How Can the Formulation of Seventh Graders' Own Word Problems in a CBI Mathematics Class Improve Their Syntactic Linguistic Competence in a Private EFL Context?

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Abstract

This action research was aimed at improving seventh graders' syntactic competence in a Content Based Instruction mathematics class through the formulation of word problems at a private institution in Medellin, Colombia. Data were collected through a journal, some students' papers, a questionnaire to students, and three peer teacher observations. Data analysis showed some improvement at a syntactic and grammatical level; surprisingly, the most significant improvement was in the lexical and semantic components. Moreover, the students' comprehension for problem solving as well as the application of several strategies for formulating and solving problems improved. Additionally, their confidence to approach mathematics as a field increased. The application of this strategy would be interesting and useful with elementary school children at long term.

***Key words**:* Content Based Instruction Mathematics, linguistic competences, word problems, formulating and solving word problems.

Degree Requirement

This action research project is submitted as a requirement of the Bachelor of Education in Teaching Foreign Languages (English-French) at the Escuela de Idiomas, Universidad de Antioquia, in Medellín, Colombia.

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I also thank the private institution, Colegio Campestre La Colina for supporting me and giving me possibility of doing this action research while I was working there, teaching Content Based Area Mathematics.

Finally, I thank my family for helping me during this long and difficult process in which all of us have changed a lot; but above all, I thank my father, Agustin Elejalde, a wonderful teacher who encouraged me to love not only mathematics but also, teaching. He died when I was just starting this program but he always supported me and enlightened me from his memory. Today I know that, wherever he is, he is the proudest human of me for having achieved this objective of becoming a graduated teacher. I love you wherever you are.

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Preface

Studying foreign language teaching is my passion; however, it is not the first major I studied. Engineering is my other degree and I love the mathematics I learnt from it. Actually, I have been teaching mathematics for more than 5 years and the possibility to mix English and mathematics teaching was always interesting for me. When I was in the middle of this program, I started to get interested in Content Based Instruction, especially in mathematics. In this paper, you will find an action research about how linguistic competences can be improved through a Content Based Mathematics class. Specifically, you will find how seventh graders in a private school could learn some strategies for improving linguistic components from the formulation of their own word problems; a strategy that was useful not only for them to improve their linguistic competences, but also to increase their confidence to solve other word problems. Finally, it is pertinent to mention that the purpose of this action research was to allow the reader to find some information that is not very common in Colombia, specifically, in this foreign language context. I would also like to inspire others to research about other implementations in Content Based Instruction.

Description of the Context

Colegio Campestre La Colina is a private, mixed, single day, and calendar A educational institution, authorized to provide formal education at the levels of preschool, primary cycle, and secondary cycle. It is located in the municipality of Medellin, in Loma de los Balsos, in El Poblado neighborhood, and placed in a big land with many green zones, detached buildings, a soccer field, a court, a coliseum, and a swimming pool. The classrooms are light and they are in buildings with no more than two floors, equipped with a projector and a speakers' system. It has a big library where games and books are available to teachers and students' practices. La Colina is a bilingual school from the preschool level up to 7th grade and maintains its level of English with an intensive process under the advisory of Cambridge English School group, but following the learning basic standards of the National Ministry of Education.

The education provided to students is aimed at achieving the integral development of the person and the search for the perfect harmony between its different dimensions. It pursues the formation of character, the recognition of authentic values, and the acquisition of virtues in an environment of plurality and respect for cultural, ideological, gender, and creed differences with total respect for the regulations, laws, and the Political Constitution of Colombia. Since its inception, the institution has guided the educational process to make people who stand out for their ethical convictions, human, and spiritual values: knowledgeable, free, autonomous, independent, responsible, with initiative, and deeply respectful of themselves, of others and of the planet.

The pedagogical inspiration of the school has been the conviction of Maria Montessori who stated that "we must teach the child to discover life and reach its full potential as a human

being ...". A potential that at La Colina School is achieved through active learning, discovery of the world through the senses, the use of sensitive periods, the prepared and adequate environment, the use of scientific observation, cooperative and meaningful learning, and the guidance of competent teachers. All the teachers in the institution are professionals and some of them hold masters' degrees. In addition, almost all the teachers are foreign language teachers or they have studied English because the school's goal is to have all its teachers speaking and understanding the language. Moreover, in some places inside the institution the teachers usually speak with students using the target language. The educators of La Colina love and respect their students and, above all, are sensitive to their needs; that is why you can proudly say that your students feel "at home".

The students come from small families, mostly with diverse family configurations whose economic activity is based on formal work and commerce. The social stratification of the sector is between 5 and 6. In the school, the students are people in all their extension, educated in an academic and formative process of rigor, in accordance with the conditions of their stage of development. They are prepared to assume life and their future through a "personalizing - humanizing" pedagogical model, committed to the promotion of national culture and a patriotic sense, open to universal culture, through the learning of English and the recognition of their role as global citizens.

The school teaches mathematics in English to seventh graders and the group in which this action research took place was seventh A, a group composed by eleven girls and eleven boys between eleven and fourteen years old who come from different places around the world. Despite their differences, all of them have something in common: they are able to learn content in English because they have been learning subjects such as mathematics, science, and social

studies since they were in preschool. They usually speak English and understand it, but sometimes they switch and speak Spanish to ask some questions or to talk to each other. The school does not have a strict rule to forbid the use of Spanish, but the teachers try to use English all the time in their classes.

The mathematics learning is well known as a tool for the development of cognitive students' capacities as well as trust and autonomy. Additionally, this learning contributes to develop the communicative skills, which make possible the increase of reasoning, mathematics language, and quantitative and qualitative argumentation. In the school English is the center of the language, thus mathematics and all its contents, theories and the textbook are completely in English. Even though the basic operations such as addition, subtraction, multiplication, and division are solved in a different way, they are all taught in English.

Statement of the Problem

As mentioned before, the course in which this action research took place is seventh A. It is a mathematics class in English, and the students have been in a bilingual context since kindergarten. Therefore, the students' English level is high; they just need to improve their accuracy in written language. They study six hours of math and eight hours of English per week. Although sometimes students use their mother tongue, the content of the class is taught in English all the time. Students read theory and take notes in English; they even try to understand and answer when structures or theories are complex. The students sometimes ask questions in Spanish or ask whether they can answer in their mother tongue. If they do not understand an explanation or a word problem they can mention it, but the teacher never answers them in Spanish, he just finds the way to do it in other words. Even when they are working on word

problems, he never asks for meanings or uses the mother tongue; he just looks for different words to explain.

Through my observations, I noticed that students did not have any problems to understand English when the teacher was explaining, but sometimes they had difficulties when they answered questions to word problems, they even gave answers that did not make any sense. This linguistic difficulty was well evinced when students were working with word problems; they read and solved the numeric part of the problem but when they were going to give literal answers, they had some difficulties with grammar. This situation was evident in word problems as these: “Candice walks 0.6 miles on each trip to the park. How far will Candice walk if she makes 7 trips to the park?” some of their answers were these: “She make 4.2”, “She walked 4.2”, “She would walk 4.2”. Students also had difficulties when they wanted to express the sense of the answer, as we can see in this example, “if David wants to invite his friends to soda and popcorn, and he only has $82,75, how many friends can he invite?”; some of their answers were these: “He cans 10 friends”, “He is 10 dollars”, “He has 10”. Some others used the right words but they were syntactically wrong. This difficulty can be illustrated in this example: “Winslow buys 1,5 pounds of strawberries. The strawberries cost $1,25 per pound. How much does Winslow pay for the strawberries?” these were some students’ answers: “The Winslow of strawberries is 1,875”, “Strawberries is 1,875”, “Pounds is 1,875”. Finally, in this last example it can be observed that they do not know what verbal tense to use. “Ruby ate 1/3 of pizza, and Angie ate 1/5 of the pizza. How much of the pizza did they eat?” some students’ answers show some grammar difficulties: “Pizza eat is 8/15”, “8/15 are pizza”, “My 8/15 pizza”.

Theoretical Background

In our educational context, mathematics and English have become important subjects but they are not always connected to each other in EFL contexts. In the following paragraphs, I will develop the concepts that guide this action research. First, I will refer to Content Based Instruction as the approach I will use for these interdisciplinary actions; then, I will specifically refer to Mathematics Content Based Instruction; subsequently, I will elaborate on syntax as a linguistic competence to finalize with solving problem approaches.

Content Based Instruction (CBI)

Content Based Instruction has been used for many years as an approach that teachers use to enhance language learning through content. In this respect, Cantoni-Harvey et al. (1987) (as cited in Crandall, 1987, p. 83) state that content-based language instructional programs are proposed to enable learners to accomplish language proficiency which goes beyond the improvement of social language abilities, more commonly developed inside language classrooms where the forms of language are taught. Furthermore, CBI is a useful approach to conduct language instruction through a subject, but centering on the language skills that are essential to participate successfully in content instruction. The goal is to provide students with the appropriate skills that help them learn academic concepts through the language.

Similarly, Stryker and Leaver, (1997) assert that CBI is based on three main theories of the language: the first one states that language is based on text and discourse; that is, the information used when teaching is taken from meaningful content rather than from isolated sentences. The second theory is related to integrated skills in language; this happens when students simultaneously perform different activities in a CBI class such as listening, reading,

writing and talking about information they have studied, and the third one is related to the purposeful sense of language; that is, language is mainly used for communication.

In the same line, Knight and Hargis (1977) elaborate on some principles of this approach, they assert that in CBI instructional and pedagogical decisions are based on content instead of language. Teaching a specific subject in a foreign language means presenting it without deepening knowledge of the language, so that it does not become a distracting element in achieving the learning objectives of the designated subject. Knight and Hargis (1977) also mention that CBI is an approach where all the language skills are integrated through content. For example, I observed that in a math class where students are working on word problems, they must read them to understand and explain clearly what the problem is about, then write and express what the possible answers or solutions are. That is, students are involved in all the phases of their learning, which is another principle of CBI. The author also elaborates on other principles of this approach related to the relevance and authenticity; when a class of a subject is taught in a foreign language, the teacher must go and use original textbooks of that language. At the same time, they are accessible to the students and with clear and comprehensible material and in the case of the mathematics, it contains simple and understandable activities in relation to grammar and vocabulary that the teacher has presented to their students. CBI considers the students' interests and goals; I consider that when they learn word problems in mathematics, they can see how similar these problems are in the real life and how useful they are for academic purposes.

CBI Mathematics

Dale and Cuevas (1987) state that CBI programs in a specific field as mathematics must take into account several components such as the nature of the "mathematics language", and the

difficulties that some students who are learning English as a foreign language can have with this particular language, even in their mother tongue. Another aspect to consider is the mathematics special features related to vocabulary, syntax, semantic properties, and discourse. Mathematics vocabulary contains words that are specific to the content, such as *divisor, denominator, quotient, and coefficient. Integer* is one of the words we can find only for this specific content and for students is something completely new. However, mathematics can also include language we use every day; for example, *rational* or *irrational* are words that have similar meanings for both contexts. The authors state that when we talk about mathematics language or we mention any other register, we refer to the context in which those words are used, and what particular expressions must be learned for this specific register.

According to Knight and Hargis (1977), mathematics language includes particularly syntactic structures and special styles of presentation, where comparative structures are the main part of mathematics syntax structures. In the same way Munro (1979) states that those comparative structures are possibly puzzling for students because of the different ways they are presented. Crandall (1987) also mentions that an important characteristic of mathematics syntax is the incongruence between symbols and words; as we see in following example: if the expression "eight divided by two" is translated word by word we can understand something like "$\frac{8}{2}$" which would be incorrect, "$\frac{2}{8}$" is the correct expression and interpretation according the syntax used.

In the same line, Dale and Cuevas (1987) specifically refer to mathematics lexicon. They state that it is not only important to know the specific vocabulary, it is also important to develop the ability to infer the correct way to use those meanings; identifying the key words in word problems is the most important to determine the correct solution and how those words are linked

to a numerical positive or negative answer. Inferring the semantic implications of words is the way students deal with different connotations of language; this happens when the information refers to one or two numbers and makes emphasis on the order, position, operation, variable or importance of those numbers.

Finally, when discourse features are mentioned by Dale and Cuevas (1987), they refer to parts of the language that can be sentences or a group of sentences with a specific meaning and purpose into the mathematics language. In our classrooms when we explain properties of addition, subtraction, multiplication, or division, we refer to the different features that mathematics language has; students who are learning this content need to have some background knowledge of these discourse features because they are essential for a good comprehension of textbooks and multiple readings of mathematical concepts. Additionally, in some mathematics courses teachers have used writing activities in order to involve students in this communicative process. Writing can become a great opportunity to provide content classes with all linguistic competences, not also about mathematics language but through the target language the class is taught, Brown, (1997) (as cited in K. Pugalee 2001, p. 1). I think that if writing is an essential skill in the mathematics curriculum, formulating word problems could lead to positive language learning.

Linguistic competences in CEFR

According to the Common European Framework of Reference, language systems are so complex that are never fully mastered by its users. Language is not static; on the contrary, it is constantly evolving to meet the different communication demands. Some linguists have proposed different ways to describe linguistic competences better according to the evolution of the language and the necessities of nowadays communication. Linguistic competence specifically,

refers to the ability to use resources to formulate meaningful messages. Sometimes linguistic competences can be defined by some rules according to theories. Different scholars have stated many structures and patterns that are accepted now; the theories to designate all those rules and ideas we understand as competences have been the same for many years.

Syntax

According to the Common European Framework, syntax can be considered as a defined system for analyzing the language structures, sentences, and rules. It refers to those ideas we need to be careful about to use the language in a logical, well-formed, and meaningful way. It is the process that allows us to use the different parts of the language, how the lexicon and grammar are used to have well-organized structures. Nouns, verbs, prepositions, adjectives, and articles are parts of speech that can be assembled to form sentences and phrases, following a set of rules that make them syntactically correct. The objective is to produce ideas and messages by using structures that make them meaningful.

Word problem and problem solving

Riley et al. (1983) defined word problems as both the numerical result of an inquire, and an assignment that has three different components: the variable that represents a certain value in the text, the relations of the variable with different numbers in the world problem, and the question that leads the process to find the value and the answer. Word problems and solving them are linked because the more students understand the word problem, the more they know how to solve it. That is why the recognition of the components of the problems and the identification of the question play an essential role.

It is important to know that there are some cognitive theories to solve word problems and it is very important to differentiate them from the language understanding. Behaviorists as

Maltzman, (1955) and an associationists as Underwood and Richardson, (1956) have associated word problem solving as a combination of strengths proper of the content, as the idea of following these specific features of the mathematics language itself and how they are based on some general rules of this performance. Other developments of the same authors have stated the importance of the language concepts in the word problems; they are focused on the diverse relations between their written part and what mathematics language components are used.

Dynamic Strategic Math can be considered one of the theories for word problem solving, and it can also be a useful strategy to word problem formulation. Orosco et al. (2011) state that this strategy consists of building language abilities that challenge learners to comprehend obstacles in their target language. These authors developed this concept through the following instructional strategies; the first part is about teaching math concepts learners can use into everyday vocabulary. The second one is when learners use those concepts, not necessarily associated with specific mathematics language. The third one is the appropriation of the terms of this specific content area, and the fourth and the last one is when the terms are not only part of the mathematics language, but also they are part of a specific mathematics topic. So according to the authors, these strategies could be useful for scaffolding the target language through Dynamic Strategic Math with word problems. Yimer and Ellerton, (2009) in their research study to seventeen teachers with the idea of identifying five phases for solving problem comprehension, they state that different stages are crucial to formulate and solve word problems, these phases are cognitive and metacognitive, nonlinear, and students use them in different parts of the process.

Research Question

How can seventh graders' formulation of their own word problems in a CBI mathematics class improve their syntactic linguistic competence in a private EFL context?

General Objective

To improve students' syntactic linguistic competence through the formulation and solving of their own word problems.

Specific Objectives

To evaluate students' use of mathematics vocabulary by replicating examples of word problems

To identify difficulties related to mathematics semantics through word problems

To explore the effectiveness of students' own formulation of word problems to improve their syntactic competence.

Action Plan

In order to help students to improve their syntactic linguistic competence through the formulation and solving their own word problems, I established some action strategies that are very useful for practitioners to test theory. I will begin with a socialization activity with a presentation on the first week in order to let them know my expectations, the importance of this action research, and the possible benefits it may bring to students. This same day, I will give them a consent form that they and their parents will sign to be able to collect and analyze some information for this project. Class observations will start on the third week and I will write my reflections and the strategies used for the implementation after every single class on a journal.

The diagnosis of the topics will be done on the first four weeks, in order to identify specific difficulties that students would have with the course content.

The first strategy to allow students to write and solve their own word problems will be to show them similar word problems using the topics of the course. They will develop different examples using specific vocabulary for formulating and solving problems; for this purpose, they will be provided with mathematics terms and their meanings and connotations in different contexts. They will learn to select different words with different meanings in mathematics language. During the implementation of this project, teacher and students will write word problems after being familiarized with the vocabulary and specific mathematics terms. Subsequently, I will elicit them to show me their own ideas, situations, and examples of word problems we can build together; this will be the starting point for them to improve their linguistic abilities through writing and solving their own word problems related to real situations. Two peer-teachers will have the opportunity to observe three different classes of this process, at the beginning, in the middle, and at the end of the term. Her contributions with her ideas and thoughts about the process and progress will be valuable to validate this action research.

Finally, I will select six focal cases with different language levels to collect and analyze their papers. They will be two students who demonstrated high performance in English and mathematics during the diagnostic stage, two students who had an intermediate level of performance, and two with an average level. Taking into account that their perspectives about their own learning process are important for validation purposes, I will interview these six students at the end of this project implementation.

Development of Actions

In order to start this action research implementation, I first did the socialization with students, I planned to do it at the same time with parents but it was not possible because parents had had a meeting three weeks after the students started. For that reason, I presented the action research proposal to students the first week, and then I was with parents socializing and giving them the consent form to sign it.

The following part of the implementation was organizing and letting students know what the topics were, through that I knew how the scaffolding of word problems could be implemented. The effects of the dynamic strategic math on English language learners' word problem solving was a paper and an important source I used to organize and understand the implementation of this action. The action plan started on the first weeks, while I was teaching and I started my journal for every single class as a useful tool for registering the development in the classroom, and making some reflections about students' progress and learning.

After organizing the strategies for helping students to improve their syntax through their own word problem formulation, I took some similar word problems from the book they have. They solved book word problems with the idea of being familiarized with mathematics terms, thus they learned to use these words to understand their uses into word problems formulation and its mathematics connotation. The second strategy was when students formulated their own word problems using those terms and vocabulary they learned, I encouraged them to have their own ideas about real situations, through that I also formulated some word problems. I gave them feedback to improve their written, helped them to reformulate or correct mistakes, and showed them linguistic abilities they are improving.

Subsequently, to have a different opinion as I planned, two peer teachers observed during three classes when students were formulating their own word problems. They were there to give me their ideas about the process of students and to validate this action research.

Finally, with the idea of having more information during all the process I selected six focal cases to collect their papers, through this I observed the progress of these students with the analysis of their own word problems. At the end, I interviewed them to take into account their impressions about their own learning process where feelings and opinions were very important.

Findings and Interpretations

Through the implementation of this action research, I have collected information since I started when I identified some difficulties with these seventh graders. I started with the assumption that these students could improve their syntactical competence through their mathematics class, and I collected some students' papers to identify the most common difficulties. Subsequently, I followed the process by writing a pedagogical journal with the idea of registering the activities I implemented and the reflections I had of every class according to their performance on their own word problem formulation.

Data analysis according to Burns (1999) is the stage in which the most important points and statements of the problem are developed to achieve the objectives and develop this research; the most important at this point is to code and categorize the data. It is at this point, where systematization and classification to categorize, play and important role as soon as the collected data is analyzed and reanalyzed to have a solid meaning in the final codes (Saldaña, 2008, p. 8). Based on the codes and categories that emerged from the data analysis, in the following

paragraphs I will present the most important findings giving them an order to answer the research question.

Linguistic improvement through word problems formulation

The objective of this study was to improve the syntactic competence through the formulation of word problems. In this respect, Stryker and Leaver, (1997) elaborated on the importance of being able to use the language as the vehicle of learning mathematics. In addition, they mention the importance of the different components of mathematics teaching that as stated by Dale and Cuevas (1987) have their own lexicon, semantics, grammar and syntax. Finally, it is important to mention that according to the Common European Framework, all the linguistic competences are important to have a meaningful message, and as the data analysis revealed not only the syntax competence was improved.

Lexical and semantic competences.

The improvement of these two components became more evident within the collected data. Evidence of this is what I wrote in my journal, “They are learning the vocabulary, they ask me to write the word on the board, and explain the meaning in an operation”. The students needed to find meaning into mathematics context to understand and then formulate their own word problems. Within the questionnaire to the students, In the question about how the strategy of formulating their own word problems was useful for them; students responded: “It was very useful because the literal problems helped me expand my vocabulary in English”, referring to the usefulness of this strategy. The observation by the peer teacher also showed her appreciation of the implementation: “They see that in English there are particular words of the subject and they must learn to use them; that is why the use of these words in the problems allows them to

consolidate that mathematical vocabulary". Finally, when the students' own word problems were analyzed mistake related to semantics appeared at the beginning of the process. The following examples illustrate this: "Emily needs 3 dogs shawer in 2 hours" where some words are not clear or understandable in this statement, it is important to highlight that the same student some months after the implementation showed this advance: "Santiago's mother gives him 5 apples every day during a week. Santiago has an apple store at Saturday, Santiago sold 10 apples, on Sunday he sold 3 times of apples that sold on Saturday". It is possible to see here the improvement at a linguistic level.

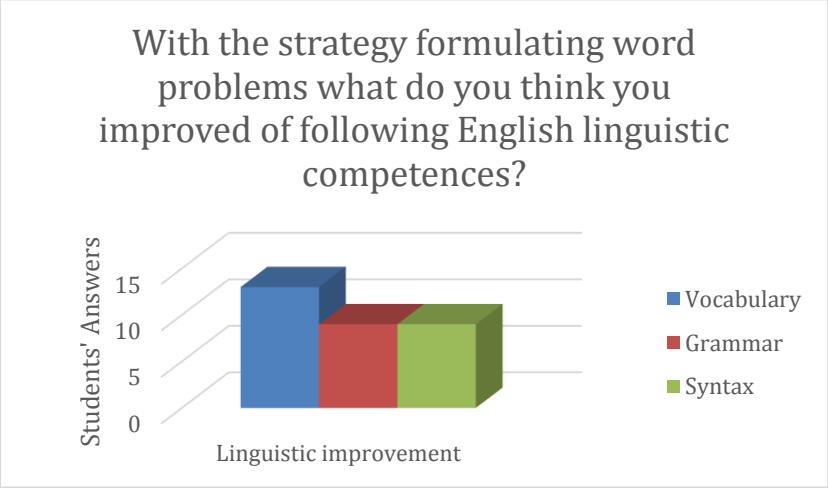
Syntax and grammar.

These two competences are identified, for example, in the journal: Mathematics concepts of the language and the linguistic syntactical component are clear for them and ideas when they want to formulate their own word problems and write the statement, I saw how they were learning to organize those ideas. Students also mentioned in the questionnaire: "I learned to order words and conjugate some verbs", they referred about something they learnt through formulating their own word problems. A peer teacher also mentioned in her observation; syntax is important to mention because the students were improving it during the whole process of word problem formulation, they needed to organize the statement of the problem and the question. This was the answer the linguistic components they think they have improved in this case referring to syntax, this peer-teacher answer evidenced in her answer the emphasis students had in the order of the sentences. Finally, the syntactic and the grammatical components are well shown in the students' papers: Observing the starting point of the focal case number three in the following word problem; "How many hours take if 4 people clean the same stadium". The question has syntactic difficulties, at the end of the implementation the same student was writing this: "How much time

is she going to take if the speed is 45 meters per hour?" where it is possible to see the order and the coherence. Moreover, the following figure shows the frequency of the improvement in these competences."

The figure showed that students improved the three competences, but also that they felt the biggest improvement was in vocabulary.

Figure 1

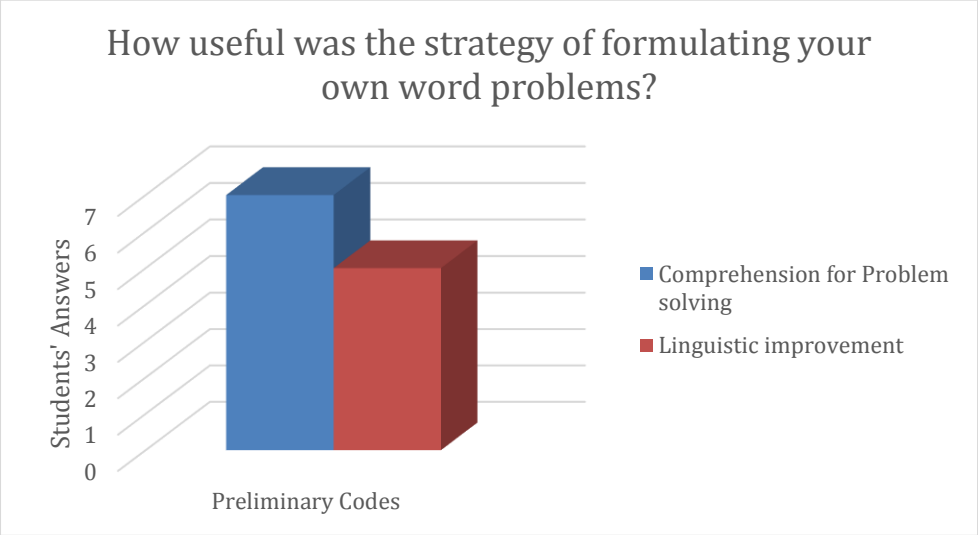


Comprehension for solving problem

This action research implementation showed the importance of understanding word problems and how useful their own formulation could be for students' comprehension. As Riley et al. (1983) mentioned, the idea of formulating word problems is linked directly with solving them because the more students understand the more they know how to solve the word problems. The data also supported how useful the students found their own word problem formulation to their own solving process as this answer in the questionnaire showed: "it helped me to better understand how to solve problems not only those of the book but with my own problems"

referring to the usefulness of this implementation. Through the journal, it is possible to evidence that: “the students have identified what words they use to know how to solve word problems”. It was evident they were using their training to solve word problems. In the peer teacher observation according to the following comment, it demonstrated; “I think that making them formulate their own word problems can not only help them to improve in the mathematical part but also in the learning of English and they can have more capacity to solve word problems”. At last, this figure shows according to them what the ability the increase was the most.

Figure 2



Strategies for formulation and problem solving

During this implementation, it was also discovered that some strategies about the formulation and problem solving were very useful for students and they increased their learning because of these strategies. As Orosco et al. (2011) stated in relation to the theory of Dynamic Strategic Math, the idea is to build learning through steps and that these increase their level of difficulty and learners will associate this knowledge not only with mathematical concepts but also with their daily lives. In the following paragraph, I present the strategies and how they worked for students and what perceptions peer teacher had.

In the journal is evidenced that: “when they started with the formulation of their own word problems they also shared them with their classmates, that is another way to notice that these are well written or not”, this strategy evidenced just one step students use. On the other hand, this evidence appeared in the questionnaire: “When I did not know a word in English, the teacher helped us to understand it and so he knew how to use new words in English” and “When I got it wrong, my teacher corrected to me and I did not make the same mistake again”. These situations showed the feedback the students received during all the implementation. The peer teacher observation was not the exception; it revealed that it was evident in the class how the linguistic competence of our students is increased. The target language in this case English is an instrument of learning and vehicle of communication. However, the collaborative work between different cycles and faculty that affects a group is encouraged; this comment exposed the effectiveness of collaborative work and the importance of doing it in different steps. Finally, it is very important to mention that the focal cases were six students selected according to different levels; two with many linguistics difficulties, other with a medium range, and the last two with a high level. They showed some improvement from the word problems they formulate at the beginning to their last formulations; this progress was evident after using the strategies.

Formulation of word problems to increase students’ self confidence

This final finding was unexpected, but it was fully evidenced into the data collected, the journal for example evidenced that: “they felt so comfortable using the words, formulating their own ideas, and solving others’ word problems”, this kind of comment was very common after students’ comprehension of the linguistics and mathematics aspects and when they repeated the steps. The students’ questionnaire also showed us that: “I did not have the imagination to invent my own word problems”, “it helped me to be able to make my own examples”, these two

comments showed how they felt insecure at the beginning and how their confidence increased through looking for their own ideas. The peer teacher comments were not the exception; “they ask their other classmates for the understanding of their own word problems, and they gain more confidence when they present them to the teacher”, this perception evidenced that the strategies implemented did not only allow their learning, they also increased their confidence. Finally, I present two figures where it is exposed what strength they increased the most according to the question.

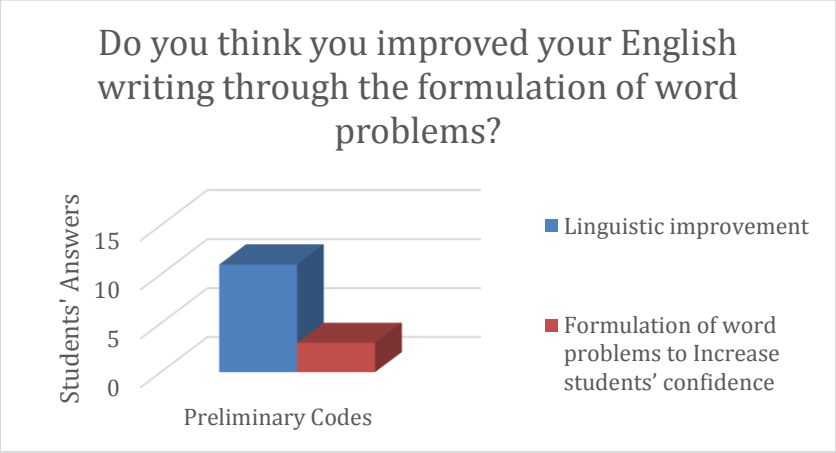
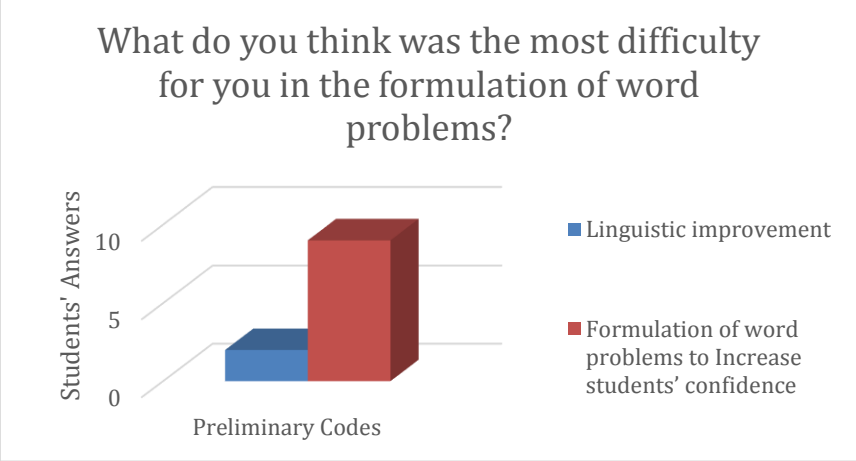


Figure 4



Conclusion

The action research process of formulating word problems to improve syntax was very relevant because of the possibility to improve linguistic competence through a Content Based Instruction class. Moreover, mathematics has not been a field where students can write too much, also, where the language has had different connotations particularly for it.

This study intended to demonstrate how students' own word problems formulation could improve their syntax and in general, their linguistics competences using English as the target language. For instance, students wrote their own ideas using the language and the specific mathematics one for expressing their own ideas in their own word problem formulation. Because of this implementation, the data analysis revealed the improvement in syntax as well as lexicon, semantics, and grammar competences enriched their linguistic learning.

Besides, their progress of their own formulation and solving was definitely better at the end of this implementation as their papers showed. Apart from these findings, it was possible to conclude that the different strategies they used, they were not only useful for better formulating and solving they increased notably their confidence in mathematics. To summarize, it is possible to state the action research question was answered and effectively the seventh graders of this private school improved their syntax competences through the implementation of formulating their own word problems.

Reflections

Although I have a difficult research process was one of the most enriching I have ever experienced, although I have already taught for several years; this was something new for me. I learned several theories from every step of the implementation of the action research, but also I recognized my improvement with writing.

I wanted to carry a research on Content Based Instruction, since I was studying foreign language teaching, however I did not think I would have the opportunity to teach mathematics in English. For me, this action research teaching in La Colina Campestre was great step as a professional because through the responsibility the school gave me, I learnt about myself as teacher. Moreover, I was doing something I believed in; it was my first time doing an action research and writing a thesis.

In conclusion, I would like to recommend future teachers using word problems for improving linguistic competences; they could try doing it with younger learners, I am sure this implementation could be more effective if it started with children.

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