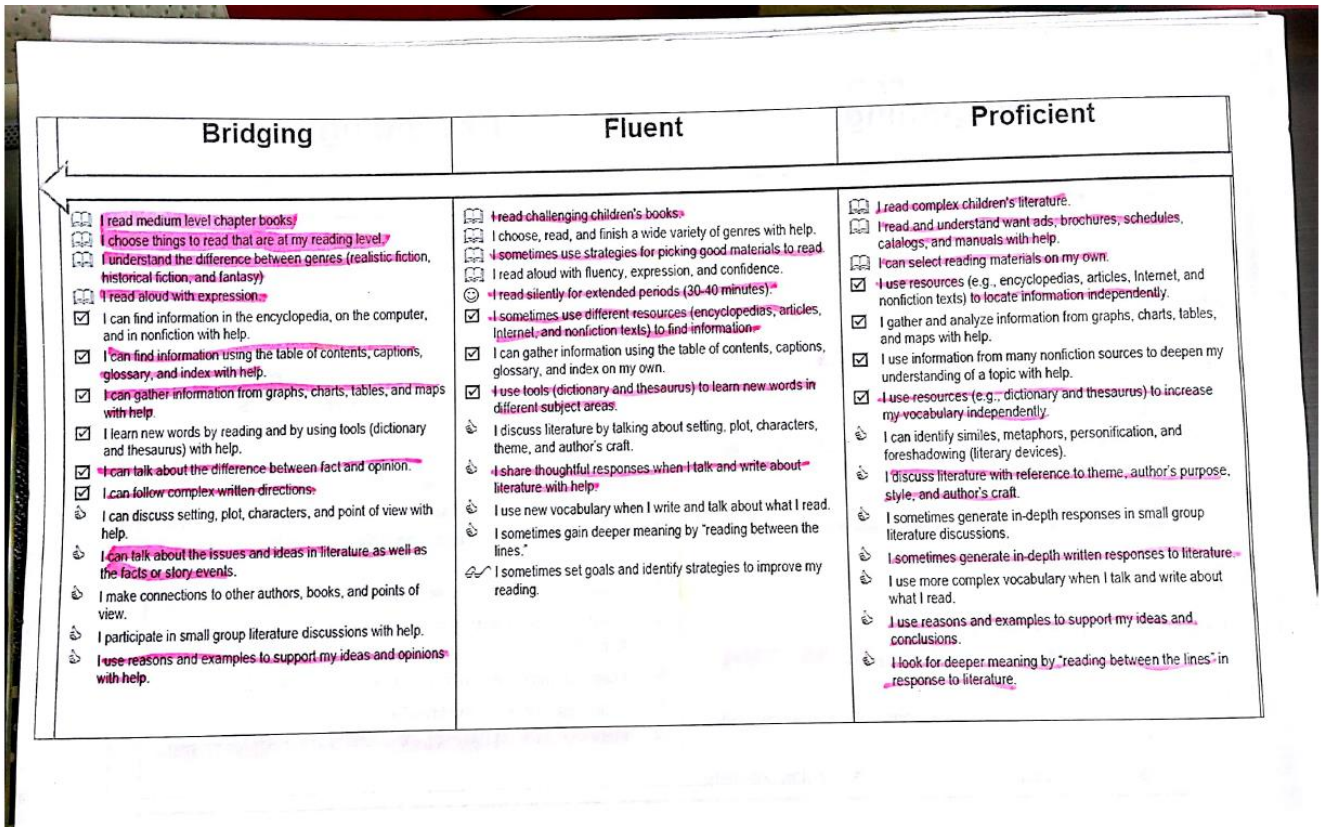
Sample of a reading continuum self-assessment done by learners to determine if the categories chosen for the rubric were coherent with the learners' needs.



Bridging	Fluent	Proficient
I read medium level chapter books. I choose things to read that are at my reading level. I understand the difference between genres (realistic fiction, historical fiction, and fantasy) I read aloud with expression. I can find information in the encyclopedia, on the computer, and in nonfiction with help. I can find information using the table of contents, captions, glossary, and index with help. I can gather information from graphs, charts, tables, and maps with help. I learn new words by reading and by using tools (dictionary and thesaurus) with help. I can talk about the difference between fact and opinion. I can follow complex written directions. I can discuss setting, plot, characters, and point of view with help. I can talk about the issues and ideas in literature as well as the facts or story events. I make connections to other authors, books, and points of view. I participate in small group literature discussions with help. I use reasons and examples to support my ideas and opinions with help.	I read challenging children's books. I choose, read, and finish a wide variety of genres with help. I sometimes use strategies for picking good materials to read. I read aloud with fluency, expression, and confidence. I read silently for extended periods (30-40 minutes). I sometimes use different resources (encyclopedias, articles, Internet, and nonfiction texts) to find information. I can gather information using the table of contents, captions, glossary, and index on my own. I use tools (dictionary and thesaurus) to learn new words in different subject areas. I discuss literature by talking about setting, plot, characters, theme, and author's craft. I share thoughtful responses when I talk and write about literature with help. I use new vocabulary when I write and talk about what I read. I sometimes gain deeper meaning by "reading between the lines." I sometimes set goals and identify strategies to improve my reading.	I read complex children's literature. I read and understand want ads, brochures, schedules, catalogs, and manuals with help. I can select reading materials on my own. I use resources (e.g., encyclopedias, articles, Internet, and nonfiction texts) to locate information independently. I gather and analyze information from graphs, charts, tables, and maps with help. I use information from many nonfiction sources to deepen my understanding of a topic with help. I use resources (e.g., dictionary and thesaurus) to increase my vocabulary independently. I can identify similes, metaphors, personification, and foreshadowing (literary devices). I discuss literature with reference to theme, author's purpose, style, and author's craft. I sometimes generate in-depth responses in small group literature discussions. I sometimes generate in-depth written responses to literature. I use more complex vocabulary when I talk and write about what I read. I use reasons and examples to support my ideas and conclusions. I look for deeper meaning by "reading between the lines" in response to literature.



Bridging	Fluent	Proficient
I read medium level chapter books. I choose things to read that are at my reading level. I understand the difference between genres (realistic fiction, historical fiction, and fantasy) I read aloud with expression. I can find information in the encyclopedia, on the computer, and in nonfiction with help. I can find information using the table of contents, captions, glossary, and index with help. I can gather information from graphs, charts, tables, and maps with help. I learn new words by reading and by using tools (dictionary and thesaurus) with help. I can talk about the difference between fact and opinion. I can follow complex written directions. I can discuss setting, plot, characters, and point of view with help. I can talk about the issues and ideas in literature as well as the facts or story events. I make connections to other authors, books, and points of view. I participate in small group literature discussions with help. I use reasons and examples to support my ideas and opinions with help.	I read challenging children's books. I choose, read, and finish a wide variety of genres with help. I sometimes use strategies for picking good materials to read. I read aloud with fluency, expression, and confidence. I read silently for extended periods (30-40 minutes). I sometimes use different resources (encyclopedias, articles, Internet, and nonfiction texts) to find information. I can gather information using the table of contents, captions, glossary, and index on my own. I use tools (dictionary and thesaurus) to learn new words in different subject areas. I discuss literature by talking about setting, plot, characters, theme, and author's craft. I share thoughtful responses when I talk and write about literature with help. I use new vocabulary when I write and talk about what I read. I sometimes gain deeper meaning by "reading between the lines." I sometimes set goals and identify strategies to improve my reading.	I read complex children's literature. I read and understand want ads, brochures, schedules, catalogs, and manuals with help. I can select reading materials on my own. I use resources (e.g., encyclopedias, articles, Internet, and nonfiction texts) to locate information independently. I gather and analyze information from graphs, charts, tables, and maps with help. I use information from many nonfiction sources to deepen my understanding of a topic with help. I use resources (e.g., dictionary and thesaurus) to increase my vocabulary independently. I can identify similes, metaphors, personification, and foreshadowing (literary devices). I discuss literature with reference to theme, author's purpose, style, and author's craft. I sometimes generate in-depth responses in small group literature discussions. I sometimes generate in-depth written responses to literature. I use more complex vocabulary when I talk and write about what I read. I use reasons and examples to support my ideas and conclusions. I look for deeper meaning by "reading between the lines" in response to literature.



Bridging	Fluent	Proficient
I read medium level chapter books. I choose things to read that are at my reading level. I understand the difference between genres (realistic fiction, historical fiction, and fantasy) I read aloud with expression. I can find information in the encyclopedia, on the computer, and in nonfiction with help. I can find information using the table of contents, captions, glossary, and index with help. I can gather information from graphs, charts, tables, and maps with help. I learn new words by reading and by using tools (dictionary and thesaurus) with help. I can talk about the difference between fact and opinion. I can follow complex written directions. I can discuss setting, plot, characters, and point of view with help. I can talk about the issues and ideas in literature as well as the facts or story events. I make connections to other authors, books, and points of view. I participate in small group literature discussions with help. I use reasons and examples to support my ideas and opinions with help.	I read challenging children's books. I choose, read, and finish a wide variety of genres with help. I sometimes use strategies for picking good materials to read. I read aloud with fluency, expression, and confidence. I read silently for extended periods (30-40 minutes). I sometimes use different resources (encyclopedias, articles, Internet, and nonfiction texts) to find information. I can gather information using the table of contents, captions, glossary, and index on my own. I use tools (dictionary and thesaurus) to learn new words in different subject areas. I discuss literature by talking about setting, plot, characters, theme, and author's craft. I share thoughtful responses when I talk and write about literature with help. I use new vocabulary when I write and talk about what I read. I sometimes gain deeper meaning by "reading between the lines." I sometimes set goals and identify strategies to improve my reading.	I read complex children's literature. I read and understand want ads, brochures, schedules, catalogs, and manuals with help. I can select reading materials on my own. I use resources (e.g., encyclopedias, articles, Internet, and nonfiction texts) to locate information independently. I gather and analyze information from graphs, charts, tables, and maps with help. I use information from many nonfiction sources to deepen my understanding of a topic with help. I use resources (e.g., dictionary and thesaurus) to increase my vocabulary independently. I can identify similes, metaphors, personification, and foreshadowing (literary devices). I discuss literature with reference to theme, author's purpose, style, and author's craft. I sometimes generate in-depth responses in small group literature discussions. I sometimes generate in-depth written responses to literature. I use more complex vocabulary when I talk and write about what I read. I use reasons and examples to support my ideas and conclusions. I look for deeper meaning by "reading between the lines" in response to literature.

Appendix 3

Sample of the reading part of the final exam with the reading task using the strategies. This exam belongs to the third period. The strategy required in the exam was used in class with a different topic. The demand here is to break down the text into parts identifying the importance of each part. Finally, they applied the knowledge collected from the reading to solve a task that matches the achievement of the term: Applying energy uses to environmental issues.

Aspaen Liceo Tacurí

SUBJECT: SCIENCE **GRADE:** 6th **TEACHER:** Angelica M. Yusty

DATE: _____

STUDENT'S NAME: _____

ACTIVITY: FINAL EXAM III

ACHIEVEMENTS: Applying energy uses to environmental issues.

READING (2 Points)

1. Read the information from **energy kid's page.** Scan the text trying to understand in detail every concept and idea.

Adapted from http://cse.ssl.berkeley.edu/energy/Resources/Intro%20to%20Energy%20Reading.pdf

Energy Kid's Page
energy information administration
energy facts fun & games energy history classroom activities

Scientific Forms of Energy

Materials developed by the National Energy Education Development Project (NEED)

What is Energy?
Forms of Energy
Law of Conservation of Energy
Energy Efficiency
Sources of Energy

What is energy?

Energy makes change; it does things for us. It moves cars along the road and boats over the water. It bakes a cake in the oven and keeps ice frozen in the freezer. It plays our favorite songs on the radio and lights our homes. Energy makes our bodies grow and allows our minds to think. Scientists define energy as the ability to do work. People have learned how to change energy from one form to another so that we can do work more easily and live more comfortably.

Forms of Energy

Energy is found in different forms, such as light, heat, sound and motion. There are many forms of energy, but they can all be put into two categories: kinetic and potential.

KINETIC ENERGY	POTENTIAL ENERGY
Kinetic energy is motion––of waves, electrons, atoms, molecules, substances, and objects.	**Potential energy** is stored energy and the energy of position––gravitational energy. There are several forms of potential energy.
Electrical Energy is the movement of electrical charges. Everything is made of tiny particles called atoms. Atoms are made of even smaller particles called electrons, protons, and neutrons. Applying a force can make some of the electrons move. Electrical charges moving through a wire is called electricity. Lightning is another example of electrical	**Chemical Energy** is energy stored in the bonds of atoms and molecules. It is the energy that holds these particles together. Biomass, petroleum, natural gas, and propane are examples of stored chemical energy. **Stored Mechanical Energy** is energy stored in objects by the application of a force. Compressed springs and stretched rubber bands are examples of stored

energy.

Radiant Energy is electromagnetic energy that travels in transverse waves. Radiant energy includes visible light, x-rays, gamma rays and radio waves. Light is one type of radiant energy. Solar energy is an example of radiant energy.

Thermal Energy, or heat, is the internal energy in substances––the vibration and movement of the atoms and molecules within substances. Geothermal energy is an example of thermal energy.

Motion Energy is the movement of objects and substances from one place to another. Objects and substances move when a force is applied according to Newton's Laws of Motion. Wind is an example of motion energy.

Sound is the movement of energy through substances in longitudinal (compression/rarefaction) waves. Sound is produced when a force causes an object or substance to vibrate––the energy is transferred through the substance in a wave.

mechanical energy.

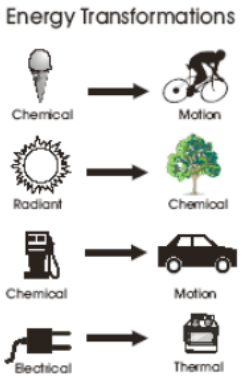
Nuclear Energy is energy stored in the nucleus of an atom––the energy that holds the nucleus together. The energy can be released when the nuclei are combined or split apart. Nuclear power plants split the nuclei of uranium atoms in a process called **fission**. The sun combines the nuclei of hydrogen atoms in a process called **fusion**. Scientists are working on creating fusion energy on earth, so that someday there might be fusion power plants.

Gravitational Energy is the energy of position or place. A rock resting at the top of a hill contains gravitational potential energy. Hydropower, such as water in a reservoir behind a dam, is an example of gravitational potential energy.

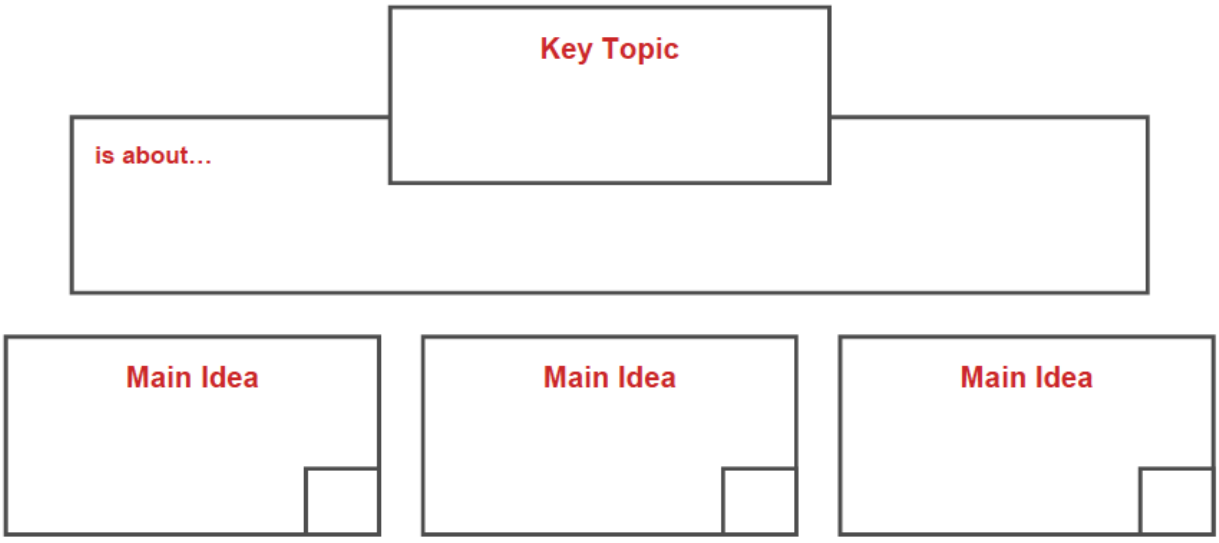
Law of Conservation of Energy

Conservation of energy is not saving energy. The law of conservation of energy says that energy is neither created nor destroyed. When we use energy, it doesn't disappear. We change it from one form of energy into another.

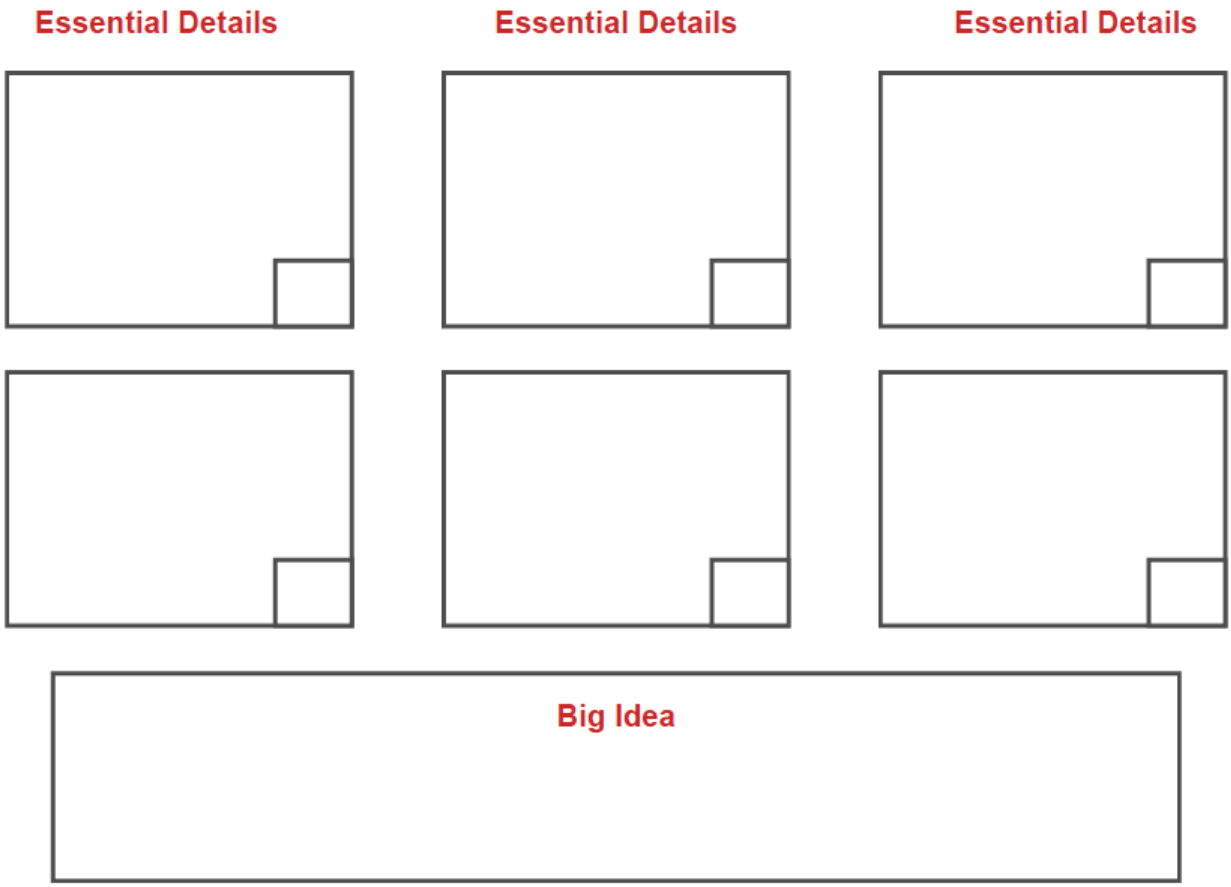
A car engine burns gasoline, converting the chemical energy in gasoline into mechanical energy. Solar cells change radiant energy into electrical energy. Energy changes form, but the total amount of energy in the universe stays the same. Scientists at the Department of Energy think they have discovered a mysterious new form of energy called "dark energy" that is actually causing the universe to grow!



a. After reading complete the following chart. Write the name of the key topic, explain what is about and then give at least 3 main ideas. (0,5)



b. Then complete the information adding 3 essential details that explain or provide argument in favour of the 3 main ideas. At the end write a big idea or conclusion about the key topic.



(0,5)

c. Explain the law of conservation with an example of energy transformation. (0,5)

_____
_____
_____

d. Which type or types of energy can help to solve the following problems. (0,5)

provide energy to an island that does not have electricity power plants.

_____
_____

keep people warm during winter in a city.

_____
_____

cook food on a desert.

_____
_____

water some plants down a hill.

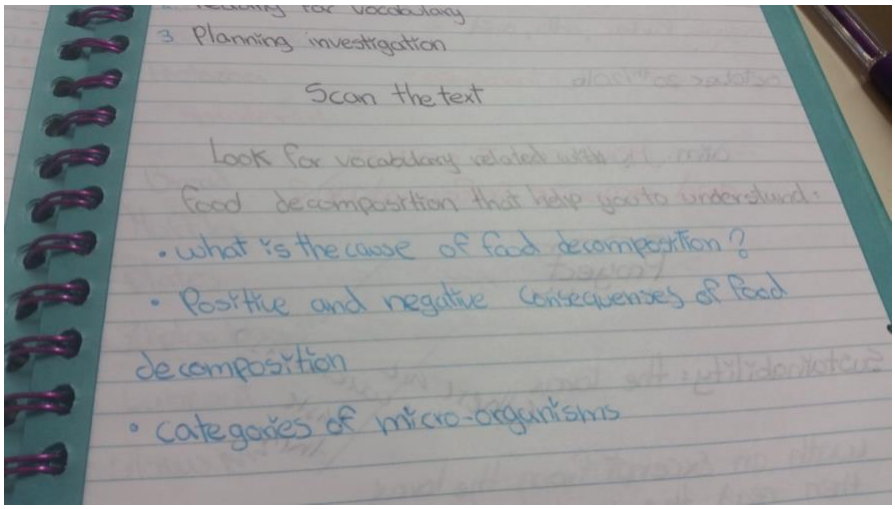
_____
_____

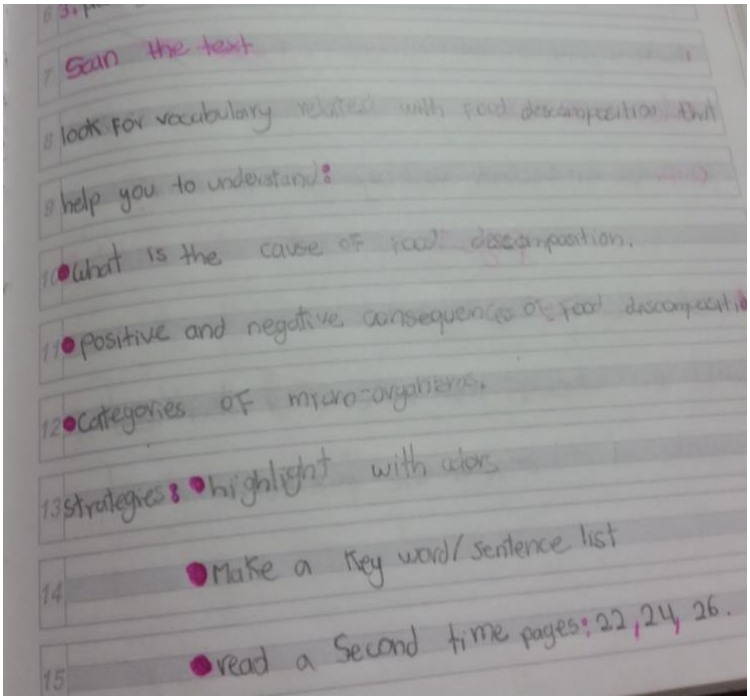
Spelling (0.3) _____ Conjugation and punctuation (0.3) Scientific knowledge (1.4) ____

Appendix 4

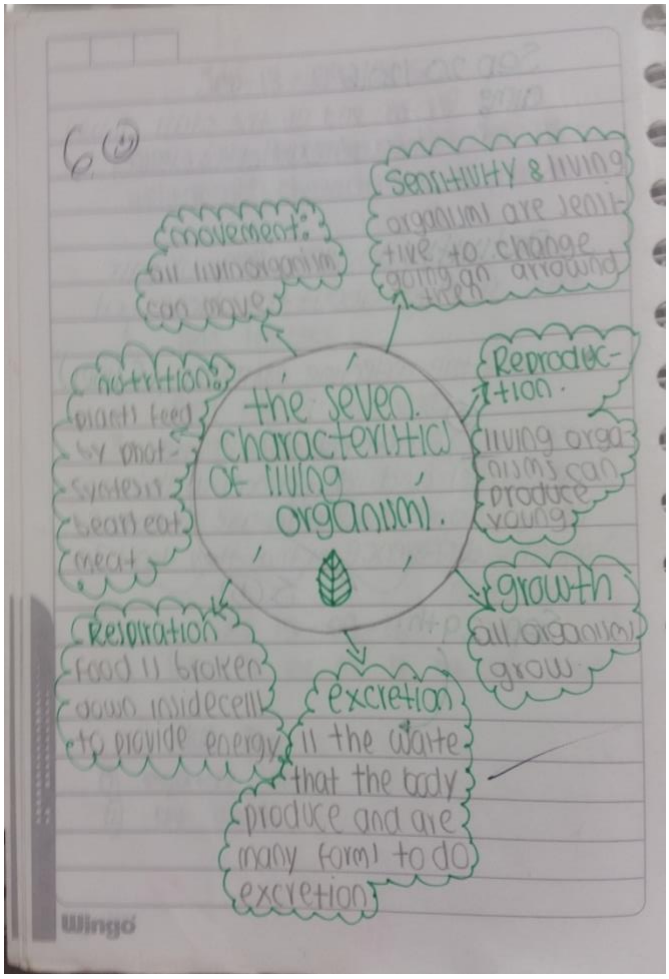
Sample of the activities done in the notebook using skimming, scanning, activating prior-knowledge and map organizers.

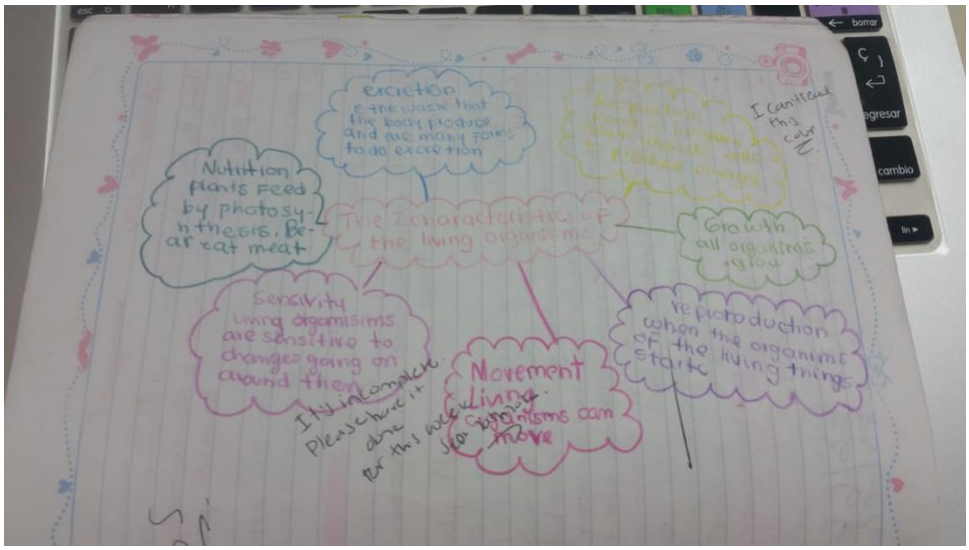
This activity is an example of the first term strategies. Here learners had to scan the text for specific vocabulary related with the topic. Then they would determine what food decomposition was. Then they would think on its consequences. Finally, they would classify microorganisms.



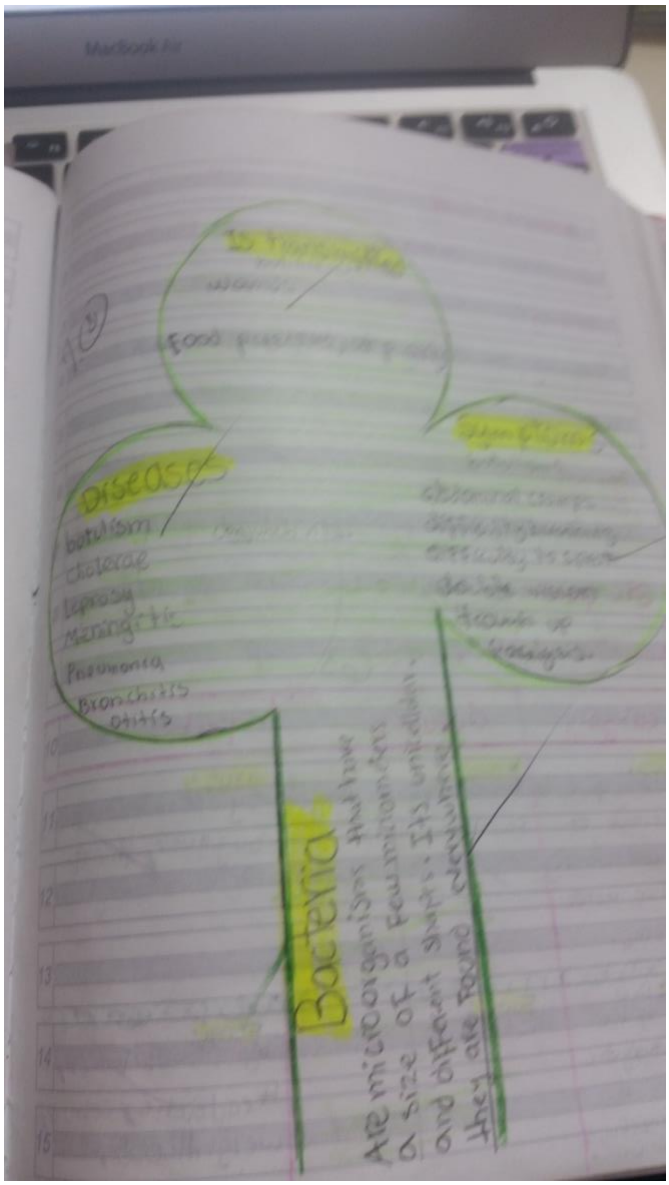


These are example of graphic organizers the learners used to report information from readings. The skimmed texts to comprehend specific points and reported back information.

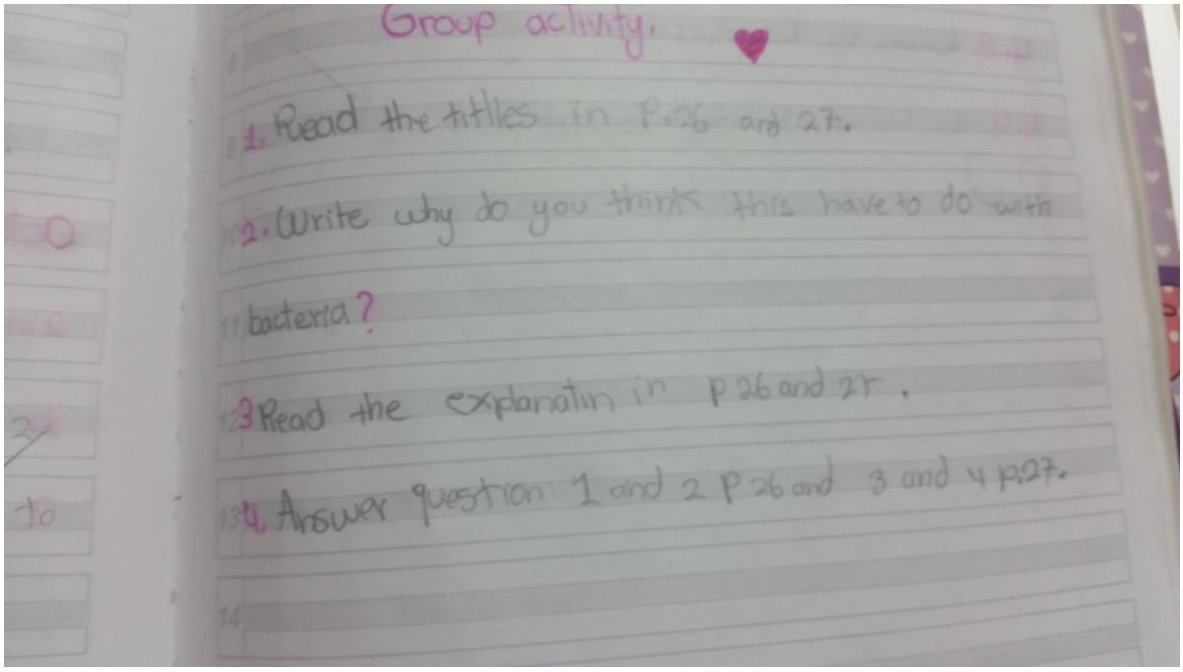




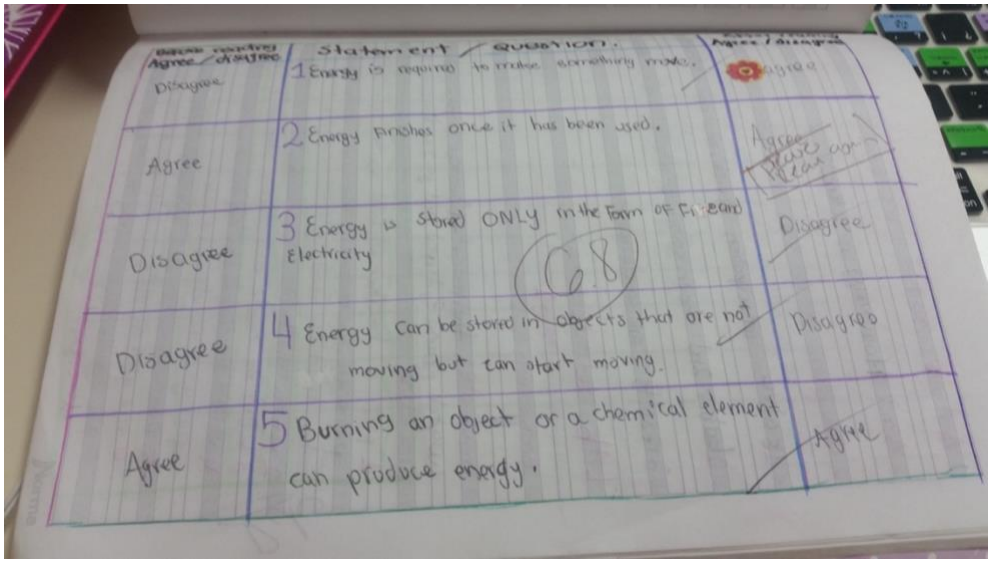
Another example of graphic organizers.

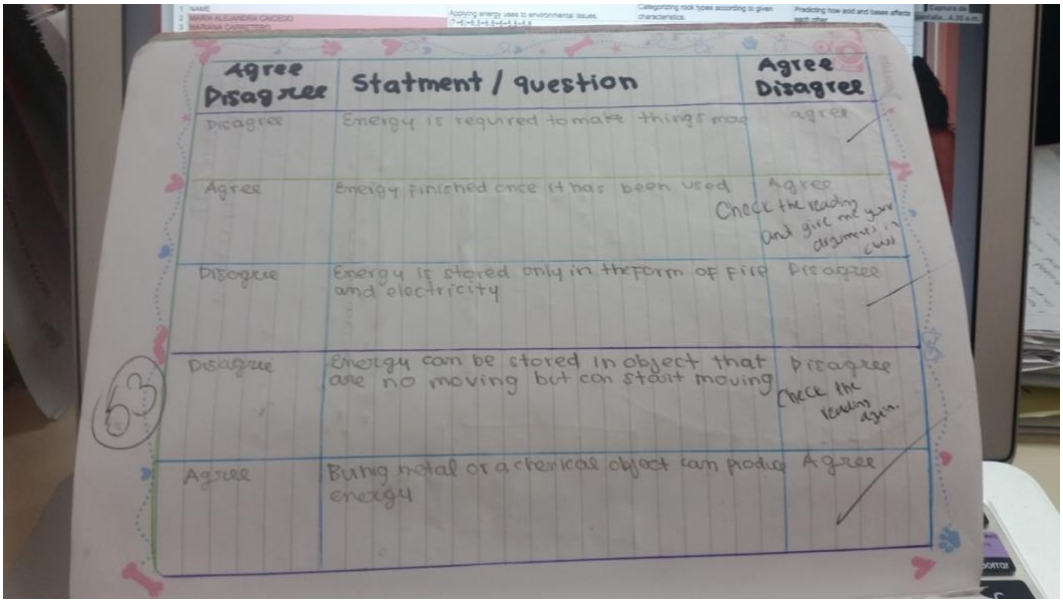


Activating prior-knowledge. Learners started their exercise predicting elements of the text. Then they would read and confirm those predictions to use the information obtained in the contrast to solve specific questions.



This is an example of the strategies where learners started relating with the texts activating their prior-knowledge and inferring elements that would be correct or incorrect in the readings. This was one of the strategies used during second and third term.





Agree Disagree	Statment / question	Agree Disagree
Disagree	Energy is required to make things mov	agree
Agree	Energy finished once it has been used	Agree Check the reading and give me your arguments in class
Disagree	Energy is stored only in the form of Fire and electricity	Disagree
Disagree	Energy can be stored in object that are no moving but can start moving	Disagree Check the reading again.
Agree	Burning metal or a chemical object can produce energy	Agree