GIST EDUCATION AND LEARNING RESEARCH JOURNAL. ISSN 1692-5777.
NO. 6, NOVEMBER 2012. pp. 129-146

Teaching Science in English through Cognitive Strategies[1]

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Abstract

This study shows the impact and results of implementing three cognitive strategies in science teaching in English. The three-month study was carried out with 144 second grade students at a public school of Bogota's Bilingualism program, but only 40 students contributed in the data collection process. Data collected from observations and fieldnotes, surveys, interviews, videotapes, and photographs revealed that the use of the strategies helped children understand not only the content and language, but also the class tasks. Preliminary findings showed that students are the main actors of their learning, and they gain certain autonomy and independence using the cognitive strategies. On the teachers' side, strategies facilitated classroom management and engagement. The author recommends the constant and gradual implementation of learning strategies not only in science classes, but also in the rest of the content classes to integrate language and content easily.

Keywords: cognitive strategies, science teaching, sheltered instruction, students' learning and emotions.

Resumen

El presente artículo muestra el impacto y los resultados de la implementación de tres estrategias cognitivas en la enseñanza de ciencias naturales en inglés. El estudio, que tuvo una duración de tres meses, se llevó a cabo con 144 estudiantes de segundo grado de un colegio público, que hace parte del programa de bilingüismo de Bogotá, pero solo 40 estudiantes contribuyeron en el proceso de recolección de información. Los datos recogidos a partir de observaciones y notas de campo, encuestas, entrevistas, videos y fotografías revelaron que el uso de las estrategias ayudó a los niños a comprender no sólo el contenido y el lenguaje, sino también las actividades de clase. Los resultados preliminares mostraron que los estudiantes son los actores principales de su aprendizaje y adquieren cierta autonomía e independencia utilizando las estrategias cognitivas. Por el lado del docente, las estrategias facilitaron la gestión del

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aula y el compromiso con la misma. El autor recomienda la implementación constante y gradual de las estrategias de aprendizaje no solo en las clases de ciencias naturales, sino también en el resto de las materias de contenido para integrar el lenguaje y el contenido fácilmente.

Palabras claves: estrategias cognitivas, enseñanza de ciencias naturales, instrucción dirigida, aprendizaje y emociones de los estudiantes.

Resumo

O presente artigo mostra o impacto e os resultados da implantação de três estratégias cognitivas no ensino de ciências naturais em inglês. O estudo, que teve uma duração de três meses, foi realizado com 144 estudantes de segunda série de um colégio público, que faz parte do programa de bilinguismo de Bogotá, mas só 40 estudantes contribuíram no processo de recolha de informação. Os dados recolhidos a partir de observações e notas de campo, pesquisas de opiniões, entrevistas, vídeos e fotografias revelaram que o uso das estratégias ajudou as crianças a compreender não só o conteúdo e a linguagem, senão também as atividades de classe. Os resultados preliminares mostraram que os estudantes são os atores principais da sua aprendizagem e adquirem certa autonomia e independência utilizando as estratégias cognitivas. Pelo lado do docente, as estratégias facilitaram a gestão da aula e o compromisso com a mesma. O autor recomenda a implantação constante e gradual das estratégias de aprendizagem não só nas aulas de ciências naturais, senão também no resto das matérias de conteúdo para integrar a linguagem e o conteúdo facilmente.

Palavras chaves: estratégias cognitivas, ensino de ciências naturais, instrução dirigida, aprendizagem e emoções dos estudantes.

Introduction

Based on my experience, I consider that teaching English is not the same as teaching science in English. The difference lies mainly on the fact that content instruction in English implies specific teaching methodologies as well as strategies to help students learn the language while learning the content. If teaching English is by itself a complicated matter, teaching science in English to Spanish speakers is exponentially more challenging.

Language is central to teaching and learning every subject. Teachers use language to help students learn contents, and students use language to explore content and to express what they have learned. So, science students who are simultaneously learning English need to have a good command of the language to master the content. However, when they struggle with the language, they fall behind with the content, too.

Thus, teaching science in English through the use of the Sheltered Instruction principles is necessary to help students learn content concepts and develop their language skills simultaneously. However, this is not enough, which brings into life the use of strategies to make learning meaningful and to achieve the goal of bilingualism. In my experience as a student-teacher in a public school, I taught science to second grade students following not only the curriculum of the school, but also the Sheltered Instruction and cognitive strategies. Therefore, the aim of this study is to describe the effects and implications of using three cognitive strategies (Classify, Acting out, and Imagery) with second-grade students at a public school of Bogota's Bilingualism program, particularly regarding their English and science learning, and emotions.

This action research study took place at a pilot public school of Bogota's bilingualism program from March to May, 2011. It is a coed school, which is starting to implement the National Ministry of Education bilingual project. This project has been advised by the Universidad Nacional through the linguistics department. The target population of the study includes four second grade courses, whose number of students range from 35 to 37. However, not all of them participated in the data collection process; 10 students (5 girls, and 5 boys) were chosen from each course (giving us a total of 40 students) to provide their ideas, experiences, and feelings regarding the class. The students' selection process was at random to avoid bias. The students' ages range from 6 to 8 years old. Data from the study were collected through daily observations and fieldnotes, surveys to the 40 students, interviews with two teachers, weekly videotapes, and photographs.

Theoretical Framework

Integrating language instruction with subject matter instruction is still a challenge for educators, especially if they lack training and knowledge. Content-based instruction has been carried out in many grade levels and educational programs. However, how do we know if the focus of this trend, content in language instruction, is effectively applied or not? Not many primary teachers in Colombia know or use the

Sheltered Instruction approach in content-based instruction, which has been used to help students with a limited English proficiency to learn English through content areas simultaneously. It has been proved in the United States that this instructional approach works and is effective in primary levels, but little research has been done in Colombia in this regard. It is therefore important to find out if this method helps teachers develop optimal ways to present content and at the same time keep it understandable to second-grade students, who are beginning to learn the language of instruction (English) and the content (Science). For this reason, this study attempts to point out how the implementation of the Sheltered Instruction approach along with the use of strategies of the cognitive level in science classes makes learning and teaching different. To have a deeper understanding of this study, a short explanation of what Sheltered Instruction and learning strategies are will be given.

Sheltered Instruction

It is defined as "an approach for teaching content to English learners (ELs) in strategic ways that make the subject matter concepts comprehensible while promoting the student's English language development" (Echevarria, et al 2004, p. 2). Such instruction came out as the result of developing strategies to foster second language development and academic learning through the use of the second language (Peregoy & Boyle, 2003, p. 78). Sheltered instruction or SDAIE (Specially Designed Academic Instruction in English) provides access to the core curriculum, English language development, and opportunities for social interaction. Basically, this model is a resource teachers can count on to improve their teaching and help learners to grasp content and language simultaneously. Its primary goal is to show teachers the way to teach content effectively to English learners while developing their language proficiency.

Learning Strategies

This refers to the mental processes that enhance comprehension, learning, and retention of information (Echevarria, et al 2004, p. 81), which in other words are the special thoughts or behaviors that exhibit these outputs (O'Malley & Chamot, 1990, p. 1). Furthermore, "Researchers have learned that information is retained and connected in the brain through mental pathways that are linked to an individual's existing schema" (Echevarria, et al 2004, p. 81). This suggests that the initiation and use of learning strategies activates mental processes

through the associations between new and old learning. In the same way, the explicit teaching of learning strategies that facilitate the learning process involves teaching students to access information in memory, helping students make connections between what they know and what they are learning, assisting students in problem solving, and promoting retention of newly learned information.

Three types of learning strategies have been identified (O'Malley & Chamot, 1990). They are: metacognitive strategies, cognitive strategies and social/affective strategies. For this study, only the cognitive strategies will be considered, which according to Echevarria "help students organize the information they are expected to learn through the process of self-regulated learning" (as cited in Paris, 2001). Besides this, the ultimate goal of using these strategies is to foster independence in students and have student-centered classes for teachers. As it is very difficult for beginner students to initiate an active role in the use of the strategies, Sheltered Instruction teachers should scaffold their use and should help learners to focus their mental energy on their thinking development skills.

From the cognitive level strategies, only three strategies are the target of the study: classifying or grouping, imagery and acting out. The first strategy, classifying or grouping, is focused on relating or putting words within categories according to their attributes, and the mental process that is expected from students is to remember information. The second strategy, imagery, is related to the creation of images to represent information, and it requires that students visualize knowledge, create a mental picture and draw it. It is also called imaging and it encourages students to create an image in their minds to support the understanding of concepts or problems to be solved (O'Malley & Chamot, 1990). Finally, the last strategy, acting out, is about creating different gestures and movements with the body to visually represent ideas, concepts, and vocabulary. It involves creativity and the ability to remember and connect information. The good point of this strategy is precisely the opportunity that students have to create experiences with which to link the new vocabulary.

Review of Related Literature

Teaching content in English is by far more demanding than teaching English only. "Teachers of English language learners (ELLs) face several challenges, not the least of which is facilitating students' simultaneous acquisition of academic content and English language and literacy" (Hart, & Lee, 2003, p. 476). Thanks to the Sheltered Instruction

approach not only can teachers face this challenge in strategic ways, but also students get better preparation in terms of language and content (Diaz, 2010). However, there is little evidence of this in Colombia, except for the research studies pioneered by UNICA University, which is one of the reasons why this study is going to be carried out. The main issue with content-based instruction is that ELL students do not have enough support from the teacher to handle content concepts in a yet-unmastered language (Lee, 2005). Furthermore, in some cases, teachers lack preparation on how to provide linguistic and content support to students so that they can learn both things simultaneously and develop skills. Science is one of those subjects that students learn through rote learning because they do not find sense in what they are learning, and they just need to pass a test. Thus, incorporating cognitive strategies to teach content-based instruction may facilitate students' learning and change the traditional way science has been taught.

Motivation

When teaching science or any other subject in a foreign language, in this case English, with the use of strategies, it is not only important to consider that students will have to deal with language, content and strategies, but teachers should think of how to integrate those components and foster motivation. This aspect affects how hard students are willing to work on a task, how much they will persevere when they are challenged, and how much satisfaction they feel when they accomplish a learning task (Chamot, et al, 1999). Several studies have found connections between motivation for language learning and strategy use. In a large-scale study of US college students, Oxford and Nyikos (1989) found that more motivated learners used four out of five categories of strategies more frequently than did less motivated students. Also, Okada, Oxford, and Abo (1996) conducted a study with 36 learners of Japanese and 36 learners of Spanish and they found that there was a very strong relationship between the use of metacognitive, cognitive and social strategies and several motivational aspects in both language groups. Students tended to be more engaged in their classes, they participated more and they felt eager to continue learning. However, all these studies converge in the same concern, causality: whether motivation fosters strategy use or, conversely, strategy use leads to better language performance, which in turn increases motivation and thus leads to increased strategy use (Okada et al. 1996).

Proficiency and Achievement

Each time a teacher implements something new in his or her class, the ultimate goal is always to achieve a positive change in learning, teaching and even in students' performance. This is one of the major reasons to research strategy use in language learning: to determine the relationship between strategies and proficiency. In a study carried out with 78 Japanese college English majors, Takeuchi (1993) reported that some 60 per cent of the variance in the Comprehensive English Language Test (CELT) scores was associated with strategy use on the SILL. In the same way, a study by Park (1997) conducted with 332 Korean University Students found a close linear relationship between SILL strategies and English proficiency measured by a practice version of the Test of English as a Foreign Language (TOEFL). These studies suggest that there is a direct relation between strategy use and the achievement and improvement in second language proficiency.

Content-based Learning Strategies Instruction

A number of studies on the Cognitive Academic Language Learning Approach (CALLA) related to learning strategies instruction in content-based ESL have been investigated, and they reported successful use of strategies by students. One example of this is the study carried out by Chamot, Dale, O'Malley, & Spanos (1993) where teachers in ESL-mathematics classrooms implemented learning strategies instructions to assist students in solving word problems. Mainly, the study consisted of teaching students how to use the following strategies: planning, monitoring, problem-solving, and evaluating in a sequential order to solve word problems. It was found that students who had been provided with explicit and frequent strategies instruction (high-implementation) performed better on a word problem think-aloud interview than students in low-implementation classrooms. In the same way, another study in the science area carried out by Varela (1997) shows the effects of CALLA learning strategies instruction in a middle-school ESL-science classroom compared with a similar classroom that received equivalent instruction without the learning strategies. Students in the intervention classroom were taught how to use strategies in their oral report on the science fair projects. It was found that students in the strategies group reported using significantly more strategies than the control group students did. Also, their performances showed considerable improvement over the performances prior to the strategies instruction.

Research Design

Context

This action research study was carried out in a pilot public school of Bogota's bilingualism program from March to May, 2011. It is a coed school, which is starting to implement the National Ministry of Education bilingual project and this project has been advised by the Universidad Nacional through the linguistics department. The aim of the project is to get students acquainted with science concepts in English and the dynamics of learning a subject matter in a foreign language. However, not all the school teachers are trained in both aspects, language and content, but they are getting prepared. So, this gave way to my intervention as science teacher in the school. Regarding the time intensity, students take 4 hours of science class in English and 5 hours of English class a week. This time is not only devoted to learning the language and the subject content matter concepts, but also to train students on basic commands and expressions to communicate in English.

Participants

The participants in this study were students and teachers of second grade at a public school in Bogota. The total of students who participated in the study was 114, but only 10 students (5 girls, and 5 boys) from four second grade courses, whose number of students range from 35 to 37, participated in the surveys. These 40 students' selection process was at random to avoid bias. They provided their ideas, experiences, and feelings regarding the class. The students were little children, whose ages range from 6 to 8 years old, of a low to middle-low economic status, and their native language is Spanish. Regarding teachers, an adult science teacher and a pedagogical assistant from Universidad Nacional contributed in the interviews. They were sometimes passive observers in the science classes.

Data Collection Instruments

In this study, qualitative data collection techniques were used as the primary research method.

Direct Active Participant Observations. This technique was useful to observe the outcomes of using cognitive strategies in terms of learning and emotions. Also, this allowed me to monitor the effects of my teaching and adjust instruction accordingly.

Fieldnotes. Daily notes from the observations were taken. They were divided in two parts: one-month field notes, and two-month field notes. In the one-month field notes, I focused my attention on the problem and class structure without the use of the strategies as well as my implicit implementation of the three cognitive strategies. In the two-month field notes, the target was to capture the effects of using cognitive strategies and the impact of their explicit teaching.

Surveys. One survey was applied to 40 second grade students (20 girls and 20 boys) to gather information about their feelings, experiences, and thoughts in regards to the use of the three cognitive strategies (Classifying, Acting out, and Imagery) in the science class. These surveys were applied by the end of May after students were familiarized with the use of strategies and had received explicit instruction about their use. The questions had options to facilitate the analysis.

Semi-structured interviews. After a three-month intervention in science class as observers, two teachers were interviewed to know their opinions about the impact of using the three cognitive strategies. The homeroom teacher that was interviewed accompanied me every class during the last two months and the other teacher was the pedagogical assistant of the Universidad Nacional.

Videotapes. One class a week was videorecorded during two months. The focus was the use of the three strategies, the instruction of tasks, their accomplishment, the students' intervention in the class, and the outcome and input of the strategies.

Photographs. This tool was useful to capture the work done by children after using a strategy. It evidences their learning and it is a physical way to demonstrate the mental processes expected when using strategies.

Data Analysis and Interpretation

After analyzing the data collected from the different sources, the following themes came up. It is important to mention that the following data results are not only due to the implementation of the strategies, but also the use of some Sheltered Instruction principles.

Simultaneous English and Science Learning

According to the results from the surveys, all the population surveyed agreed on having learned science and English simultaneously during my intervention as science teacher. However, their reasons varied as shown in Figure 1. It is shown that only 10.2% of

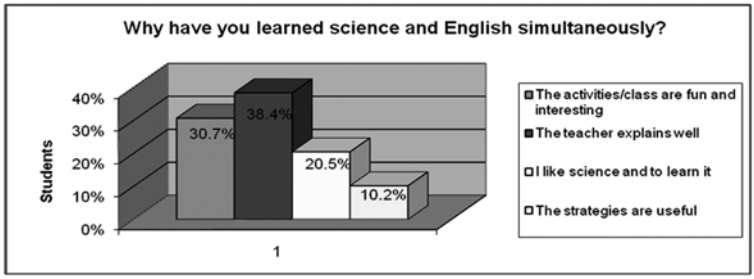

Figure 1. Why have you learned science and English simultaneosly?

the students think that their science and English learning is due to the use of the three cognitive strategies and their usefulness. The rest of the students share the opinion that the activities, the teacher instruction, and their own interest are what have determined their dual learning. However, my intervention as a teacher and the activities developed in class were focused merely on the strategies and the principles of Sheltered Instruction, which reveals that these students indirectly are recognizing their learning thanks to the strategies. One reason for not mentioning the strategies in their answers may be that as students are second graders, they are not conscious of their learning process and they cannot reflect upon it yet, even though the strategies were made explicit during the classes. Children perceived the strategies as a tool, but not as the cause of their learning due to their lack of awareness. In this regard, in the interviews teachers revealed that indeed students are learning both things (language and content) simultaneously due to the use of strategies and the process the teacher has had with them. However, they also consider that their English learning at this level is focused on vocabulary, the pronunciation of key science concepts, some simple grammatical structures, and basic English commands. They made emphasis on the fact that learning English and science simultaneously is a process, which takes time and needs to be constant to achieve results in the future.

In addition, the surveys showed that 89% of the representative population of second grade considers that they feel happy learning

science and English simultaneously; none of the students expressed that they felt bored or sad. In the same way, in the interviews teachers confirmed this information by saying that children felt fine, relaxed, and happy to learn; they considered learning to be a game and they liked to learn.

Based on my fieldnotes, at the beginning, I perceived that English in the science class was considered to be a barrier for children to learn because they demonstrated that they had learned the content, but they were not able to express things because of the language. Then, I realized that they were lacking training and familiarity with the language, not to say that they are in a silent period. In the first classes during the first month of observation, I talked in English 100% of the class, and children were unresponsive, but attentive. It was probably the first time somebody gave them a class in English. They all looked at me with a lost gesture on their faces, but the body movements and the drawings helped them to create an idea of what I was saying, which was not always the right one. The homeroom teacher told me to speak in Spanish and to use English merely for the key science words, but that translating them would be a lot easier for children. Thus, I realized that their "dual" learning was aimed at learning a list of isolated English vocabulary.

During the next two-month observation period, when I started to implement some Sheltered Instruction ideas (lesson-planning, scaffolding processes, clear instruction, adaptation of content, setting objectives, using visual aids) along with the three cognitive strategies (classifying, imagery, and acting out), changes in their dual learning (content and language) were noticed. Children started to associate and retain English words in context; they knew what they meant without having to translate them, they learned their pronunciation through games and songs, and they were able to complete simple written prompts related to the vocabulary studied. In the same way, vocabulary was recycled in each lesson, and students got used to listening to me in English. They were able to understand when I spoke in English, although I obviously had to change the speed of the speech. I used English 90% of the class, and the remaining 10% was in Spanish to give instructions, clarify information related to content, or get students' attention.

Students' Learning Process

100% of the students agreed on saying that the use of the strategies has helped them learn, but their reasons differed a bit. 15 out of 40 students, which correspond to 37.5 % of the students, think that the

strategies have helped them learn because they are interesting and easy to apply, while 17.5% attribute this to the fact that the strategies have helped them either retain information easily or do things they like, such as drawing or acting. This suggests that disregarding the reason they attribute to their learning, students recognized the strategies as a factor for their learning (when formally asked) although they are not totally aware of them, which does not mean that they do not know how to use the strategies. In this aspect, teachers manifested that even though 36 or 37 students are not easy to manage, they agreed on the fact that about 75% or 80% of the students are learning, and they demonstrated this through the way they use vocabulary, structures and content within the classroom when developing their tasks.

Students were asked about the changes they perceived with the strategies and the results show that the answers are homogenous in the four courses and that 47% of the students consider the "better grades" factor as the main way in which the strategies benefited them. It is just 25% of the students who think that enjoyment in class, better understanding, and better grades altogether are the changes they have undergone with the use of the strategies. This information is confirmed in the interviews, where teachers expressed that the impact the strategies have had on the students' learning process is positive and meaningful since they are doing things (drawing, acting out, and classifying) that they like and enjoy and which creates stronger connections in their minds. The pedagogical assistant of Universidad Nacional stated that "the impact of those strategies on the children is basically lifetime learning." Thus, they suggested that those cognitive strategies not only were useful for learning during that period, but they will facilitate their future learning if the strategies are used.

Similarly, the information gathered from the videotapes and fieldnotes is evidence of the fact that children learned thanks to the strategies, and also they showed the impact the strategies had on students' learning in terms of autonomy, creativity, understanding, and involvement. During the first-month observation period, it was observed that students were not thinking, they were filled out with nonsensical information; their role was limited to copying information from the board, but little attention was paid to their thinking processes. Children were not able to associate information, apply knowledge, and not even transfer ideas to other contexts. With the use of the strategies, children started to wake up their minds; their learning process was strengthened by providing them with the tools and not the products.

Another benefit and change of implementing those cognitive strategies in terms of the students' learning process is that they understood concepts easily because definitions at this age do not say much to children, but doing something tangible and real allowed them to grasp concepts and to retain them for a longer time period. The strategies facilitated the students' understanding and they helped children clarify ideas. Also, when using the strategies children tended to be more focused on their task, and their levels of concentration increased. As the activities required students to do something and sometimes to interact, children had to strain their minds to think and connect ideas, which guarantees learning for life and not merely for a class.

Furthermore, these cognitive strategies were also useful to recall information (concepts and vocabulary) and to have students respond for their own learning; they gained certain autonomy and independence in their work. In fact, when applying the strategies, children had to remember the main aspects of the input, and they had to associate that information with their previous knowledge in order to be able to do their task using the strategy. However, when children had not understood the concepts, they happened to understand them through the use of the strategies. Also, in the photographs, the students' efficient use of the strategies shows progress through the science tasks' accomplishment and the quality of the students' work as the time goes by.

Motivation and Students' Emotions

Based on the analysis from the survey results, it was found that 87% of the second grade students felt happy using the cognitive strategies (acting out, classifying, and imagery), and none expressed feeling bored or sad using them. Similar results were revealed by the teachers in the interviews, where they affirmed that children felt different in the science class since the strategies resulted in something innovative for children. They are separated from paper-pencil activities, and different things were combined (drawing, acting, classifying, matching, giving names to categories, etc) which made them feel comfortable and relaxed enough to learn in the class. Also, the teachers agreed on saying that children felt more motivated and happy in the science class compared to the rest of the classes, in which they merely wrote. This shows that the use of these cognitive strategies (classifying, acting out, and imagery) created the desire to learn in the science class.

Besides this, when students were asked in the survey whether or not they liked the science class, 100% of them said that they did like

the class. Then, they were asked for their reasons and 19 out of 40 students which correspond to the majority reported that they liked the science class because both the topics and the class were fun. 17 out of 40 students said that they liked the class because they learned a lot, so once again they were not explicitly acknowledging that the strategies were the cause of their like for the class, but indirectly they agreed on this because if they learned a lot and the class was fun, it was due to the implementation of the strategies and the teacher intervention.

In the fieldnotes, I also noticed that children enjoyed using the strategies and different from having to write merely, they kept their minds busy with something that required them to think, which encouraged them to work and learn. It can be said that when children used the strategies in the science class, their level of motivation increased and it was demonstrated through the children's enthusiasm to participate and work in class.

Class Dynamics Changes

According to the fieldnotes and videotapes of the first-month period, it can be said that the class was a bit harder to manage and instruction was the focus. Science classes were teacher-centered and there was some, if only a little, student involvement. As the groups were difficult to manage in terms of discipline, teachers assigned worksheets where children had to color and paste, but content and language were left aside. The classes tended to be very disorganized and noisy, and children got distracted because they did not know what they had to do. Afterwards, when the strategies started to be implemented and children started to be trained in their use, children were a bit more attentive to the input, but anyway they tended to get distracted because they did not understand instructions and as it was the first time they had to do something different from writing, they felt insecure. Fortunately, with time, students got adapted to the use of the three cognitive strategies (acting out, classifying, and imagery) and the results were dramatic not only in terms of learning, but also in the class structure and in the teacher's role.

There was a noticeable change in classroom management with the strategies; when using the strategies, children were so concentrated and focused that they did not disturb each other and the times they stood up and walked around the room decreased. There was little noise in the room and I could speak without having to scream. When using the acting out strategy, children tended to get so excited that they shouted and it was difficult for me to control them, but as they wanted

to continue using the strategy, I could control them with it. Children were more concentrated when using the strategies and even though they interacted more with each other, they did not get disorganized, and their behavior changed for the better. In the same way, I could perceive that the classroom climate changed with the implementation of strategies because the class could be delivered, students respected each other, and they were not nervous about making mistakes.

In addition, the strategies benefitted my instruction as a teacher in the sense that with the use of the strategies I could create more dynamic and challenging activities, where children had to think and do mental processes necessary to accomplish tasks. The strategies were useful to avoid lectures as one interviewed teacher said, and also they allowed me to create tasks from which children could benefit in terms of learning and enjoyment. Also, with the strategies, students knew what to expect from the class, and they knew what they had to do.

In the same way, the strategies facilitated the teacher role since students already knew how to apply the strategies to the different topics and activities. "Students got used to the application of strategies and they were already familiar with them, so that the teacher did not even have to explain what they had to do" (Extracted from fieldnotes April 25th, 2011). Thus, the strategies allowed the teacher to separate from formal instruction, give the opportunity to children to develop thinking skills, and have a focused-output class.

Besides this, strategies were reported to be useful for both teachers-students' assessment and self-assessment. When students used the strategies effectively, that is to say with the set purpose and to accomplish the assigned activity, the teacher could notice if students understood the topic and if further practice or teacher instruction was necessary. The strategies allowed the teacher to perceive the learning process of students, if they were learning or if they were merely doing a task. As in all classes the topic of the last class was reviewed and articulated with the new topic, and it was noticed if children made connections with past learning and new knowledge using the strategies. In the same way, through the use of strategies, children could, to a certain degree, monitor their learning in the sense that they were aware of their mistakes and they could check their understanding of the topic. However, as they are children and they are just starting their learning process, they noticed their mistakes with the teacher's assistance, and not by themselves.

Findings

This study revealed that the use of the three cognitive strategies (classifying, imagery, and acting out) integrates the students' dual learning (science and English) and makes the language and content concepts easier to grasp for students and to teach for teachers. In the same way, some of the benefits found with the use of the strategies were: they allowed children to build vocabulary, support their understanding, organize information mentally, and provide language support. Not only did the strategies have an impact in students' learning process, but also in their learning skills. Besides this, the efficient use of the strategies facilitated the task accomplishment and they guarantee learning through thinking; students had better mental processes.

Even though second graders are starting to get acquainted with simultaneous English and science learning, they were able to associate information, apply knowledge, recall ideas, and sometimes transfer ideas to other contexts thanks to the use of the strategies. Also, the students' level of understanding, engagement, autonomy, creativity and concentration increased when using the three cognitive strategies (classifying, imagery, and acting out). By teaching children how to use the cognitive strategies, they got more efficient in task accomplishment and they were independent users of the strategies.

Another important finding was that the use of the strategies in the science class created the desire to learn in students, they were more motivated and enthusiastic to work, and they, in turn, became more active learners. However, the strategies had a strong impact not only in students, but also in the classroom dynamics. The effective use of cognitive strategies in large-size groups worked as a classroom management technique and changed students' behavior for good, but teachers should not expect to achieve a quiet environment, but a place where students interact and the level of discipline problems decreases.

To use strategies as part of the teaching methodology is useful to avoid lectures, and have a more student-centered class, where different types of activities can be created. So, the strategies implementation keeps students focused on their task and they give way to well-structured focused-output classes with clear expectations for both students and teachers.

Conclusion

This study showed that thanks to the explicit training on the use of the cognitive strategies along with the implementation of the

Sheltered Instruction principles, the role of the teacher and the students was turned 180 degrees; the teacher could separate from lectures and create more dynamic activities, and the students were the owners of their learning. The class was more motivating and students developed a love for learning when the strategies encouraged them. Thus, the use of strategies became a factor for motivation and students' motivation fostered the use of strategies; this was a cycle. However, it is important to know how to apply the strategies, especially carrying out a scaffolding process to ensure good results. The cognitive strategies use generated a better class structure and increased students' level of understanding and enjoyment. Finally, it can be said that implementing learning strategies in any class is a great way of complementing instruction and making learning easier and delightful for students.

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