EXPLORING HOW TEACHERS SUPPORT STUDENTS' COMPREHENSION OF
MATHEMATICAL WORD PROBLEMS IN A CLIL CONTEXT

BY

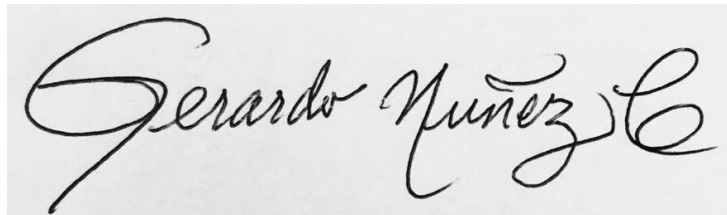GERARDO ANDRÉS NÚÑEZ CORONADO

RESEARCH PAPER

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AFFIDAVIT

I, Gerardo Andrés Núñez Coronado, hereby declare that this master's thesis has not been previously presented as a degree requirement, either in the same style or with variations, in this or any other university.

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Abstract

This qualitative case study of four elementary school mathematics teachers in a bilingual institution aimed to review the different strategies that teachers implement to support students' comprehension of mathematical word problems. For the collection and analysis of the information, an interview with each teacher, the review of 15 lesson plans, three for each course, and two classroom observations of each teacher were carried out. Results showed the importance of both the role of language along with other strategies in the comprehension of mathematical word problems. Teachers used strategies that highlight mathematical vocabulary as a way to support the process of both understanding and solving the problems. Another strategy included transforming word expressions to mathematical expressions through the conceptualization and contextualization of the meaning of words. In addition, the influence of a first and second language context in the acquisition of mathematical skills was seen. Teachers teach a second language through content but use the native language sometimes to reinforce the process of content acquisition and language comprehension. Additionally, teachers employ an eight-step structure for solving mathematical word problems, as well as other strategies such as underlying or circling new vocabulary or having their students do this, and modeling through interaction during classes. Considering the results obtained, it can be concluded that for the understanding and solving mathematical problems, it is clear that teachers employ strategies that build mathematical content competencies and language skills at the same time.

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Chapter 1. Introduction

During the past decade, Colombia has focused on improving the quality of education of its schools. According to the National Development Plan, 2014-2018 (Departamento Nacional de Planeación, 2014), education is one of the three most important pillars of this plan since an educated population can take advantage of economic opportunities that present themselves and are more capable of participating in the political system, in the market economy, and in the defense of their own rights. However, this plan concedes that there is still much to be done since problems with both educational quality and relevance still exist and have limited the development of the necessary competencies of the students. This gap can be seen in the results of both national and international standardized tests which show that Colombian students, in general, are not developing the competencies necessary for life or for insertion into the workforce (Departamento Nacional de Planeación, 2014).

One such standardized test, the Programme for International Student Assessment (PISA) by the Organisation for Economic Co-operation and Development (OECD), tests and ranks students of participating countries in their ability to use their reading, mathematics, and science knowledge and skills to meet real-life challenges. Colombian students' have participated in these tests since 2006. In relation to the results in 2018 and previous years, Colombia has remained at level 1, the lowest on a scale of 1 to 4 (PISA, 2020). A similar result was obtained in 2018 in the Cambridge examinations checkpoints, which evaluate private institutions in Colombia associated with their international education program (Cambridge, 2019).

Nationally, in order to evaluate the competencies and factors that affect the quality of national education, the MEN works with the national evaluation program ICFES. ICFES develops tests at the levels of primary, secondary, and higher education. At the elementary

school level, assessments are conducted in third and fifth grade and include mathematics,

Spanish communication skills (reading and writing), citizenship, natural sciences, and

environmental education. The fifth-grade test contains specific aspects of the area called

components, which are framed within each area and help to clearly define the contents of the

test. The competencies in the area of mathematics are reasoning and argumentation,

communication, representation and modeling, problem statement, and problem-solving. The

components to evaluate are numeric – variational, Geometric – metric, and probability (ICFES,

2018).

Traditionally, the component with the lowest international performance in all math tests

is word problems (Bernardo, 1999). According to the results by the ICFES 2018, students

present greater difficulty in developing the questions related to the competence of problem

statement and problem-solving. Additionally, some critical components, according to the results

obtained in the previous years, are the numerical – variational and geometric – metric. In this

sense, these results demonstrate that there is a lot of work to do in relation to the mathematical

teaching-learning process in Colombia.

In Colombia, in the context of this study, the institution is cognizant of this situation and

has made some general changes in the curriculum, hiring international teachers, adopting new

models in education, and creating some agreements with international institutions to overcome

this reality.

One new model of education that some institutions have used to confront this problem is

by implementing content and language integrated learning (CLIL). According to Coyle et al.

(2010), this is a dual-focused educational approach that emphasizes the learning of content by

integrating the learning of another language. The school of this project, as an international

institution, recognizes the advantage of a dual approach, where the students are learning the content proposed in the curriculum and, at the same time, they are developing the abilities of a second language.

The teacher plays an important role in the learning process and in the achievement of students (Rivkin et al., 2005), even to the point that García et al. (2014) argue that teachers are the *most* important factor in the learning of students. Therefore, it is important to explore how teachers are teaching mathematical word problems and how they are facing the students' comprehension in mathematics.

Research Question

This project aims to answer the question: How can teachers support the comprehension of mathematical word problems in a CLIL context? To answer this question, two sub-questions were created:

- How do teachers analyze the linguistic challenges of mathematical word problems?
- What strategies do teachers employ to support student comprehension?

This study reports on academic literacy in mathematical word problems in the context of content and language integrated learning (CLIL) in an elementary school. The study offers a revision of different strategies that teachers implement in the development of comprehension of mathematical word problems. Additionally, the role of language in the understanding of mathematical problems is explored, as well as the incidence of a second language context in the acquisition of mathematical abilities. Both of these areas have been studied somewhat (especially word problems in the field of mathematics education), but little work has been done with them in CLIL settings or with second language students. Also, viewing the role of teachers and students

during the process to understand all the elements involved in the comprehension of mathematics word problems is an aspect that could help teachers to better help student learning.

Setting of the Study

According to the institutional educational project (PEI), **The British School of Cartagena SAS**, is a private educational bilingual institution that was acquired in 2015 by the **Ashmore group,** international investment partners, who have had the support and advice from **REDCOL**, a Colombian company that has 8 more schools in different cities of Colombia.

The British School of Cartagena has two sites in the city. One in Castillo Grande and the other one in Anillo Vial Road. The main campus is the Anillo Vial Road site, located on the outskirts of the city with four independent, self-contained wings for Preschool, Elementary, Middle School, and High School, and here is where this study is taking place. It is a calendar B institution, with its school year from early August to late June, and offers a national and IB curriculum with a focus on both social and environmental responsibility. The families of the students in this institution are mainly upper-middle class.

The curriculum, through an agreement with the British Council, offers a Colombian college-preparatory education with instruction in both English and Spanish, which prepares students for both national and international universities. The graduation rate is 100%, and students go on to colleges and universities in Colombia, the United States, and Europe.

The British School of Cartagena's aim is to educate students with an international mindset, aware of the responsibility of looking after the planet and creating a better world. Their goal is that they will be characterized by being inquiring, informed thinkers, and good communicators, upright, open-minded, caring, bold, balanced, respectful, and thoughtful. To do this, the study plan is worked in cycles of 6 days, allowing significant learning between the

knowledge and the contents, giving the student the opportunity to give practical sense and apply the knowledge acquired. It is based on educational objectives in accordance with the provisions of the MEN and international programs. Likewise, it has collaborative projects which complement the curriculum and allow the students and families to work as a team to strengthen the skills of each student.

The English language begins to be integrated from 2 years of age, laying the foundations of this for when students enter the primary level, where they begin to speak, read, and write in that language. In primary school, 69% of the classes are in English, taught by a native English teacher and bilingual teachers. In elementary school, students work with the Cambridge Primary Scheme of work Program (CP-Stages 2, 3, 4, 5, and 6) in the areas of science, English, and mathematics.

From first grade through third grade, students are with self-contained teachers for the following subjects: science, math, English, and social studies. The rest of the subjects are taught in Spanish, except their French class which is offered from first to ninth grade. From fourth grade on, they have different teachers for different subjects. The subjects of English, science, mathematics, and global perspectives are in English while Spanish, ethics, sports, and others are in Spanish.

Outline of the Thesis

Regarding its structure, this document has five sections. The first chapter presents the approach to the problem and details the context in which this research is carried out, as well as the research question that guides the study. Later, in the second chapter, the main conceptual elements that theoretically frame and support the study are described, including the most important antecedents and strategies of the teaching and understanding of mathematical

problems and CLIL are presented. The third chapter describes the methods used to achieve the proposed objectives. The fourth chapter shows the findings, where the main results are presented. The next chapter discusses those results in light of the literature on the topic as presented in the theoretical framework. Finally, in the last chapter, the conclusions of the research are shown in the light of the research questions, the implications for teaching, and possible future research.

Chapter 2. Theoretical Framework

The objective of this study is to explore how teachers support the comprehension of mathematical word problems in a primary CLIL context. This will be done by analyzing how they identify the linguistic challenges of mathematical word problems and what strategies they employ to support comprehension of these problems. The first section deals with general historical aspects of mathematics education at the world and national level as well as its current trends. The second section turns to the teaching of math, with a special focus on Colombia, issues related to teaching word problems, and the language of mathematics. The next section relates to CLIL, including its definition, characteristics, and advantages and disadvantages, especially related to the teaching of math. Finally, the chapter includes a review of studies that have been carried out on this topic and others related to it.

History of the Teaching of Mathematics

Mathematics, like the different scientific disciplines, has been taught from a wide variety of approaches and across different cultures, so it is not possible to establish a specific origin of the transmission of mathematical thinking (Argumero, 2012). However, it is possible to affirm that each civilization developed its specific methods to perform mathematical calculations which evolved according to historical and environmental processes (Anacona, 2003; Galán, 2012).

Since the 19th century in Europe, the need to modernize the educational system and consequently improve the teaching of mathematics by integrating new curricular contents became notable (Radford-Hernandez, 2011). Thus, the traditional teaching of elementary mathematics from numbering skills, arithmetic calculation, and problem solving entered into the curriculum (Ruiz, 2011). Around the world, by the 1950s, the general consensus on the teaching of mathematics indicated that what was being taught was insufficient as the students did not have

a good level with respect to other subjects (Contreras, 2012). Hence, between 1950 and 1970 the so-called "reform to modern mathematics" was carried out in France, where mathematics was introduced in early years, emphasizing geometric, logic, and a self-centered area, which sought to solve the problem of the gap between the different types of mathematics taught at the moment (Sánchez, 2004).

As of 1980, the reform mentioned above proved to be deficient in terms of the ability to improve student capacity to apply what they are learning to different contexts (Ávila, 2011). The periods of the world wars brought technological advances that introduced a new vision of mathematical education and its role in the formation of citizens (Valero, 2017), and pedagogues used the development of psychological science and the contributions of Jean Piaget, Lev Vygotsky, among others, to update the way mathematics was taught (Contreras, 2012). These theorists, who proposed an evolutionary development of the child, fostered a change in the way the contents of math were taught to children and young people, connecting the application of math concepts to real scenarios through its integration with other areas, especially through mathematical word problems (Radford-Hernandez, 2011).

In recent years, teachers in the area of mathematics have been reflecting and working on the mathematical development of children and youth and how they can contribute to the objectives and purposes of their current education. In this sense, there is a call for mathematical education to respond to new global demands such as those related to multiculturalism, attention to diversity, and quality education accessible to all (OECD, 2016). Besides teaching some of the more traditional mathematical knowledge and skills, this should also include what has been termed "mathematical literacy." The Organization for Economic Cooperation and Development (OECD, 1999) has come to define mathematical literacy as:

The ability to identify, understand and participate in mathematics and make informed

judgments about the role that mathematics plays, as necessary for the current and future

private life of an individual, work-life, social life with peers and relatives, and life as a

constructive, worried and thoughtful citizen. (p. 50)

Teaching Mathematics in Colombia

In terms of the teaching of mathematics, the difference between the European and Latin

American processes lies in the fact that in the latter, many people did not have the possibility to

access training processes, discussions, reflections, and academic environments since education

was reduced to a series of European colonies that maintained the monopoly of western education

(Beyer, 2015). In Latin America, in the past, those who had access to education were usually

military, civil, and religious members of the elites of the time (Gonzales, 2018).

As the decolonization process took place in Latin America, new ways of promoting

education emerged in Colombia. There was the possibility for the creation of different

institutions, so in the nineteenth century, Francisco de Paula Santander created schools where

arithmetic classes were formally taught with study plans guided by legislation (Patiño, 2014).

Subsequent to this historical milestone is the creation of the so-called "Normal Schools" with the

objective of training teachers with a novel pedagogical approach (Báez, 2004).

In Colombia, mathematics education is one of the central areas of the academic

curriculum since it is considered to be one of the basic areas of knowledge for citizens to actively

participate in contemporary culture (Valero, 2017). In the presidency of Alfonzo López

Michelsen (1974-1978) a series of reforms were made in 1975 on the improvement of teaching

capacity and the provision of educational means. A year later education became a right, and the

General Directorate of Teacher Training and Improvement, Curriculum and Educational Media

under the direction of the Ministry of National Education (MEN) was created (Congress of Colombia, 1976). This ministry implemented a series of structural changes to the way in which the contents are presented to students, moving from a traditional approach to a "systems approach," where the teacher had to distinguish between the systems: symbolic, conceptual, and concrete (MEN, 1998). Additionally, another of the reforms of the Colombian educational system, and consequently the way in which mathematics is now taught, occurred with the issuance of Law 115 of 1991, where classroom processes are guided by basic standards of competencies (Colombian Congress, 1994). In relation to this, it was sought to provide the student with the tools to guarantee their skills according to the level established in the educational system.

On the other hand, in order to evaluate the effectiveness of the reforms described above, the Colombian Institute for the Evaluation of Education (ICFES) was created in 1968 to evaluate educational processes at all academic levels through standardized exams for verbal aptitude, abstract reasoning, social studies, chemistry, and physics (ICFES, 2019). In its first version, its function was to allow students to enter higher education, and later in 1980, it was taken as an instrument of quality assessment of basic and secondary education. These tests were applied to students in grades 3, 5, and 9 (Saber) and for students in grade 11, ICFES tests were established. Both types of tests were aimed at measuring the educational processes of the country in order to improve school curricula in a relevant way (Fernández, 2009).

Despite the efforts of the MEN, one of the historical problems of teaching in mathematics at the national level is the fact that Colombian students have lagged behind their peers from other nations (Henao-Garcia & Tamayo, 2014). All these processes have led to the transition from teaching towards the achievement of specific objectives related to math contents and memory to

a teaching oriented to support students in the development of mathematical skills, technological problems, linguistic characteristics, and citizenship (MEN, 2006).

For the area of mathematics in Colombia, specifically, five standards were created that contemplate formulating and solving problems, modeling processes and real phenomena, communicating, reasoning, and formulating procedures and algorithms for comparison and exercises. These standards are designed so that students can acquire proficiency in the knowledge and skills of the discipline grade by grade. In this way, at the end of each course, students are expected to acquire the proposed competencies of the grade in relationship with the five standards, creating a vertical connection through courses and a horizontal one through the standards. According to this, the SABER program in primary (third and fifth grades) and in secondary (eighth and eleventh grades) performs annual evaluations to ensure that the measurement of the scores obtained in the different schools of the public and private sector reflect what the National education expects from students in the area of mathematics.

Mathematical Word Problems

Mathematical word problems are found in all academic programs of educational institutions in the world, being taught from preschool to university levels (Gerretson & Mchatton, 2009). They are a narrative, in many cases of an everyday situation, where their main objective is the use of mathematical thinking through operations and representations (Verschaffel et al., 2000). Considering the structure of a math problem, Wickelgren (1974) claims that three main parts can be identified in mathematical problems. The first is related to the context in which the mathematical problem is framed. The values and data necessary to carry out the operation are found in the second part. Finally, there is a question, which represents the objective of the problem.

Researchers have found that often because of the structure and use of mathematical language, word problems represent a challenge in the educational system for students, teachers, and researchers (Daroczy et al., 2015). For students, the main difficulties occur in the characteristics of language, such as the use of nominalization and mathematical procedures associated with mathematical thinking (Chan, 2015). In the case of teachers, they usually focus on the solution of the problem and rarely on the challenges of the mathematical language that students may present (Gough, 2007). Furthermore, Slavit and Ernst-Slavit (2007) have found that the language used for the instructions in math classes often does not correspond to the language that the student must know in order to solve the problems presented in evaluations. In this way, researchers in the education sector have shown that there is a gap in the teaching-learning process of mathematical word problems.

In the basic standards of mathematical competence in Colombia, the formulation, treatment, and resolution of problems are described as the main axis of the mathematics curriculum. In this way, they are presented as an active process throughout all activities and not in isolation, allowing the teacher and students to address the content through daily experiences. It is hoped that, in this way, they will be meaningful for all those involved in the educational process.

In 1945, Pólya presented four steps to solve mathematical word problems. The steps include: (1) understanding the question, (2) organizing a plan, (3) applying the plan, and (4) reviewing and checking the answer. Since Póyla, many authors have worked on the application of strategies to help students to understand and to follow a structure to solve word problems. Some authors focused on the language, like Johnson (1944) who identified improvements in the solution of mathematical word problems when the students were exposed to specific vocabulary.

Supporting the same idea, Strain (1969) discusses the importance of use of literature, since word problems are short narratives, as a medium to develop vocabulary skills which they can then apply to the comprehension of word problems. Dahms (1970) evaluated a method where the students convert language statements into mathematical statements, by concentrating their effort on a few words at the time.

Other authors emphasize the use of visual representations to solve problems. Kinstch and Greeno (1985) describe the use of representations, pictorical, symbolic, and verbal, as a medium to organize the information from word problems in order to guide the students to make a plan to solve problems. Marshal (1995) also mentions Kinstch and Greeno's approach as the identification of specific structures of a problem type, schema, used in primary levels.

Another important area to mention is the verbal interaction between the teacher-student and student-student. Lowel (1971) refers to the importance of communication between the teacher and the student, especially in the early years of learning and teaching mathematics, in order to foster interactions between all the actors involved in the learning process inside the classrooms. In this way, Turner et al. (2019) show that this emphasis on language transcends the teacher's expectations because there is a need to support student's communication skills, as well as conceptual understanding in the area of mathematics.

The Language of Mathematics

During classes, students use language gained from interactions at home and in the community. This language is known as everyday language or natural language. During math classes, this everyday language is limited when compared to the vocabulary that the students need to interact with other students and the teacher. According to Simpson and Cole (2015), learning and teaching the language of mathematics represents understanding vocabulary, syntax,

word order, and abbreviations. In that sense, Chan (2015) points out the importance of identifying the technical vocabulary that is used during the classes and, in particular that presented in word problems, in order to scaffold mathematical learning strategies for a high student performance. With regards to teachers working with word problems, Schleppegrell (2007) mentions that there is a typical way word problems are presented, but the use of words, such as verbs in forms of nouns or action verbs for specific operations, cause potential confusion in learners that are struggling with the mathematical vocabulary, per se.

A student with knowledge of mathematics must be able to make mental representations of the different quantitative elements immersed in the linguistic elements in the text, formulating solution strategies derived from the representations of real contexts (Allan, 2002). In this way, teachers cannot assume that the language of mathematics has been taught within another curriculum. Therefore, the application of strategies to achieve its development in students should be part of the work in the math class. As a consequence, Barwell (2005) maintains that the language of mathematics differs from everyday language, and all math teachers must support the process through language strategies that allow students to avoid confusion and promote connections between them.

Ausubel and Robinson (1969) recommend, in the lower grades, to work on concepts through simple and explicit images. Additionally, for learning the concepts related to mathematical operations, they suggest using real elements or examples with real experiences. Also, Mastropieri and Scruggs (2007) describe ways to practice fluency in mathematics by connecting the new vocabulary to their prior knowledge. Riccomini et al. (2015) discuss the use of explicit vocabulary instruction during the classes to develop the language of mathematics.

Other traditional strategies are recommended such as the use of flashcards, in which one side of an index card has the vocabulary term and the other has the definition and a visual.

Bilingual Institutions and CLIL

Although CLIL began in Europe, it has spread throughout the world, and many Colombian institutions have adopted this approach, especially bilingual schools. The term CLIL, which stands for content and language integrated learning, is used to refer to "an educational setting where a language other than the student's mother tongue is used as a medium of instruction" (Dalton-Puffer, 2007, p. 1). Coyle et al. (2010) define CLIL as "an educational approach in which various language-supportive methodologies are used which lead to a dual-focused form of instruction where attention is given both to the language and the content" (p. 3). This means that the content provided for the learner is developed in the second language of instruction, and in many cases, in English. According to Marsh et al. (2012), CLIL is a real integration between the language and the content being developed and has a dual-focused aim: the knowledge (content) of any subject and communication (language) in an additional language. Thus, it is an approach in which both the content and the language can have the same level of importance during the learning process.

While learning a foreign language is not the main educational purpose of CLIL per se, it is part of the nature of the learning process. According to Coyle et al. (2010) an essential aspect of CLIL relates to what they have termed the 4Cs. The characteristics of each are related to the broad spectrum that covers the model in general and represents the advantages of this approach. The first "C" represents curricular content to be developed by the teacher, commonly related to the subject. The content to be developed is an important component and represents the

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contribution of the traditional models. In this particular study, the content relates to the

mathematical foundations. However, its application expands to all areas of knowledge.

The second "C" represents all the actors and elements involved in communication, in

other words, language. This component aims to make the student, who is often not very active in

the classroom, as the main actor, allowing students to be empowered during time of exchange of

knowledge and ideas in the classroom (Marsh et al., 2012). In addition, student interactions are

constant, facilitating cooperative work and joint growth. Thus, the role of the teacher is to

promote spaces of communication and the selection of language that allows effective

communication between all participants.

The third "C" is for the process of linking through cognition, also known as thinking.

Before the emergence of the CLIL model, teachers, through different strategies, taught students

to think. The development of thinking skills is fundamental in this model, allowing the

interrelationship of thought and content. The thinking skills used in this model are taken from the

Bloom Taxonomy, these being classified according to the thinking skills, minor and/or greater.

Through this scale, teachers take the student from the lowest level, which is to remember, to the

highest level which is to create. In addition, one important advantage is that it provides

opportunities to study content through different perspectives (Cenoz, 2015).

The last "C" is culture, which relates to the awareness of the self and the other. Also, this

"C" includes learning with the world around us as one of the main objectives of this element.

This item is the key to enabling meaningful learning through the application of knowledge as an

individual and the relationship with others in different spaces. Furthermore, the combination of

the 4Cs builds synergies integrating learning (content and cognition) and language learning

(communication and culture). Some advantages related to these aspects include fostering a better

environment, making students learn in the same way as they learned their native target language, and developing intercultural awareness and communication skills (Ouazizi, 2016).

Most CLIL programs have several objectives related to culture, language, content and/or learning (Llinares, 2015). This means that, in many cases, the language used for learning or teaching is not the main objective of CLIL programs, although language is one of the main elements of CLIL learning environments. In this way, CLIL proponents argue that programs can be developed worldwide at all ages and levels of education, from preschool to higher education, by a native speaker or a bilingual person, in any language, subject and during any period of time. Therefore, this approach is seen as very flexible.

While there are many advantages to CLIL, there are also some challenges that teachers and students face. In bilingual institutions, the first challenge is related to the fact that new concepts are presented in a foreign language, laying on students a double cognitive effort: that of learning new concepts and learning these in a foreign language (Hüttner et al., 2013). In general, the educational system recognizes these difficulties as a potential challenge for students, but this reality takes place when the students are in the process of developing their cognitive abilities (Jäppinen, 2005).

The second challenge is the adaptation of the teachers to the requirements of this approach's dual-aims. This means that students need more support from the teachers, and teachers need to employ strategies to support both the purposes of the language used and the development of content for learning to be achieved (Chan, 2014). Lasagabaster and Sierra (2009) suggest that CLIL teachers should provide optimal conditions for students' communication. To do this, they should be proficient enough in that content area and know the foreign language very well. CLIL teachers must understand the difference between language learning and language

acquisition, and they must introduce activities that link language and subject aspects. Therefore, in effective CLIL practices, teachers explain and scaffold the process that leads to the successful completion of tasks, reducing the cognitive load and creating a context for the language used so that content can be learned (Walqui, 2006).

Literature Review

This section presents a variety of studies conducted during the last ten years related to aspects of this project. These include the teaching of math in CLIL settings, teaching word problems, and strategies for students and teachers involved in mathematical word problems.

Turner et al. (2019) conducted a qualitative study to examine the instructional language-related practices of six early career elementary and middle school mathematics teachers in different regions in the United States. The study describes the patterns found in the language from teachers and learners during mathematics teaching. All six early career teachers in this study evidenced a strong lexicon perspective by regularly inviting students to hear, see, and say math vocabulary. Five of the teachers leveraged vocabulary as a means of reinforcing the precision required in the mathematical register, both as it applied in the mathematics classroom and in everyday contexts. Four of them evidenced practices related to mathematical discussion to build student understanding that reflected key tenets of the situated-sociocultural perspective. As a conclusion, Turner et al. (2019) mentioned that primary school teachers need more support during their preparation at universities in order to provide greater support to all students in the acquisition and development of language in the classes of math.

In 2016, Nastická conducted a qualitative study in Slovakia in bilingual elective math classes after school to nine lower-secondary students. The fundamental purpose of the research was to explore the different instructions that the teacher provided to the students and how these

allowed for (or not) the resolution of mathematical problems by the students. Additionally, the identification of the most outstanding intercultural characteristics that prevented the learning process of problem solving was sought through the recordings made in the classes. For the study, a series of guides with a CLIL approach and English as a second language were developed.

Nastická (2016) found that exposing students to a bilingual context does not prevent learning the processes involved in solving mathematical problems; however, each student has a different learning pace. In addition, it was possible to show that some students had difficulties for the positioning of the comma in quantities greater than thousands, and this was identified as one of the largest intercultural differences in this study. As a conclusion, Nastická (2016) recommends that teachers need to predict difficulties that may rise to some intercultural differences to reduce the possible negative effects of a bilingual context on the teaching of mathematics.

In the 2016-2017 school period in Andalucia, Spain, Cabezuelo and Pavón (2019) conducted a pilot study with 53, 10th graders in a CLIL context. The study was developed in a quantitative ex-post facto approach where the variables were not manipulated. The purpose of this study was to investigate whether a second language (English) influences the resolution of mathematical problems when assessing mathematical content. A reading comprehension test was applied to all participants and two questionnaires, in Spanish and English, which contained problems used in standardized assessments (PISA).

According to Cabezuela and Pavón (2019), the results show that the resolution of mathematical problems is not only affected by the use of L2, but also depends on the difficulty in the mathematical content, regardless of the level of English proficiency of the students. To conclude, Cazuela and Pavón (2019) mention that the interaction between linguistic difficulties

and mathematical complexity is one of the main aspects that affect students in solving mathematical problems.

In Hong Kong, Tavares (2015) conducted a qualitative case study in an Asian bilingual context to investigate the strategies used by a bilingual teacher during math sessions in an L2 environment. During her study, the methods she used included class observations, lesson recordings, and semi-structured interviews. The participants were a bilingual teacher and her group of students from 9th to 12th.

In the results obtained, Tavares (2015) found that teachers used the methods of noticing, syllabification, morphological cues, think-pair-share, vocabulary-building strategies, questions techniques, immediate corrections, among others. It was also evident that the teacher used her native language in order to support the students' process in the acquisition and strengthening of a second language. As a conclusion, Tavares considers that bilingual teachers should continue to work hand in hand with the native language in L2 contexts since a positive impact on the students' learning process can be evidenced. Additionally, it is recommended that mathematics teachers not only work on strategies that favor the acquisition of mathematical content but also prioritize and give importance to the teaching of language.

Chan (2015) carried out exploratory work in Hong Kong, mentioning the main difficulties presented in the EFL in a math context, specifically, with word problems. The data included extracts from secondary mathematics books, 7th to 9th grade, and observations of mathematics teachers during school training. In the analysis and recommendations, Chan provides strategies for teachers through the identification and classification of examples of mathematical problems associated with linguistic challenges in words, phrases and clauses, and at the discourse level. As a conclusion, Chan (2015) suggests that mathematics teachers need to

pay close attention to language when teaching word problems. He recommends decomposing the word problem as a narrative genre, where particular features like past tense, conjunctions, pronouns and adjectives are presented since, for learners, they represent the beginning that they need during the process of solving math word problems. Also, he mentions the importance of working at the word level with technical vocabulary and action verbs that are common in word problems. All of these strategies allow collaboration between mathematics teachers and language teachers to promote interest in the language of mathematics in the EFL community.

Chapter 3. Methodology

The main purpose of this research project was to explore how teachers support comprehension of mathematical word problems in a CLIL context. This chapter discusses how the research project was carried out, including the main paradigm of the project, the methodology, and the design and data collection instruments, procedures, and analysis of the data. It also includes information about the participants and how the project was carried out ethically.

Paradigm

Scientific research paradigms currently represent thought models used by researchers to get closer to reality. The paradigms of scientific research obey an epistemological orientation, referring to the way in which scientific knowledge is produced, specifically, to the orientation of the researcher, the techniques that he or she incorporates to carry out his research process and the underlying assumptions (Creswell, 2014).

In this way, there are various paradigms that can be identified in educational research: (1) the positivist, (2) the interpretative, (3) the socio-critical, (4) hermeneutical, and (5) the holistic research (Creswell, 2014). The positivist paradigm is based on quantitative techniques and is part of the hypothetical deductive method, which seeks to verify a hypothesis by statistical means or determine the parameters of a certain variable through numerical expression (Creswell, 2014). Therefore, it views scientific research in the rational, objective way and presents as a basis what is observable, manipulable, and verifiable (Ortiz, 2012; Ricoy, 2006). On other hand, the interpretative paradigm aims to know subjective phenomena through qualitative techniques and methods whose objective is to interpret and understand realities whose criterion is based in subjectivity (Ramos, 2015; Ricoy, 2006). The socio-critical paradigm questions the positivist

paradigm and its way of conceiving reality, since it starts from qualitative and quantitative

techniques to know social problems of investigative practices (Maldonado, 2018). Furthermore,

there is also the hermeneutical paradigm, the one that is the most widely used in the field of legal

and discourse analysis because it looks to understand, interpret, and explain the communications

of a certain branch of study (Pérez et al., 2019). Finally, new trends in research have enabled

emerging paradigms, one of them is the holistic research paradigm, which does not study

particular knowledge, but general knowledge. This offers a broad vision, organization and

systematization of information and knowledge, gives value to human inventiveness, creativity

and stimulates intellectual initiative (Velásquez, 2011).

The present study conceives the paradigm as the particular way of understanding reality,

conceiving it from the interpretative paradigm since it seeks to observe and analyze the support

of teachers for the understanding of mathematical problems in a CLIL context. Through the

experiences of teachers in their specific context, it is intended to understand the strategies, the

materials and the interactions that they use during the lessons to support the process of the

students, when they have to solve mathematical problems.

Methodology

Research methods present the contexts of realities in a particular way in relation to facts,

phenomena, processes, relationships or generalizations, and manifest itself or not in a specific

field. Thus, quantitative, qualitative and mixed methods are typical of the various research

methodologies that correspond to forms, procedures, and requirements of scientific

characteristics.

The quantitative method is used when informative data is collected in order to contrast a

hypothesis, based on a numerical measurement and statistical analysis, creating behavioral

guidelines and testing theoretical hypotheses (Hernández et al., 2014). The qualitative method, to the contrary, starts from the experiences or subjective testimonies that the participants provide about a concrete reality of the study or the social representation that is formulated of the research object (Carhuancho et al., 2019). Finally, mixed methods are the result of the joint use of quantitative and qualitative techniques, this being an opportunity to join two ways of understanding into one reality (Ramos, 2015). Taking these elements into account, the qualitative method will be described in more depth below since the present investigation is developed within this framework.

Qualitative research is multi-methodic, naturalistic, and interpretive way of doing research; that is, from this method, researchers inquire about natural situations, interpreting and giving meaning to phenomena in correspondence to the meaning of the people under study (Carhuancho et al., 2019). The above allows them to obtain a particular look at the social phenomenon since it starts from the subjects who inhabit a certain reality. Furthermore, qualitative research is supported by constructivism. Hernández et al., 2010 (as cited by Ramos, 2015) refer to the matter that acquires the sense of a socially constructed reality from various forms of perception, as well as the social construction of knowledge by the participants in the investigative process, the proximity of the researcher to the research process, and the non-generalization of the results due to context and time.

Additionally, Merriam (2002) emphasizes that qualitative research is the interpretation of reality through the experiences and the context in which the participants are situated. Also, the qualitative researcher, described by Merriam (2002) as the primary instrument, responds assertively in data collection and analysis, mainly due to verbal and non-verbal language interactions to understand reality in a more objective scenario. In this sense, qualitative research

assumes a different way of understanding the research, in general, from its usual environment, describing situations, individuals, texts, among others (Aveling et al., 2015).

Therefore, the present research project was developed under a qualitative approach, which uses the collection and analysis of information to answer research questions and contrast new subjective realities (Hernández et al., 2014). The use of words rather than numbers allows the researcher to describe the participants, the identification of analysis of the strategies used in the classroom by the teachers, the collection of data in the different research documents, surveys and lesson plans, supports the soul of this descriptive-qualitative study.

Design of the Study

Considering the characteristics of this investigation, the methodological approach to be followed is essentially qualitative. The object of study is to understand and describe the strategies of mathematics teachers in elementary school when teaching word problems. According to this, the most suitable design is a case study. According to Cohen, Manion and Morrison (2017), a case study investigates the complexity of the interactions of events and allows, in a simple way, to show the factors and human relationships involved at each moment of the evaluated context.

Among the advantages found in a case study, the flexibility and nature in which the research is conducted distinguish it from other designs. The researcher has the possibility to live the real experience of the participants and the problem itself that is being investigated (King & Mackey, 2016). Additionally, the data can be collected in multiple forms, relying on a single data source (Cohen, et al. 2017). This allows the possibility to show, from different perspectives, the problem under study. Consequently, the initial study plan and some phases of the process should not be strict. On the contrary, they should allow for constant movement and adaptation.

Furthermore, the study is non-experimental since it sought to observe the variables without intervening or manipulating their course, and neither did it seek to compare experimental or control groups (Sousa et al., 2007). Also, the research design is descriptive and cross-sectional due to the exploration of teachers' support for understanding mathematical problems in a CLIL context, recording the data only once over time (Gómez, 2009; Manterola and Otzen, 2014).

Description of the Participants

The criteria for selecting the teachers were the following: they had to (1) teach mathematics in English, and (2) teach in the elementary school of the context of the study. Therefore, the participants of this project were 4 teachers, all of them women, from the British school in Cartagena. They are also all bilingual, in Spanish and English, and teach their classes mainly in English. Their teaching activity takes place in elementary school, and some teach other subjects (in self-contained classrooms), in addition to mathematics. Additionally, all teachers have experience in international schools, where national and international curricula are worked on. The methodology used by teachers in the classroom is CLIL, attending to the school objectives of a dual-focus approach. All teachers have more than one year of experience in the institution. That is to say that they know the academic program of mathematics they are teaching very well.

Table 1 presents information about the participants with regard to their academic training and teaching experience. It is important to note that to protect the confidentiality of the teachers, a number has been assigned to each of them.

Table 1

Basic Information of Participants

TEACHER	EDUCATION		EXPERIENCE IN YEARS	
	Undergraduate	Postgraduate	Teaching	Teaching Math
Teacher 1	Elementary Education	x	28 years	12 years
Teacher 2	Modern Languages	x	25 years	3 years
Teacher 3	Early Childhood Education	Master in Pedagogy of Play	20 years	8 years
Teacher 4	Chemical Engineer	Master in Engineering	3 years	3 years

Data Collection Techniques and Procedures

A qualitative descriptive case study can be carried out by observing the individual behavior of personal characteristics (perceptions, capacities, motivation, etc.) and the group processes that occur in these contexts (Morga, 2012). Following this methodology and design, different tools are available that allow for the collection of information from the participants. In this section, the techniques used in this project will be briefly described.

Observations

According to Cohen et al. (2017), an observation "offers an investigator the opportunity to gather 'live' data from naturally occurring social situations" (p. 396), precisely by listening and looking at the context of the study. In addition, Díaz (2011) mentions that observation is a technique through which the greatest amount of data can be taken from a given object of analysis, providing to the researcher a big picture of the phenomenon.

Patton (as cited in Cohen et al., 2017) mentions that there are different types of observations: (1) structured observation, (2) semi-structured observations and (3) unstructured

observations. In structured observations, the researcher knows in advance what he or she is looking for and has a clear classification system for the information. Semi-structured observations provide a general idea of some possible issues that have been investigated. Finally, in an unstructured observation, the researcher needs to be involved in the context to identify its significance for the investigation.

This study emphasizes the identification of the teacher strategies during the interactions in their lessons. By having a list of possibilities, the types of the strategies that need to be observed, the semi-structured observation helped organize the information in a systematic way and, at the same time, offered other perspectives for new categories. Observations also allow particular characteristics of the subjects, such as verbal and non-verbal behavior to be seen (Piacente, 2009). These features were important for this study, due to the necessity of specific details during the data collection and teacher interactions with the students.

In order to have representative information about teachers and students, each grade was observed two times. This means that Teacher 1 was observed two times in first grade, Teacher 2 was observed two times in second grade, Teacher 3 was observed two times in third grade, and Teacher 4 was observed four times, two times in fourth grade and two times in fifth grade. All the observations were made virtually due to the national situation of COVID-19. This means that teachers taught their classes using Zoom or Google Meet, recorded them, and sent them to the researcher to analyze. Every observation, 55 minutes for each session, was transcribed (see Appendices 1-10). When analyzing the observations, the researcher took notes on the strategies teachers used to teach word problems, any key vocabulary and/or grammar they taught and/or used, what language was used in the classroom, what type of questions they used, and what

feedback they gave students. The findings from this analysis are summarized in the results section.

Document Analysis (Lesson plans)

An important method for collecting information that researchers are using more and more is document analysis. Merriam and Tisdell (2016) define the document as "a wide range of written, visual, digital, and physical material relevant to the study (including visual images)" (p. 162). Bowen (2009) widens this definition to describe it as a process where printed and electronic material are evaluated to collect data.

In this study, the documents that have been analyzed are lesson plans. Some of the advantages of using this type of document is its availability, that it is not time consuming, and that it can be used in combination with other methods. In addition, this document analysis provides a general overview of what could be expected to be seen during the observations.

For this study, 15 lesson plans were analyzed (see Appendices 15-29). Teachers provided the series of lesson plans and the researcher selected a sample per term in each course that related to word problems. During the analysis, the information collected was organized and classified according to the structure of the session observed. Then, the researcher reviewed the objectives of the lesson plans and the strategies most used by teachers to solve problems.

Interviews

Being one of the most widely used methodological instruments for the collection of data, interviews are characterized by the simplicity of the process with which it is carried out and by the variations it may have according to the field of study (Morga, 2012). In the educational context, they not only collect information but also are used to understand the needs and motivations of the subjects, raising in them higher levels of participation and effectiveness

(Aragón & Silva, 2002; Piacente, 2009). Additionally, according to Cohen et al. (2017), an interview is a flexible tool designed to collect information from the interactions of participants and researchers in a scenario where they converge. There are many types of interviews in relation to how they can be categorized. One way to classify the interviews is by the structure of the questions and includes: (1) structured interviews, (2) semi-structured interviews, and (3) unstructured interviews.

In the structured interviews, the questions are predetermined and may not allow the interviewer to access broad participants' perspectives. On other hand, the semi-structured interviews include a guide of questions, like the ones that are in the structured interview, but no predetermined wording or order of the questions (Merriam & Tisdell, 2016). This type of interview also allows for the inclusion of other questions that may come up as the interview progresses. The unstructured interview includes open-ended, and possibly not defined before-hand, questions, more like a conversation.

Attending the nature of this investigation, semi-structured interviews were used to allow some specific but flexible questions to explore emerging perspectives from the interviewees. It means that during the interviews, the order of questions presented to the teachers is flexible, giving way to new ideas that occurred.

For this study, the interviews were conducted individually and virtually, due to the COVID-19 pandemic. Additionally, the recording was made in Google Meet for later transcription (see Appendices 11-14). To collect quality information and promote a safe environment, the teachers were asked the language in which they would prefer the interview. All the teachers decided to conduct the interview in Spanish. For each teacher, eight questions were used during the interview and there was no time limit for the interviewers. In some interviews, it

was decided to explore a little more about the teachers' responses, in line with a semi-structured interview. Likewise, with others, some questions were omitted because the teacher had already answered them. The questions attempted to provide evidence of the strategies that the teachers plan and use for classes and how they handle the linguistic features before and during the class.

Ethical Considerations

In research studies, during data collection, ethical problems can be found regarding the privacy of the participants and the protection of the information provided. During this project, certain ethical issues were taken into account to carry out the study in an ethical way. Merriam and Tisdell (2016) emphasizes confidentiality and good relationships between the participants and researcher, promoting security for the merging voices that are to be heard. In this project, before applying any instruments, it was necessary to ask permission from the institution and the participants. To both groups the objectives and method of the project and some details related to the instruments were explained. After the institution gave its permission to carry out this project, the teacher participants were asked to sign a consent form. Also, data was kept anonymous by providing a number to each teacher instead of using their name.

When the interviews were taking place, all the participants received the time necessary to express their opinions. No judgement was made from their answers or comments. During observations, no interruptions, interventions or additional comments were presented from the researcher. While the project focused on teachers, in the observations, if there were any student participation, the word student and a number was added every time they said something, maintaining the privacy of the children.

<center>**Chapter 4. Findings**</center>

This section shows the results obtained from the data collected from the lesson plans, the observations and the interviews of each teacher. This section will show the findings from each separately, beginning with the analysis of lesson plans, continuing with the observation and ending with the interviews.

Results from Observations

One source of collecting the information necessary in this study is the observations to teachers. As mentioned earlier, each grade was observed twice, with Teacher 4 being observed four times because she teaches both fourth and fifth grade math. In this section, a description of the most important aspects collected during observation are mentioned. The methodology implemented by the teacher to teach word problems and language and linguistic features through interactions and strategies applied to the teachers to support comprehension are included.

Teacher 1: Observation One – First Grade

In first grade observation, Teacher 1 greeted the class and presented to them the agenda of the session. The structure included a video as an introduction, then the parts of a mathematical word problem, and, finally, the resolution of mathematical problems. During the video, the teacher showed the vocabulary that referred to the basic operations of addition and subtraction. Additionally, the steps to solve the problem were shown and the quantities were presented using pictorial representations.

In the second part, the teacher, in a very playful way, presented a problem situation, using elements that she had at her disposal. In this way, Teacher 1 created a word problem situation with the children in which she intended to use part of the vocabulary seen in the video. In a

formal way, she introduced the students to the vocabulary and symbols for math operations and asked them to repeat the pronunciation.

Before presenting the first problem, she asked the students to review their result before telling the class. The teacher began by reading the problem and left spaces for the students to mention the numbers that were appearing. It is important to note that first grade students are just learning to read. In order for the students to understand the situation, the teacher was counting with them, using her fingers to show the numbers that were appearing. At the end, the teacher asked the operation to be carried out and the procedure to find the result. At all times, the teacher guided the procedure necessary for students to understand and solve the mathematical problem.

Teacher 1 continued with another problem where two-digit numbers were used. The teacher asked the operation to use and the students answered that to solve the problem they needed to add. During the resolution, the teacher asked some students to model the procedure by adding the units and the tens. In this way, all the students observed the procedure and were able to compare the answer with their own results.

In this part of the class, Teacher 1 showed a list of keywords used in word problems. All the students began to mention the words that they had seen and practiced before, as appears in this excerpt of the observation:

> **Teacher 1:** ... Let's continue boys and girls. Okay, to talk about addition we have this special vocabulary, boys and girls. I want that you repeat with Miss Ivo these words, right? Are you ready? Okay you say plus
> **Students:** Plus
> **Teacher 1:** That's right, now you say together
> **Students:** Together
> **Teacher 1:** Now you say in all
> **Students:** In all
> **Teacher 1:** That's right, total
> **Students:** Total
> **Teacher 1:** Both
> **Students:** Both
> **Teacher 1:** Combined
> **Students:** Combined

Teacher 1: Increase
Students: Increase
Teacher 1: Add
Students: Add
Teacher 1: Sum
Students: Sum
Teacher 1: Altogether
Students: Altogether
Teacher 1: That's right, these words are always about addition, addition. If I say in all, you say "oh is addition." What is the name of this symbol? Plus, plus, one plus zero, one plus zero is one.

After doing this exercise and practicing addition word problems, the teacher presented a subtraction word problem. The students immediately identified the key word and mentioned that they had to subtract to solve the word problem. The teacher continued with the same procedure, asking about the result obtained from the subtraction of the units and the tens. This time, she emphasized the use of a mathematical sentence, highlighting the importance of mathematical symbols. The teacher together with the students solved two more mathematical problems, following the same structure presented above.

It is very important to mention that the teacher did not speak Spanish at any time. With regards to the student interventions, only two interventions were made in Spanish.

Teacher 1: Observation Two – First Grade

In observation 2, Teacher 1 greeted the class and mentioned that word problems were going to be worked on that day. The activity was independent, where the students had to show what they had learned on the subject of addition and subtraction. Between problem and problem, the teacher left time for the students to find the result. In total four problems were solved.

In the first problem, the students had to add. The teacher asked them the operation to be carried out and the students answered "sum." Then the teacher asked them to show the procedure and realized that some did not know how to do it. The teacher reminded them of each step in the

form of a column to solve addition and subtraction operations. In this process, some students

used Spanish; however, the teacher addressed them in English.

In this class, the students asked for the teacher's support all the time to help them

understand what was happening in the problem. The teacher addressed the whole class, recalling

the steps that must be followed to solve mathematical problems, emphasizing that they had

already seen that. This support can be seen in the following excerpt from the observation:

> **Teacher 1:** Okay number two, one volunteer to read the number two?
> **Student:** Miss yooo
> **Teacher 1:** Yes [student's name], listen to [student's name]
> **Student:** Thirty-three
> **Teacher 1:** There are thirty-three
> **Student:** Twelve more come. How many **in all**?
> **Teacher 1:** What math operation do you have to do?
> **Student:** Addition, miss.
> **Teacher 1:** How many rabbits **in all**?
> **Student:** Forty-five
> **Teacher:** Okay, we need to make an addition, three plus two is equal five, three plus one is equal four, very good!
> **Students:** 45!

Some students had difficulty understanding the question. The teacher read the problem to

them again, pointing out the quantities that were being used and the drawings associated with

them. Additionally, Teacher 1 underlined the key words in the question to identify the operation

they had to perform.

Teacher 1 allowed the students who had finished to use a platform called "Matific,"

where they could practice exercises and math problems. For the students who presented

difficulties doing the class word problems, she asked them about the questions they had. Due to a

girl's insistence on not understanding the problem, Teacher 1 supported the process in Spanish,

accommodating the question so that the student could understand and solve the problem.

The class ended by pointing out the importance of reading for solving problems and that

they should practice addition and subtraction operations.

Teacher 2: Observation One – Second Grade

In the second grade class, Teacher 2 started the lesson saying hello to all students and presenting the topic: greater than and less than. In the first part of the session, Teacher 2 introduced the topic with a video and highlighted the key words related to mathematical symbols. The teacher provided two pieces of paper (simulating flashcards) where the symbols greater than and less than were shown. Before starting with word problems, the teacher practiced some exercises where the students needed to identify the corresponding symbol, in order to complete the mathematical sentence.

> **Teacher 2:** You have two papers in your hands, so I want everybody now to show me. According to this, the greater than, that points to the right. With your right hand everybody, like this, like this. Everybody up; I want to see. The greater than symbols points to the right with your right hand. Alright? Excellent. Let's see the examples we have here. 45 is greater than 23. 67 is greater than 50.
> **Teacher 2:** Excellent. Now let's go with the less than. Everybody, show me the less than. Greater than with your right hand and less than with your left hand.

After they practiced the exercises, the teacher showed the students a short digital book "Monster Knows – Greater Than and Less Than," a story that included pictorial representations of the content in an attractive way for the students. During this activity, the teacher pointed out the key vocabulary and how the students needed to use greater than and less than concepts.

In the second part of the class, the teacher told the students that they had to solve word problems using the concepts that they covered in the book. She helped the students by reading the word problems and showing them the objects on the screen. The students participated by raising their hands and giving the answer to the teacher, who modeled the solution as a way to support all the students' understanding. In the first group of word problems, it included yes/no questions. She read the word problems and the students needed to answer as a yes or no regarding the situation. All the students got the answer correct for the five word problems. It was noticeable that the problems increased in difficulty as they progressed. The class finished with

two different word problems, where students had to solve a mathematical operation to get the answer. In the first word problem, one student answered the word problem. The teacher asked some questions to check the result and to provide feedback to the class. Another student and the teacher repeated the same process with the second word problem.

Teacher 2: Observation Two – Second Grade

Teacher 2 began the class by greeting the students and commented that in the session, the topic of greater than and less than was going to be continued.

In the first part, the teacher showed a video related to the subject as a review. With the video, students could remember the vocabulary worked on and apply it to the class. After the video, they began to solve math problems. It was clearly noticeable that the level of difficulty was increasing.

In the first problem, the teacher corrected a student who mistakenly mentioned the wrong answer. To support that student and all the class, the teacher repeated the question of the word problem and emphasized the concepts of greater than and less than. After this contribution, the students found the correct answers to the two problems related to the same structure. To include problems with mathematical operations, the teacher first modeled the procedure to do so, as can be seen below.

> **Student:** Nella has five valentines. Sara has nine...eight
> **Teacher 2:** No
> **Student:** Ten, sorry, ten valentines. How many more valentines does Sara have?
> **Teacher 2: How many more valentines does Sara have?**
> **Student:** five
> **Student:** I think she have five
> **Teacher 2:** Okay, can you please write the answer? Do you know how to do it?
> **Student:** Yeah, I know how to do it.
> **Student:** Where I need to write the answer?
> **Teacher 2:** Write it right next to Sara, right below. [Student's name] we're waiting for you now.
> **Student:** I need to put five more, right?

In the company of a student, they went through the steps to find the answer, always emphasizing the problem question.

After modeling two, Teacher 2 presented a problem with subtraction. The students used the concepts of greater and less than to perform addition and subtraction operations. In the first problem, a student mentioned the answer and, with the teacher's help, showed the procedure used to find the result.

In the next type of problems, the values had to be compared, using subtraction to find the result. A student mentioned the correct answer and the teacher asked her to complete the missing number in the math operation. After completing it, the teacher asked her to read it for everyone. It was important for the teacher to repeat the symbols that were being used and to review the procedure. In this way, all students could understand the necessary procedure for this type of mathematical problem.

In the following three mathematical problems, the same procedure was performed. It is important to note that the teacher used the images of the elements involved in the problems. In this way, the student could associate the elements with the vocabulary. Additionally, the student could make a graphic representation of what the problem was presenting.

The teacher continued with mathematical problems related to addition and identification of the greater and less than symbols. After having practiced with the problems related to subtraction, it was quite noticeable that students could solve these problems easier. All the students wanted to participate in solving the word problems. The teacher presented three problems, where three students modeled for their classmates how they had found the answer and which symbols were present.

To end the class, the teacher shared an educational game where students had to solve mathematical problems related to the topic of the class.

Teacher 3: Observation One – Third Grade

In this observation, Teacher 3 greeted the students who were entering the room, mentioned the work schedule for that day, and reminded them about the materials they needed for class. She made a brief description of the stages for the class, noting, first, the completion of a mathematical challenge and, then, the explanation of word problems using the concept of multiplication.

In the first part of the class, the teacher presented a mathematical challenge. The idea was to practice the mathematical operations that they would use during the session. The teacher guided the students during the resolution of one exercise by asking one by one, the answer of each multiplication problem, modeling the procedure to all the students and finding the product. It was clear that the students were used to doing these kinds of challenges during math classes.

In the second stage of the class, the teacher began with the presentation of a video, where seven strategies for solving mathematical problems were shown: (1) read the entire word problem, (2) think about the word problem, (3) write on the word problem, (4) just if you want to, you can draw a simple picture and label it, (5) estimate the answer before solving, (6) check your work when done, and (7) practice word problems often. The students did not seem surprised by the strategies. To the contrary, they seemed to remember using those strategies previously. The teacher emphasized that they would be working with not only addition and subtraction problems during the class. She mentioned that the problems must be read very carefully to identify the type of operation to be carried out. Also, Teacher 3 showed the list of keywords associated with addition and subtraction in word problems (see excerpt below).

Teacher: Good. Here I said that in all the word problems, we always notice some key words, right? always, to make you understand the word problems. Here we have some examples of addition key words, for example. Can you read the first one please?
Student: Sum
Teacher: Next
Student: More, in all, altogether, plus, combined, total, more than, increased.
Teacher: These are specific keywords if you are talking about addition word problems, okay. Just keep that in your mind. For example: There are seven pencils on the desk. John drops off two more pencils. Easy word problem. How many pencils are there **in all**?
Teacher: Before giving the answer we have to read the word problem, as you can see here there is a keyword, **in all**, is one of the examples of keywords addition word problems. When you see **in all** it means that you have to do an addition, okay?
Students: Okay

After presenting the video, Teacher 3 modeled four math problems. The students, using the keywords previously presented, had to identify the type of operation to be carried out in the word problem. The math word problems were grouped into two addition and two subtraction word problems. Students had no difficulty identifying the operations of the word problems. However, during the process of solving mathematical operations, it was evident that some students have difficulties in subtraction.

To apply what they learned, Teacher 3 assigned them three math word problems to solve individually. The students had to follow the previous steps to identify the operation and then go through the procedure to find the result. All the students wanted to participate. The teacher gave the opportunity to other students who had not participated during the class. The procedure was repeated: the teacher asked the operation to be carried out and the result. On two occasions, the results were incorrect. The teacher provided feedback on the answers, highlighting the procedure of addition and subtraction. To close the session, Teacher 3 summarized the concepts of addition and subtraction in word problems, emphasizing the most common keywords. There was no time to practice multiplication word problems due to the weaknesses found in students.

Teacher 3: Observation Two – Third Grade

Teacher 3 greeted the students and mentioned that the activity carried out the day before, which was related to the creation of mathematical problems, had been graded and that she had prepared today's class, in relation to the results. The teacher presented a list of verbs, noting that they were the most common in math problems and that day everyone was going to use these verbs to create math problems.

In the second part of the class, Teacher 3 explained that they were going to carry out an experiment. The activity consisted of copying three mathematical problems; the first one was going to be shown on the screen and the second and third were going to be dictated. During the explanation of the first problem, several students interrupted the teacher saying that the answer was a sum, to which the teacher replied that she had not asked the operation to be carried out but rather the exercise they were doing consisted of analyzing the question of the problem. At that time, the teacher explained the structure of the problem and presented the question. During the resolution, the students participated by sharing the answers obtained.

In the second mathematical problem, the teacher began to narrate a situation between two siblings and asked the children: "What do you think the question of this situation should be?" The activity consisted of looking for a question that fit the situation that the teacher was asking. After two attempts, they found a question that fit the situation presented by the teacher.

For the last problem, the teacher presented a complete problem, including the question. She asked the students to identify the verbs used in the problem. Without hesitation, the children mentioned the verbs. Then the teacher asked them to analyze the question and find the answer. The students individually worked on the resolution of the exercise. At the end, a student said the answer, and with the help of the teacher, they modeled the procedure to find the result.

To end the class, the teacher told them that they would continue the next session with the creation of more problems, including the concept of division.

Teacher 4: Observation One – Fourth Grade

In this observation, Teacher 4 greeted the students and asked them what the topic was for today, to which some students responded "money" and others responded "the vocabulary of money." The teacher affirmed that they would be dealing with money and asked if they had printed the material for the class (note: teachers publish in advance what is going to be done in the classes, so students come prepared with the materials they need to develop the activities).

For the introduction, the teacher showed them a video presenting the vocabulary that was going to be worked on during the class. The teacher began to use the concept of exchange to build some situations, such as problems, and the students were contextualized with the definition and its use in mathematical problems. Additionally, she emphasized the currency of some countries, including Colombia, the United States, Spain, and England.

In the second part of the class, she explained the concepts of income, expenses, savings, and investments. As an example, she showed them how the stock market works with Tesla and Google. Throughout the time, the teacher addressed the class in English; however, to give some clarification of some concepts that the students did not understand, such as "stocks," the teacher used Spanish.

She finished the class, summarizing the concepts worked on and informed them that for the next class, they would solve mathematical problems using the vocabulary of this topic and the basic operations.

Teacher 4: Observation Two – Fourth Grade

In this class, Teacher 4 greeted all the students and mentioned that they would solve problems using the last topic: money. The teacher asked the students to write the definitions of the concepts and recommended paying attention to the words because they will appear in the word problems.

After working with the vocabulary, the teacher explained that individually, they had to find the results of the word problems that she was going to present. Randomly, the teacher asked the students for the answer. The first student mentioned that it was an addition and the teacher said that the operation was correct but the result was incorrect. She called on another student and the child replied that she did not have the answer. The third student that was called on answered correctly. The teacher asked this student to explain to her friends how she found the answer. The student mentioned that it was an addition problem because the question was "how much money did he spend?" The teacher agreed with the student and recalled the vocabulary associated with addition.

For the next word problem, the teacher applied the same strategy, giving the students a couple of minutes to find the answer. She randomly called on three students and none of them had the answer. The fourth student said an incorrect quantity. Then the teacher asked the student to tell everybody the operation that he used, and the child replied that it was addition. The teacher agreed and asked another student for the correct answer. Finally, another student found the answer to the problem.

The teacher mentioned to the class that she was going to change the type of word problems. The teacher provided the children with an equation where they have to subtract income from expenses to identify the savings. Immediately, the children identified the operation

and said that they were going to use subtraction. Teacher 4 asked the students to do a word problem. After a couple of minutes, she asked for the answer. She called on two students, and none of them knew the answer. The third student identified the operation and after that, shared the answer with the group. The teacher requested that he explain to his classmates how he got the answer. The student replied that the child from the word problem had enough money to pay for the course, after subtracting $1,200,000 Colombian pesos from savings to $800,000 Colombian pesos as expenses. The teacher reflected on the vocabulary presented by the student and explained to all the students how to use it in word problems to find the operation and the result.

For the next word problem, the teacher repeated the same procedure, gave students time to do the problem, and randomly asked for the result. She called on one student who did not have the answer. The teacher told her to use the formula that she had given to all of the students to find the answer. One student said that the answer was $1,999,000 Colombian pesos, but the teacher asked if he had included all the expenses because the answer was not correct. The teacher asked for the operation that he used, and the student replied that it was addition. The teacher agreed and recommended checking the procedure. It was clear that this student knew the type of operation to solve the problem, but had problems with the procedure. The teacher asked another student for the answer and she said $2,350,000. To show all the students the procedure, the teacher asked the student how she found the answer, and the student mentioned that she added all the quantities. The teacher highlighted on the screen the values and showed the procedure.

The last word problem included savings. The teacher read the word problem and one student asked what salary was. The teacher explained the concept and connected it to the equation that she showed at the beginning of the class. After that, the teacher asked one student for the answer, but he did not know it. The teacher called on another student who gave the

correct answer. The teacher asked for the math operation that was used. The student said subtraction, and the teacher confirmed the answer. The teacher modeled the procedure to solve the word problem. In this case, it was clear that the last student understood the concepts, and he could apply them to solve the math word problem.

Teacher 4: Observation One – Fifth Grade

In this class, the teacher greeted the students and presented the agenda for the day where she mentioned the new topic: money and the vocabulary related to this topic. The class started with a video where the most common words related to the topic appeared. The teacher used the video as an introduction for the new topic and highlighted the most common words.

In the second part of the class, the teacher showed the Colombian currency. The teacher explained the place value of the quantities that are used in Colombia compared to dollars. She pointed out this part because they will need it for word problems. The teacher explained some concepts associated with money in context. The teacher was talking about her life and how her parents taught this important habit. The students were saying the concepts, some of them in Spanish, and in some cases they referred to some personal examples such as "Last year, I was saving money to buy the new PlayStation." Other concepts such as income, investment, profit, spend, stocks and stock market were explained by the teacher.

In the last part of the class, the teacher mentioned the stock market and used Apple as the example. The teacher explained the concepts used above with the application and one student replied that he had an application like the one the teacher showed. He said that he was going to apply all that he learned in the class to earn more money.

The teacher closed the session, mentioning that the next class they were going to continue applying the concepts in word problems.

Teacher 4: Observation Two – Fifth Grade

The teacher said hello to all the students and mentioned that the objective of the class was to solve word problems using money. She started with a review of the concepts used in the last class.

In the second part Teacher 4 pointed out the types of word problems that they were going to solve which were related to incomes and expenses. The first word problem included expenses where they had to add. One student asked if the prices were in pesos or in dollars. Before the teacher answered, another student said pesos. The teacher agreed and explained that according to the context, it was not common to spend 12,000 dollars on apples. The teacher reminded the students about the explanation of the last class on currency and place value. On this occasion, the teacher gave the students the opportunity to participate without her calling on them. One student said he had gotten $30,500 pesos and the teacher checked the answer by modeling the procedure on the screen, adding the numbers and getting the same answer. Some students said that they got the same answer. In the next word problem, the teacher used the same structure, including the key word "spend" related to addition. One student raised his hand but had problems saying the number. The teacher supported him by reminding the place value chart. As a recommendation, the teacher suggested practicing numbers and place values.

The teacher told the class that the last problem was an introduction, and it was time to combine the concepts, income, expenses and saving. According to what she said at the beginning, they needed to use addition and subtraction. The teacher presented a word problem with three parts: A, B and C. After Teacher 4 read part A, she repeated the concepts of the main words in the mathematical problem. One student raised his hand and told the teacher that he had

the answer. The teacher asked the procedure he used to solve the problem. Both the teacher and

the student solved the word problem for the class, as can see below.

> **Teacher 4:** Again, the income from Andrea is four million pesos and the expenses is two million two hundred thousand, so how much can she save? Remember that the savings are the incomes that are not spent, the money that she didn't spend, Okay, [student's name] tell me.
> **Student:** One million and two thousand, ehh two hundred
> **Teacher 4:** Okay, how did you solve that one? How did you solve it [student's name]?
> **Student:** I take the four million and I like, I subtract two million and eight hundred and that gives me the answer.
> **Teacher 4:** So yes, what you needed to do there, and I'm writing into the chat. You need to do a subtraction; the operation is a subtraction. You need to do the subtraction between 4.000.000 minus 2.800.000 and the result of that subtraction is 1.200.000, okay? I just put it there on the chat, 4.000.000-2.800.000=1.200.000, okay? That is how much she saves; again that is the money that she didn't spend from her income.

In Part B, the teacher read the question and, at the same time, used the answer from part

A to connect what operation they had to do. She asked one student, and he said that the answer

was "yes" because after expenses she would have money left. She connected this answer with

part C, where the students needed to answer the savings of the woman after the expenses,

including the English course. One student said, $500,000 pesos, but that was not the answer. She

supported him by saying that he was close to the correct answer. Another student said $400,000

pesos. The teacher summarized the word problem giving the answer of each part and the

operations applied.

Another similar problem was presented. In this word problem the word "fixed" was

included and the teacher pointed out that this word was not mentioned in the glossary, but she

wanted to know if they knew the definition. None of the students answered, and she asked for the

definition in Spanish. One student said "arreglado" but the teacher replied in English that it was

correct but that there is more than one definition for that word. Another student said "fijo" and

the teacher confirmed it by adding more information to support the meaning and connected it to

the word problem, as shown next.

Teacher 4: Now the next example. Every month Sara have the following fixed expenses. Do you guys know what is fixed expenses? I think I didn't put it on the glossary. What is fixed? What it means fixed?
Student: Arreglado
Student: That you don't waste any more money that's left.
Teacher 4: No, do you guys know what is fixed in Spanish?
Student: Arreglar
Student: Arreglado
Teacher 4: Umm, that is one meaning but they have another meaning.
Student: Miss, fija
Teacher 4: Fijo yes, fijo. So are expenses that don't change, they don't change every month, they're fixed. They're always the same, so every month she has the same expenses that is why they're fixed, son fijos okay? That is fixed expenses. The one that people need to spend every month.

When the teacher was reading the word problem, immediately, as a way to clarify, one student asked the teacher if "fixed" expenses were the rent, the housing bills, and the internet. The teacher said that it was and requested the solution of the problem. After this explanation, many students raised their hands to give the answer to the word problem. The teacher called one student and he explained the procedure on how to get the answer. Part B of the word problem was a subtraction using the information of part A. One student and the teacher solved the problem together, and the class followed the steps and checked their answers.

In the last part of the class, the teacher invited the students to create word problems. She presented to the students a word problem where the values were missing and as a group they had to complete it. During the activity, the teacher asked the students the quantities that fit according to the description. One example was how much money a family pays for water monthly. The students participated in the activity providing the support for their answers. After they filled all the values, the teacher started with the questions of the word problem. While doing this activity, students were engaged and wanted to participate. The teacher called different students, the ones that never participated before. Two of them told the teacher that they did not have the answer. The teacher gave them the mathematical equation to solve the problem and motivated them to earn some extra points for solving the problem. After a couple of attempts, one student said the

correct answer and showed the procedure for part A. For part B, one student said one quantity but the teacher mentioned that it was the answer for A, and they were solving part B. Another student asked for an explanation because he was not sure about the procedure. The teacher repeated the equation that they needed to use to solve the word problem. The teacher called one student but she said that she was not sure about the answer. The teacher tried to persuade the student, but she insisted that the answer was not good and she did not want to participate. The teacher called another student, and he explained how to get the answer using a subtraction.

The class ended with the creation of another word problem. The class followed the same structure, filling the missing quantities and identifying the operation. This time, the teacher called the same student who was not sure before for her answer in the last word problem. The teacher explained the question and the student got the answer correct.

Results from Interviews

This section describes the results obtained after the application of the semi-structured interviews. As previously mentioned, eight questions were asked in Spanish, since the language was requested by the teachers. This is considered to be advantageous because the answers reflect, in a natural way, the thoughts and feelings of the interviewee. Any quotes from the teachers in this section were translated for this document.

The questions are classified into two groups: (1) strategies for solving mathematical word problems, and (2) analysis of language structures in word problems. The first group aims to identify similarities and differences between the difficulties encountered when teaching or learning mathematical problems with the most common strategies among elementary school teachers. The second group aims to analyze the grammatical structures of a mathematical

problem. In turn, it allows for an evaluation of the recognition of these structures by teachers and their application in the teaching of mathematical problems.

Teacher 1: Interview – First Grade

In the context of first grade, Teacher 1 uses playfulness as a fundamental tool for the development of her classes, especially when teaching word problems. She believes that students should use elements that are around them to connect with their imagination and reality. She takes advantage of the resources at hand to include them in mathematical problems. For the teaching of mathematical problems, she said that the students must have the concepts clear before being presented in a mathematical problem. In this way, it is important that the student knows the vocabulary that will be encountered. Additionally, the development of mathematical problems for younger students should be done through play, as she said in the interview "During the lessons we played, who took my cookies? Who stole them from me? Then everyone says me, you. That way, they see that it was a problem to be solved" (Teacher 1, Turn 2). She points out that it is not the same to teach the younger children in elementary school as it is to teach the older ones.

The teacher mentions something interesting about the use of English. For her, the English language must be taught through a context and the student must be shown the object that is being talked about. Grammatical structures cannot be shown, since they are in the process of learning to read and identifying words. She suggests that all the time a teacher must model and use resources to support the process. This is where the different digital platforms, books, and other interactive resources appear so that the student, little by little, becomes familiar with the language to later present it in the mathematical word problems.

Teacher 2: Interview – Second Grade

For the application of the interview with Teacher 2, I continued with the same procedure, where the two types of questions mentioned above were presented.

During her interview, this teacher emphasized the use of elements found everywhere to teach mathematical problems. She insists that students should observe the elements that are mentioned to them in the problems, either real objects or through images. In this way, the student can continue with the learning process towards mathematical operations.

Another important element that Teacher 2 pointed out is associated with the vocabulary that children should know. She mentions that it is important to work on the key words associated with mathematical operations. However, she stated that the specific vocabulary of mathematics in isolation does not make any sense and that is why a general vocabulary related to different contexts should also be worked on.

At this point, the teacher connected the vocabulary and the use of English. She identified the second language, in this context, English, as one of the difficulties for students in learning math problems. She also pointed out that students are more attentive to the words and grammatical structures than to the problem situation and the mathematical process. During her classes, she always tells her students that math problems include content and language, where reading is very important in the process. This can be seen in Turn 18: "You see what a lot of reading comprehension is? We must understand what we are reading in order to analyze it, in order to know what we have to do."

Teacher 3: Interview – Third Grade

Teacher 3 mentions that identifying the level of the students, taking into account their level of mathematical thinking, is fundamental when teaching mathematical problems, too. She

considers that there are many strategies to teach students to understand and solve problems. However, she believes that the most effective one will be the one that the students need. Previous knowledge and the ability to solve basic operations must be taken into account. She considers that before presenting a mathematical problem, a review of the contents and basic operations should be done.

In the second part of the questions, she talked about a connection between the students' level at the time of solving the mathematical problems and their level of proficiency in English. She does not consider the use of a second language during the teaching of mathematical problems to be a great limitation; however, she affirms that there is a relationship in terms of the students' speed and confidence when facing mathematical problems.

Finally, the teacher recognizes that when teaching word problems, she does not evaluate the linguistic characteristics of the problems that she is going to present to the students beforehand. Related to this, she said: "We simply enter the topic, the same problem includes the mathematical part and the language part, and I think that is how everything evolves" (Teacher 3, Turn 24). She said that, while teaching mathematical word problems, she highlights vocabulary and keywords related to basic operations.

Teacher 4: Interview – Fourth/Fifth Grade

During the interview with Teacher 4, it was evident that she uses many everyday situations where students can identify themselves as a way to capture their attention and then show the mathematical operations to be used. For her, the greatest difficulty presented by the students is related to the organization of a plan to solve the problem, she said:

I think what I have been able to evidence the most is how to structure the step by step process that they should follow in their heads because normally the student tends to read

the question and wants to do the process quickly, and many times they have to stop and think, what are they asking me, what do I have to do, what do I have to find, and then start solving. (Teacher 4, Turn 6).

She recommends guiding the student through the entire process, emphasizing that they should organize a plan, starting with reading the whole word problem and finishing with the identification of the problem. That will allow them to find the answer to the question posed in the word problem.

In relation to the second group of questions, associated with linguistic structures, the teacher points out that in teaching mathematical problems, a second language is an additional challenge for students. She mentions that in a bilingual context, students with a higher level of English tend to identify and understand more easily what is being asked of them in the mathematical problem. Also, when creating their own problems, the level of English is an important factor in terms of grammatical structure and vocabulary used. Considering all of the above, she suggests that it is an advantage for those students with a high level of English and a disadvantage for those with a low level of English.

Results from Lesson Plans

In this section, the results of the lesson plans are described, focusing on the identification of language objectives, the integration of the use of mathematical problems in each of the topics, and the application of strategies and resources used by the teacher to understand and solve mathematical problems. The mathematics lesson plans were chosen, taking a sample from each period, three in each grade, from all primary school grades (Grade 1 to Grade 5) for a total of 15 lesson plans to evaluate.

First, in reference to the linguistic objectives, during the review of the lesson plans, no evidence was found of that aspect mentioned directly in the document. It is important to point out that during the activities, it can be inferred that aspects of language are worked on, but it is not explicitly mentioned in the objectives section. All the objectives found in all lesson plans are focused on mathematical skills and subject content rather than language.

It is necessary to highlight the presence of mathematical problems in each of the lesson plans that were analyzed. In all of them, it could be observed that during the activities proposed for the class, the presence of mathematical problems comprised a high percentage in the development of the plan. It was evident that the teachers, within their planning, work on the understanding, development, and creation of mathematical problems. In fact, there are exclusive lesson plans to develop skills in understanding and solving mathematical problems (see Lesson Plans – Third Grade, Term 2 in Appendix 22). Another important aspect relates to the creation of mathematical word problems, although usually in the higher grades, the lower elementary school teachers develop activities to promote this skill.

Taking as a reference the presence of mathematical problems in the lesson plans, it is necessary to mention that all the teachers included several strategies related to word problems (e.g., key words, images, analysis of the problem question, among others). To cite one example, in the third grade plan the CUBES strategy was found where each of the letters symbolizes an action: C stands for circle the numbers, U represents underline the question, B means box the key word, E for evaluate and draw, and S is solve and check. In all grades, teachers indicated the use of mathematical vocabulary for the content and the basic operations. Additionally, it can be seen in the lesson plans that the teacher plans for providing feedback on the activities performed,

promoting the understanding and verification of the process carried out in the mathematical

problems.

Chapter 5. Discussion

This chapter discusses the results of this research project. To carry out this process, the data was triangulated using the observations, teachers´ interviews and lesson plans.

During their classes and interviews, it is clear that all teachers emphasize vocabulary that students must know in order to face mathematical problems. This vocabulary, also known as keywords, contains a group of words that, according to the level of the student, allude to the procedure necessary to solve the situation presented. More specifically, the keywords are connected to the basic mathematical operations. In this way, a student with a command of this vocabulary will be able to identify the operation needed to solve a mathematical problem, as mentioned by Johnson (1944). As evidenced in the results, all teachers present the key words to their students. Depending on the grade and the teacher, they are presented and highlighted during the explanation of the class. The keywords that teachers used during the observations and the interview from 1st to 5th grade were the following: add, sum, addition, increase, combined, in total, all together, subtract, left, sold, decrease, increase, minus, lost, take away, reduce, product, factors, times, percent, parts, each group and half. The most interesting case was presented by Teacher 1, who showed her students a list of key words needed to solve addition problems and had them repeat them. Therefore, the teachers support the process of student recognition of the operations to be performed in the mathematical word problem, as Chan (2015) suggests teachers do in his article.

Besides teaching students the vocabulary of mathematical operations, the teachers in this study also teach the words necessary to understand the context of the word problem. It is well known that the vocabulary of mathematics differs from everyday vocabulary. As mentioned by Tavares (2015) in his study, in the context of mathematics, some words have a different

connotation, and it is necessary for teachers and students to be able to identify this vocabulary. Many times it is found in the problem, so it becomes necessary for teachers to provide the corresponding explanation, giving clarity to the student about the context and use of that word. An example of this was when Teacher 4 asked the students for the meaning of the word "fixed," and, as expected, the students gave the most common meaning. However, in the context of mathematics, specifically in money matters, the word fixed has another meaning. This is when Schleppegrell's (2007) statement about students facing and struggling with vocabulary becomes clear and her recommendations on what teachers must do in order to support the process of vocabulary acquisition becomes important.

In lower primary, as recommended by Ausubel and Robinson (1969), vocabulary should be presented through images or representations, providing a context for students. This was also evident in this study, for example, when one teacher used flashcards as an additional classroom resource as a tool that supports the students' learning process. Similarly, teachers used narrative texts during classes to allow the student to connect with a particular context, in line with the same idea from Strain (1969). In this study, this was seen in the way the second grade used the book "Monster Knows – Greater Than and Less Than." In this way, students do not feel that what they have learned is isolated knowledge; on the contrary, it is part of a whole and, thus, their learning is more meaningful.

Similarly, teachers used the concept of prior knowledge during classes to introduce new vocabulary as Mastropieri and Scruggs (2007) suggested in their study. This connection to vocabulary that they already know is necessary so that students can understand what is being presented, and they can connect it with the new vocabulary that teachers are trying to teach them. This is when questions such as "Do you remember this topic? Do you remember what it means?"

appear in the classes. In the lower elementary school grades, the teachers referred to the fact that students are developing the process of reading and acquiring skills in their mother tongue. Although they suggest that there is no impediment for students to learn, they mention that it is necessary to use more ludic strategies and activities to support this process. In upper elementary, the students are expected to have a wide range in vocabulary due to several years of exposure to new vocabulary. However, as mentioned by teachers, not all students have the same level mainly because some are new to the institution and their academic background is not the same as students who have been in the institution for years.

Besides focusing on language features such as vocabulary, the teachers expressed the need to use different strategies so that all students have the opportunity to understand and solve mathematical problems. The most commonly used strategy is related to structuring a method or steps for understanding the problem and then solving it. In 1945, Póyla presented a structure for teaching mathematical problems. Since then, many authors have united to establish a guide for teachers and students when working with mathematical problems. In the context of this study, all teachers recognized a structure for teaching mathematical problems. Likewise, the teachers established that, depending on the level, more emphasis should be placed on some steps than on others. As a summary, the stages used by the teachers during the classes are presented below, not necessarily in order: (1) read the problem as many times as necessary, (2) identify quantities and values, (3) identify key words, (4) identify the operation to be performed, (5) read and understand the problem question, (6) design a plan, (7) implement the plan, and (8) review and check.

Going more deeply into this process, the first item refers to the understanding of the problem as a whole. In their interviews, the teachers placed great emphasis on this stage,

especially because it is what they consider should be done first since it represents understanding the general idea of the problem. They emphasized that even if the other stages are developed, this one is fundamental at the moment of understanding the situation to be solved as mentioned by Wickelgren (1974). If the students do not understand what is being presented to them, no matter how much the teacher insists that they continue with the other stages, the students will not connect with the problem and it will be very difficult for them to find the solution. In this study, teachers employed this stage and used different strategies to carry this out. In elementary school, modeling and reading by the teacher was the most frequent strategy used. In the upper grades, although modeling was done, in some moments of the class, the students were independently in charge of carrying out this first stage. Thus, the teachers considered this stage as crucial when presenting mathematical problems to the students and used several strategies during this stage.

The second stage refers to the identification of the numbers or quantities presented in the mathematical problem. In most cases, problems present the values in the form of digits; however, there are some cases where the quantities are presented in written form. When this happens, as evidenced in third grade and suggested by Damhs (1970), the teachers insist that students write the quantities in digit form in order to use it later in the solution of the mathematical problem. All teachers mentioned the importance of identifying these quantities, and the most common strategy used is for students to circle each of them in the mathematical word problem.

As for stages 3 and 4, a list of the words most used by teachers in the institution was identified and presented above. Each of them refers to a basic mathematical operation. When the problems were presented to the students, the teachers during the modeling, underlined or highlighted the words in the text. This makes it much easier for the identification of the math operation and the design stage of the plan.

Stage 5 relates to understanding the problem question. The whole analysis of the mathematical problem is summarized in the understanding of the question to be answered. During the interviews, lower elementary teachers pointed out that the question contains the keywords that allow students to identify, and sometimes confirm, the operation that needs to be performed. The strategy evidenced in the observations was reading the question and noticing where they found the key words. The students, together with the teacher, identified them and associated them with a mathematical operation. However, upper elementary teachers, in addition to confirming such information, emphasized that students in the upper grades must go beyond the key words and analyze the context and the information requested. For example, during the grade 4 and 5 observations, the teacher used mathematical problems with more than one question to be solved. To support the process for all students, the teacher broke down and reformulated the problem questions as mentioned by Taveres (2015). Grammatical structures and vocabulary were taken into account for the process.

After the previous stages, a plan must be designed to solve the mathematical problem. In stage 6, as mentioned by Allan (2002), strategies should be sought to solve the problem through representations of a real context. As evidenced in lower elementary school in the observations of Teachers 1 and 2, the problems followed a specific structure. When noticing this schema, the teacher and the students find it easy to design a plan, most of the time through graphic and symbolic representations, as suggested by Kinstch and Greeno (1985). In upper primary, teachers must classify the different exercises to be presented, as Teachers 3 and 4 commented in their interviews. As evidenced in the observations of teacher 4, in word problems with more than one question, the student must establish a general plan, identifying each of the

operations involved. Thus, the conversion of language statements to mathematical statements mentioned by Damhs (1970) was evidenced as a strategy for this type of word problems.

In stage 7, after identifying the type of problem and designing a plan, next comes the application of the plan, basically, the application of the mathematical operations necessary to find the answer or answers to the questions of the problem. As Marshall (1995) mentioned, depending on the level of the students and problem type, graphical representations, column operations procedure, or mental math operations are usually used. All teachers modeled the procedure in the mathematical operation. In lower elementary school, the process was totally guided and on a few occasions, the student independently carried out the process. On the other hand, in upper elementary school, the teachers modeled a few problems and the students continued with more independent work.

In the last stage, the review of the operations used, the teachers carried out the process through the students themselves. Among the most used strategies according to Tavares (2015) and found in this study, too, were questioning techniques or immediate corrections. In addition to understanding the problem, the teachers showed interest in performing the basic operations. At all times, the teachers accompanied the students at this stage. Likewise, in the interviews, all teachers agreed that this stage is fundamental in the process of teaching mathematical problems. It is necessary to confirm that all students understood and focus on those students who did not. As evidenced by teacher 1, one student did not understand the operation performed and had some questions. The teacher, at the time, explained it to her and provided her with a different space, at break time, to go deeper into this type of operation.

Since this study took place in a CLIL setting where certain characteristics are essential, this chapter now focuses on those aspects. The first essential aspect relates to CLIL's

development of both content and language. It was evident that although the teachers work with certain elements of language, they did not have them clearly identified as objectives for the development of the course, as was noticed during the class observations and in the lesson plans. However, in the interviews, they affirmed the importance of the use of language when teaching mathematical problems. One of the main considerations when working with CLIL is the use of strategies to work with the dual focus of content and language, as stated by Coyle et al. (2010). During the lessons, teachers were more focused on problem solving (content) than on language features, as Gough (2007) found, somewhat lessening the strength of integrating this dual objective of CLIL. Although some opportunities were lost, some significant gains were evidenced in terms of the work carried out for the development of vocabulary skills, especially related to key words and the context of the problem, as mentioned earlier.

As mentioned in the first part of this section, teachers placed a lot of emphasis on math vocabulary and content. In CLIL it is important to work content hand in hand with language, as mentioned by Coyle et al. (2010) referring to first "C" content. In this way, teachers provided students with the vocabulary necessary for the shaping of a mathematical context and environment. Likewise, as mentioned by Barwell (2015), the language of mathematics differs from everyday language, a space of trust and excellent communication was necessary for all those involved in the learning process. The teachers, during their classes, provided a safe and calm environment for their students, who, in a spontaneous and enriching way, asked questions and contributed to the development of the activities. Hence the importance of effective communication, as mentioned by Marsh et al. (2012), in strengthening cooperative and collaborative growth.

Additionally, the learning process, in this case for understanding and solving mathematical problems, follows a route through the thinking skills set out in Bloom's taxonomy, an aspect that is a part of CLIL's 4Cs, also: cognition. In the lesson plans and in the observations, the presence of a step-by-step structure for the achievement of the proposed objectives was noted. From identification to creation, students developed their thinking skills through the activities proposed by the teachers. A greater emphasis on the identification of key words and structure was evidenced in the lower elementary while in the upper elementary, although this skill was necessary, the students created their own problems, demanding a greater challenge in their thinking process and a high commitment from the teachers to support this process in the students.

The last characteristic of the CLIL methodology refers to culture. This aspect is fundamental when preparing and conducting classes. In the classroom observations, the teachers did their best to move the students to different spaces through imagination and creativity. Although the study was conducted in the context of the pandemic and most students were behind a camera, the teachers used different resources to make it possible to take the students to other scenarios. In lower elementary, teachers told stories and read books, and in upper elementary, through pages and digital content, students were able to get closer to that other reality. In addition, the teachers used the resources that the students had from previous experiences or objects that made the class more meaningful. In this way, the native language was not blocked. On the contrary, it was used to reaffirm the new content and strengthen the language to be acquired, as recommended by Tavares (2015).

Chapter 6. Conclusion

This study recognizes the teacher as a key element in the process of helping students in the understanding and solving of mathematical word problems. With this in mind, it aimed to answer the question: How can teachers support the comprehension of mathematical word problems in a CLIL context? More specifically, it focused on two sub-questions: (1) How do teachers analyze the linguistic challenges of mathematical word problems? and (2) What strategies do teachers employ to support student comprehension?

In answer to the questions of the study, it is clear that planning, designing, and executing different pedagogical strategies is important to support the comprehension of mathematical word problems in students. Teachers recognize that for students, linguistic elements are one of the greatest difficulties when facing mathematical problems. During their planning, teachers identified prior knowledge and a list of words to be worked on in class. In this way, the teachers were prepared to face the possible lack of knowledge of the words and their meaning for the students. Additionally, they recognize that students are in the process of reading and writing, especially in the case of lower primary, and emphasize repetition and contextualization of vocabulary. In the case of upper primary, teachers anticipated possible confusion of meaning of certain words and through different strategies, repetition, native language, or context, they were able to support language difficulties.

Additionally, all teachers agreed that the recognition of the structure of the question is the main challenge for its subsequent understanding. Therefore, grammatical structures, verb tenses, adjectives, nouns, and nominalizations are examples of complex structures where many of the students have difficulties and that teachers have to support through the analysis of mathematical problems. Also, the teachers emphasized the mathematical problem question. The teachers

classified, analyzed, and even created, together with the students, different questions with the purpose of building the foundations of mathematical thinking through the acquisition of mathematical language.

In addition to analyzing language challenges, teachers use some strategies to support students' comprehension process when confronted with mathematical problems. The strategy most used by teachers was the recognition, interpretation, and application of everyday and mathematical vocabulary. Additionally, teachers used eight stages for solving mathematical problems. While carrying out these steps, teachers also supported students' comprehension by underlying or circling new vocabulary or having their students do this, transforming word expressions to mathematical expressions, and modeling through interaction during classes. Similarly, the integration of the 4C's of the CLIL model during classes recognizes, in addition to content and communication, fundamental aspects such as culture through different contexts and thinking skills by working upward through levels. The teachers were able to integrate these aspects, along with communication (i.e., language) and content, in their classes. Finally, the use of the native language, Spanish, by teachers and students was another strategy that was used to strengthen skills and concepts needed during the teaching and solving of mathematical word problems.

The results obtained from this study will be shared with the head of department for analysis and implementation of the strategies considered effective in primary. In order to obtain a more in-depth perspective on this process of problem solving in the area of mathematics in the institution, it is recommended that a similar study be conducted in the middle and high school section. In addition, a suggested strategy for this is peer observation since it allows for professional growth and invites reflection among the participating teachers as they enrich their

pedagogical work. Continuing with the same idea, it is recommended that mathematics teachers in this institution work together with the language department to strengthen the appropriation of the language of mathematics through strategies used in the acquisition and development of language.

A limitation of this study is that it was carried out only at one institution with four teachers. In order to have a broader view of strategies that teachers use to support students' comprehension of word problems, other studies could be carried out involving more schools and teachers. Furthermore, it could be interesting to see if the same strategies are used in other contexts, for example, outside of Colombia, so a comparative study could be done.

Through this study, it was possible to conclude that the comprehension of mathematical problems is a process that requires an analysis based on both content and language and supported by different strategies used by those who participate in the process, the students, and those who support it, the teachers.

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Appendix 1: Observation 1 – Teacher 1 – First Grade

First Grade
Observation 1
Teacher 1

Teacher 1: Good morning. How was your break? Great?
Student: Great.
Teacher 1: Great, okay very good, okay I'm going to put you some points in class Dojo because you came on time to the class. Yes, very good! How many points do you have now?
Student: Six hundred seven six
Teacher 1: Six hundred seventy…
Student: Sixty-six
Teacher 1: Six. Ohhh wow.
Teacher 1: Okay, show me your paper for math or in a jamboard
Student: Yo la tengo aquí
Teacher 1: That's right, excellent.
Student: Miss yo hice dos, una mi mamá para explicarme para ver si comprendí
Teacher 1: Okay, good.
Teacher 1: Okay boys and girls let's start our class, we are on time. Good morning boys and girls!
Student: Good morning miss
Teacher 1: Okay, are you ready for your class?
Student: Yes, miss
Teacher 1: Yes, today boys and girls today we are gonna talk about addition and subtraction word problems, ohh problems...yes we need to solve, to learn how to solve those problems. First we're going to watch a video.
Teacher 1: We are ready now to start.
Teacher 1: Okay, I bring a play, look at my box, my magic box, think what I have inside
Student: Cookies
Teacher 1: Cookies! yes point to [Student name]. One cookie to [Student name]. Okay, let's play who took the cookie from the cookie jar? Like this, who took the cookie from the cookie jar? come on let me see you like this...who took the cookie from the cookie jar? Somebody took the cookie, let's see who took the cookie. Everyone sing, who stole the cookie from the cookie jar? Come on, sign with me, who stole the cookie from the cookie jar? let 's see.
Teacher 1: One cookie, what name in this class starts with the letter A?
Student: [Student name].
Student: [Student name].
Teacher 1: Okay, [Student name] stole the cookie from the cookie jar. [Student name] you say "who,me?"
Student: Who me?
Teacher 1: Everyone say, "yes you"
Students: Yes, you!
Teacher 1: [Student name] say "not me"
Student: Not me!
Teacher 1: And then everyone asks, "then who?"

Students: Then who?
Teacher 1: Okay, another name that starts with A
Students: [Student name].
Teacher 1: Okay, let's sign… who stole the cookie from the cookie jar?
Teacher 1: Abigail stole the cookie from the cookie jar. [Student name] you say
Student: Tambien [Student name]
Teacher 1: That's right, after Abigail is Abril. Okay, [Student name]
Student: Who, me?
Students: Yes, you!
Student: Not me!
Teacher 1: That's right, everyone then says, "then who?"
Students: Then who?
Teacher 1: Okay, let's ask [Student name], [Student name], who stole the cookie from the cookie jar? [Student name] stole the cookie from the cookie jar.
Student: Who, me?
Teacher 1: Okay everyone says, "yes, you!"
Students: Yes, you!
Student: Not me!
Students: Then who?
Students: [Student name]
Teacher 1: [Student name], who stole the cookie from the cookie jar? [Student name] stole the cookie from the cookie jar.
Teacher: [Student name], who stole the cookie from the cookie jar? [Student name] stole the cookie from the cookie jar
Student: Who, me?
Students: Yes, you!
Student: Not me
Students: Then who?
Teacher 1: ¿Lo dejamos para la próxima class, yes? Let's continue boys and girls. Okay, to talk about addition we have this special vocabulary boys and girls, I want that you repeat with Miss these words, right? Are you ready? okay you say plus
Students: Plus
Teacher 1: That's right, now you say together
Students: Together
Teacher 1: Now you say in all
Students: In all
Teacher 1: That's right, total
Students: Total
Teacher 1: Both
Students: Both
Teacher 1: Combined
Students: Combined
Teacher 1: Increase
Students: Increase
Teacher 1: Add
Students: Add

Teacher 1: Sum

Students: Sum

Teacher 1: Altogether

Students: Altogether

Teacher 1: That's right, these words are always about addition, addition, if I say in all, you say "oh is addition" What is the name of this symbol? Plus, plus, one plus zero, one plus zero is one.

Teacher 1: Okay, help me to solve some problems but first let's think about that we need to read the problem, right? Is it very important to read, read a plan, yes? What do I know and what do I need to solve? What do I know about the problem and what do I need to solve?

Teacher 1: Then try to solve but please write and use some object to solve the problem and don't forget to check and work backwards right? yeah it's very important to review if everyone is okay. Are you ready to solve one problem?

Student: Yes

Teacher 1: Yes, okay let's start number one, there are…(whistling)

Student: Six birds

Teacher 1: Six birds sitting on a tree. Six birds sitting on a tree. Three more come there. How many birds are there in all?

Students: Nine

Teacher 1: Nine, but how do you know that? Read, listen, somebody can read the problem? Okay José, listen to [Student name]

Student: There are six birds sitting on a tree. Three more come there. How many birds are there in all?

Teacher 1: That's right, okay here I have my six birds, let's count

Students: One, two, three, four, five, six, seven, eight, nine

Teacher 1: Okay six plus three is equal

Students: Nine

Teacher 1: In all indicates that is addition

Teacher 1: Okay, I have more problems, look, there are 35 men and 22 women, where? in a bus. How many persons are there in the bus?

Student: ¿Puedo decir?

Teacher 1: Yes, of course. We need to solve to make addition or subtraction? Addition, there are 35 and 22 women. Thirty-five plus twenty-two in vertical position, five plus two?

Student: Seven

Teacher 1: Is seven and three plus two?

Students: five

Teacher 1: Ohh is five, so how many persons are there on the bus?

Students: Fifty-seven

Teacher 1: fifty-seven, 57, to word the problem is very important to read, try to understand, what do I need to know and how do I solve? Ohh I have to make an addition, right?

Teacher 1: Okay, I have one more, ohh is subtraction, the key words for subtraction, this is minus, minus, now you say less than

Student: Less than

Teacher 1: Take away

Students: Take away

Teacher 1: Decrease

Students: Decrease

Teacher 1: How many more?
Students: How many more?
Teacher 1: Fewer than
Students: Fewer than
Teacher 1: Remains
Students: Remains
Student: How much more? fewer, difference
Teacher 1: That's right, who is reading? Abigail?
Student: Yes
Teacher 1: Very good Abi, try it again, listen to Abigail.
Student: How many more? decrease, take away, minus, less than, difference, fewer, how much more?
Teacher 1: And remains. Okay good. Okay, problems, 5 students were playing in the playground. 2 of them go back to classroom. How many students are there in the playground now?
Students: Three
Teacher 1: How do you know? Subtraction, look, how many students were at the playground?
Student: Five
Teacher 1: Five okay, and how many come back to classroom?
Student: Two
Teacher 1: To, okay let's write the subtraction sentence, you say
Student: Five minus two
Teacher 1: Is equal
Students: Is equal three
Teacher 1: That's right, very good, big applause boys and girls. I have one more word problem, left indicates that is subtraction. Let's read, don't forget to read the problem.
Teacher 1: There were seven…(whistling)
Student: Birds
Teacher 1: Birds sitting on a tree. three of them fly away. How many birds are left on the tree?
Student: Four
Teacher 1: So we need to make a subtraction. At the beginning there were 7 birds but 3 of them fly away. Okay, let's write the subtraction sentence, one volunteer to read this subtraction sentence?
Student: Yo miss, soy [Student name]
Teacher 1: Okay, yes [Student name]
Felipe: Seven minus three equals four
Teacher 1: Four, the answer is four…
Student: Birds
Teacher 1: Birds, that's right. Ohh I have another bus again. There are 35 students in the bus, how many students are in the bus?
Student: 35
Teacher 1: 35, suppose that this is the school bus number 2, there are 35 students in a bus but 12 of them are girls, I need to know how many boys are there
Student: 23
Teacher 1: Okay I need to make a subtraction, yes Felipe? 35 minus 12
Felipe: 12 equals 23

Teacher 1: Okay, let's start with the what is this position? one or ten?
Student: One
Teacher 1: For one, five minus two is equal
Student: Three
Teacher 1: That's right, now three minus one is equal
Student: Two
Teacher 1: That's right, so the answer is…
Student: Two
Teacher 1: Two?! Are you sure?
Student: 23
Teacher 1: How many boys are there? 23 boys, 23 boys. Okay another, Tiya caught 12 ladybugs in the lawn. She let 4 go. How many are left?
Student: Eight
Teacher 1: Left means that is subtraction.
Student: Eight
Teacher 1: Oh that's right, how do you know that?
Student: Twelve minus four equals eight
Teacher 1: Twelve minus four is eight. Oh here is a mistake, is eight. Okay more word problem, this is a fruit, what fruit is this?
Student: Apple
Teacher 1: Apple, a fruit seller had 45 apples. He sells one, two, twenty, thirty, thirty-one, thirty-two of them. So how many apples are still left with him? We need to make a sub…
Student: Thirteen
Teacher 1: Subtraction, that's right, 45 minus 32, five minus two?
Student: Three
Teacher 1: That's right, oh is three, what happened here?
Student: Miss is thirteen
Teacher 1: Yeah, that's right
Student: It equals 13
Teacher 1: Yeah, that's right equals 13. Okay, the subtraction sentence is 45 minus 32 is equal 13, that's right. One more, there were 34…
Student: Flowers
Teacher 1: Flowers on a plant. Mary took 22 of them to make a garland. How many flowers are left, all indicating that is subtraction. 34 minus 22, four minus two?
Student: Two
Teacher 1: Two, that's right and three minus two?
Student: One
Teacher 1: One, very good, what is the answer?
Student: Twelve
Teacher 1: Twelve, very good. One more, ohh what is this?
Student: Pizza
Teacher 1: Delicious, is a slice of pizza. Sara ate three slices of pizza and Jack ate five. How many slices of pizza did they eat altogether? This word, altogether…
Student: Eight
Teacher 1: ...that means is an addition, okay three plus five
Students: Eight

Teacher 1: Is eight, that's right.
Teacher 1: Okay boys and girls, the class is over, happy say goodbye, goodbye, goodbye, we see you another time.
Students: Bye miss

First Grade
Observation 2
Teacher 1

Teacher 1: Good morning
Student: Good morning miss
Teacher 1: Are you ready for your class?
Teacher 1: We are going to start and is activity time boys and girls, okay, this problem, number one, one volunteer to read the problem number one
Student: Yo miss, soy [Student name]
Teacher 1: That's right [Student name]
Student: There are 25 fish
Student: Miss, ¿eso si es una tarea?
Teacher 1: Fishes, that's right, yes is activity time
Student: There are 12. What is sum?
Teacher 1: Okay, what is the sum? What is?
Student: ¿Toca sumarlos?
Teacher 1: Addition, okay write it in vertical position boys and girls, write
Student: 37, 37
Teacher 1: Ahh, very good! Okay write, write working out. Okay take your pencil boys and girls and do the addition in vertical position.
Student: Ya voy por la dos
Teacher 1: Ohh wow, what is the answer for the number one?
Student: 37
Teacher 1: Okay, five plus two
Student: Miss, ¿todas son sumas?
Student: Miss ya voy por la número seis
Teacher 1: Ohhh one moment, two plus one
Student: Miss una pregunta, ¿esos todos son sumas?
Teacher 1: Yes
Student: Miss I finish
Teacher 1: Ohh very good [Student name], wait for your friends Vero.
Teacher 1: [Student name], [Student name], listen, my champions, very good [Student name]; are you working [Student name]?
Teacher 1: Okay number two, one volunteer to read the number two?
Student: Miss yooo
Teacher 1: Yes [Student name], listen to Vero
Student: Thirty-three
Teacher 1: There are thirty-three
Student: Twelve more come. How many in all?
Teacher 1: What math operation do you have to do?
Student: Addition, miss.
Teacher 1: How many rabbits in all?
Student: Forty-five

Teacher: Okay, we need to make addition, three plus two is equal five, three plus one is equal four, very good!

Student: 45!

Teacher 1: 45, yes [Student name]. I want to… uhm let me see, [Student name], can you read the question number three? The problem number three, sorry.

Student: Yes

Teacher 1: Okay

Student: I have 34

Teacher 1: Apples

Student: I buy 11 apples more. How many apples do I have now?

Teacher 1: Now, okay, so you have to make an addition

Student: Forty-five

Teacher 1: 45, let me see if it is 45, four plus one is…

Student: Five

Teacher 1: Five

Student: Miss I finish all

Teacher 1: You finish all, wait for Miss, please. Four plus one is five, three plus one is…

Student: Four

Teacher 1: Four, ohh is 45 boys and girls, very good. Okay let's right here the answer, 37, 45 and 45. Okay let me ask, [Student name] did you finish? Very good [Student name]

Student: Miss I finish

Teacher 1: Ohh you finish the part one, I finish the part one, let's continue with the part two, okay question or problem number two, miss please call one student to participate

Student: Miss yo todavía no había terminado

Student: Miss ¿por qué vas tan rápido? Yo todavía estoy en la primera.

Teacher 1: Okay, no problem. Here [Student name]? Are you in number three?

Student: Listo miss, ya

Teacher 1: Okay [Student name], but let me ask to [Student name].

Teacher 1: [Student name], you are in what problem?

Student: Todavía no

Teacher 1: Five more minutes [Student], right?

Student: Miss ya puedes cambiar

Teacher 1: Okay, thank you and [Student name]?

Student: Miss no

Student: Miss finish all

Teacher 1: Don't worry girls, I have a surprise, there is a game

Student: Miss estoy jugando ese juego

Student: Miss, ¿cuál es el número?

Teacher 1: Please [Student name] say the number, one hundred…

Student: One hundred

Teacher 1: Fifteen?

Student: Fifteen

Teacher 1: Okay, yes. [Student] ready?

Student: Miss es que todavía no, es que se me borró todo y lo tengo que volver a hacer.

Teacher 1: Okay [Student], entonces hacemos algo, right? En homeroom podemos quedarnos mi amor y podemos terminarlo todo.

Student: Miss I finish all, soy [Student name]

Teacher 1: Okay [Student name], I have a surprise, go to google classroom, what number, listen.

Teacher 1: Abi, two plus four

Student: Six

Teacher 1: Two plus four is equal six, good. [Student name], two plus one is equal, listen to Mariana, yes Mar? Open your microphone my dear

Student: Three

Teacher 1: Excellent

Student: Miss

Teacher 1: Yes [Student name]?

Student: ¿Puedo compartir pantalla del juego?

Teacher 1: Es que están trabajando todavía tus amigos, ¿yes? Ahora les doy el momento. Okay let's read the problem number five; there are 27 snails, 11 snails more come. How many snails are there now? Okay, [Student name] is going to help me to know the answer, [Student name], seven plus one?

Student: Seven plus one?

Teacher 1: Yes

Student: Eight

Teacher 1: That's right, and two plus one?

Student: Three

Teacher 1: That's right, the answer is 38

Student: Thirty-eight

Student: Finish all

Teacher 1: Okay, the number six, one volunteer to read the problem number six? Okay listen to Ana, yes Ana?

Student: Miss, ¿cuál es? ¿el six?

Teacher 1: Yes [Student name], number six.

Student: I have 13. I buy 15 more. How many do I have?

Teacher 1: Yes…

Student: Twenty-eight

Teacher 1: Okay, we make an addition

Student: Miss ya son las 11:10

Teacher 1: Ohh no lo puedo creer,   ensi boys and girls ahí les queda, play now.

Teacher 1: The class is over, happy say goodbye, goodbye, goodbye, we see you another time.

Students: Goodbye miss.

Appendix 3: Observation 1 – Teacher 2 – Second Grade

Second Grade
Observation 1
Teacher 2

Teacher 2: Okay. Today we are going to see greater than, less than and equal to. Do you know what equal to means, right? Okay. Now [Student name] read this please.
Student: We use the greater than sign to show that one value is more than another.
We use the less than sign to show that one value is smaller than another.
Teacher 2: Have you seen these signs before? Yes or no? What about you [Student name]?
Student: No, miss, I am in primary
Teacher 2: But you are in primary, this is primary, second grade. Maybe [Student name], have you seen this sign before, no? No?
Student: No
Teacher 3: Okay so maybe [Student name] was here last year or she doesn't remember, right?
Student: I don't remember
Teacher 2: She doesn't remember oh okay. Well these signs mean greater than and less than.
Teacher 2: [Student name] could you please read that part over there.
Student: We use the greater than sign to show that one value is more than another.
Teacher 2: Now [Student name], could you please read this part?
Student: We use the less than sign to show that one value is smaller than another.
Teacher 2: Okay thank you very much, let's continue. When we compare numbers we are telling about their sizes,3 is greater than 1, 2 is less than 9. Instead of writing words we use signs that tell about size.
Teacher 2: Let's watch the following video to understand more about it.
Teacher 2: Here we find more ways to say greater than, what are the ways? Who wants to read?
Student: Me miss
Teacher 2: Okay go ahead [Student name]
Student: larger.
Student: more
Student: bigger.
Teacher 2: This is the same as greater than so we can say larger than, more than and bigger than is the same, alright? Okay.
Teacher 2: Reminder of equal signs when a number is the same.
examples: greater than, you see the symbols? 5 is greater than 4. Now let´s see [Student name] can you please read this one. Five is less than sixteen, okay.
Teacher 2: [Student name] can you read the first one please.
Student: five is greater than four.
Teacher 2: Now let´s see this one, everybody at the same time, one, two, three.
Students: six is greater than four.
Teacher 2: The next one two is less than three and the last one here is four equals four, okay easy you see? okay.
Teacher 2: You have two papers in your hands so I want everybody now to show me, according to this the greater than, that points to the right. With your right hand everybody, like this, like this. Everybody up I want to see. The greater than symbols points to the right with your right

hand. Alright? Excellent. Let´s see the examples we have here 45 is greater than 23. 67 is greater than 50.

Teacher 2: Excellent. Now let's go with the less than, everybody show me the less than, greater than with your right hand and less than with your left hand.

Teacher 2: Let's practice now and show the sign you have. Everybody ready? Okay let's practice. Let´s see the first one, do you have the answer for the first one? 23 is less than or greater than 32? This one or this one?

Students: Less than

Teacher 2: yes, 23 is less than 32. Great okay number two, 67 is less than or greater than 76?

Students: Less than

Teacher 2: excellent. Okay number 3, 101 is less than or greater than 110?

Students: Less than

Teacher 2: correct, number four 108 is less than or greater than 180?

Students: Less than

Teacher 2: great. Now number five, 549 is less than or greater than 203?

Students: greater than

Teacher 2: okay now six, 302 is less than or greater than 203?

Students: Greater than

Teacher 2: okay great I think they are gonna get Dojo points because they are participating so much. Okay number seven, 809 is less than or greater than 908?

Students: Less than

Teacher 2: alright yes. Now number eight

Students: equal.

Teacher 2: 777 is equal to 777. And the last one 150 is less than or greater than 105? That would be greater than, right?

Students: Greater than

Teacher 2: Yes. lest continue then. Let´s practice, let's continue. Now let´s see, okay pancake. So let´s start 3 is greater than or less than 1?

Students: Greater than

Teacher 2: yes, that's correct. Two is greater than five or less than five?

Students: Less than

Teacher 2: okay. Next one, is four less than or greater than one?

Students: Greater than

Teacher 2: alright. Next one, is seven greater than or less than 9?

Students: Less than

Teacher2: that's correct. Next one is eight greater than or less than two?

Students: Eight is greater than two

Teacher 2: Now three is greater than or less than zero?

Students: Greater than

Teacher 2: So three is greater than zero, okay. Is three greater than or less than nine?

Students: Less than

Teacher 2: So three is less than nine, now the next one is eight less than or greater than two?

Students: Greater than

Teacher 2: Excellent, greater than, yes. Next one is zero greater than or less than five?

Students: less than

Teacher 2: you're right, okay great. Now the next one is four greater than or less than two?

Students: Greater than

Teacher 2: Okay four is greater than two and the last one is three greater than or less than six? Which one?

Students: Less than

Teacher 2: Yes, excellent, is less than. Now, let's listen to this book in MyOn – Monster knows. greater than and less than.

Did you like it?

Students: Yes, can we read it again? It is funny.

Teacher 2: yes! It is so funny. Okay, let's read and listen to it one more time.

Students: Yes!!

Teacher 2: Okay, now let's solve the following word problem. I will read it and you please, think and tell me the answer. Raise your hand if you know the answer.

My number is greater than 5 but less than 7. What could my number be? Who wants to answer? Let me see… [Student name]! Go ahead.

Student: miss. The answer is 6

Teacher 2: Great [Student name]! Good job. Now, let's see more word problems related to greater than and less than. Look at this. Miss, please. Take some of them to the board to write the answer- and I will read each word problem.

Does the number sentence match the story? Circle Yes or No.

Number one: Dizzy has fifteen bananas. Mango has more. She has nineteen bananas. Now, is 19 greater than 15? Yes? or No?

Students: Yes, miss.

Teacher 2: Good job! Excellent! Now let's read the next one. Ruby buys twenty-nine bows. Doc buys the same number of bow ties. Now, is 29 equal 29? Yes or no?

Students: Yes, miss. That's so easy!

Teacher 2: Perfect. Now let's see the next one. Number 3. Waldo sleeps for fifty minutes. Mango sleeps for less time. She sleeps for 40 minutes. So, is this correct? Is 50 less than 40? Yes or no?

Students: No miss. That's not correct. It is not right. Because 50 is greater than 40.

Teacher 2: wow! Awesome! Miss more Dojo points for everybody! They are doing great today and always, right?

Teacher 2: yes miss. They are amazing kids.

Teacher 2: yes, miss. They are so smart, intelligent and they understand everything. Yay! Now, let's read the next one. ready everybody? Number 4: Dizzy eats 6 pears and 3 apples. Ruby eats more. She eats ten pieces of fruit. So, pay attention to this situation. Is 10 greater than 6 plus 3? yes or no? What do you have to do here? Who wants to tell me?

Student: Me miss I want.

Teacher 2: Okay [Student name], go ahead and tell us.

Student: We have to add, first 6 plus 3 that is 9. Then we need to compare that number with the number 10.

Teacher 2: Excellent [Student name]! So, according to what he said, let's see the new way now. So, is it 10 greater than 9?

Students: Yesssss miss.

Teacher 2: good job everybody! Oh my God I am so happy to see that you understand. Now, I am going to read the next word problem. Number 5. Waldo catches 5 fish and then 5 more. Doc

has less than Waldo. He has 8 fish. Do you see that this is quite similar to the one before? So, pay attention to see what we have to do. Anyone want to say the answer?

Students: Me, me, me

Teacher 2: let me see who can answer this one. Uhmmm [Student name]. You! Go!

Student: We need to add 5 plus 5 and then we do the rest.

Teacher 2: excellent [Student name]! Can you do it, please?

Student: okay miss. Five plus five is 10. And now, we say 10 is less than 8. But is not. The answer is no.

Teacher 2: Great [Student name]. Now, let's listen to this song. This is the greater than and less than song. Did you like it?

Students: Yes, miss

Teacher 2: Okay. Now let's go to the next slide. And it is time to write in the notebook.

So everybody opens your notebook and start writing. Remember to write the date, cycle and day. This is going to be for the next 10 minutes that we have to finish the class. Please, be careful when writing, okay? Next class we will continue practicing greater than and less than word problems. Oh, I forgot to tell you that we need to finish this one first, obviously. But then we can continue with the next one. Next step is to solve some Math riddles but let's finish today with the notebook. And you have now class with miss.

I will turn my microphone and my camera off for a moment because miss is here now and she needs to be ready, Okay? So, see you. Bye, bye. See you later.

Students: Bye, bye miss.

Second Grade
Observation 2
Teacher 2

Teacher 2: Hello
Students: Hello miss
Teacher 2: Remember that last time we saw this, use greater than less than signs and find a number in between, so today is going to be a practice, okay¡, so this is the practice, so let me start presenting this.
Teacher 2: Greater than and less than and equal to but we are going to see this video one more time just to refresh, okay?
Student: To remember
Teacher 2: To remember
Teacher 2: The math muscle, which one is our math muscle?
Students: The brain
Teacher 2: The brain, that's right, it's our brain.
Teacher2: Okay, word problem/find a number in between, let's read first, listen to this we need to read first and if I don't understand then we have to read again, okay? if you need a pencil and a paper to write, you can do it, okay? Just in case, if you don't need it it's okay.
Teacher 2: Number one, Luisa has, what sign is this
Student: Smaller than
Teacher 2: Less than, less than nine stickers and
Students: Greater than
Teacher 2: Greater than seven, how many does she have?
Student: Sixty
Teacher 2: No, she has, Luisa has less than nine stickers, right? and more than seven
Students: Eight
Teacher 2: So we need to find a number that comes right here in between
Students: Eight, eight
Teacher 2: Eight, how many does she have?
Students: Eight
Teacher 2: Simple, uhu? Easy?
Students: Yes
Teacher 2: Okay, so now [Student name], no [Student name], can you read the second one? please
Student: [Student name] ran twelve miles
Teacher 2: No [Student name], [Student name], [Student name]
Student: [Student name] ran twelve miles but twenty-four
Teacher 2: More than, remember to say, to use this
Student: [Student name] ran more than twelve miles but
Teacher 2: Less than
Student: Less than twenty-four miles. How many miles did Max run?
Teacher 2: How many? So we need to have 24, and?
Student: 12

Teacher 2: 12, that's correct, that's correct, what did you do there? [Student name], what did you do there? [Student name], what did you do there?

Teacher 2: Because you have the number 24, right? [Student name], what did you do there? How did you find out that the answer was twelve?

Student: Because it was greater than

Teacher 2: That's it, greater than 12 but less than 24, because you used the two numbers, right?

Student: Yes

Teacher 2: Okay, so let's continue, can you add a number to make this correct? Listen umm, I'm going to allow you to write, so if you want to write an answer you can do it, okay let's start with the first one, it says, can you add a number to make this correct?

Teacher 2: So that would be, two is less than, what number would you write? Okay [Student name], great, go, go, go, do it.

Student: Three

Teacher 2: Excellent, alright, excellent, so that's the idea, okay? That's the idea, that you understand that a number is greater than another and in this case you chose your own number, okay?

Teacher 2: Okay, so let's continue with the next one, let's go with this one, thirty-five is greater than… okay [Student name], great [Student name], excellent [Student name], excellent [Student name], alright, great.

Teacher 2: Now let's go do this

Students: Seventeen

Teacher 2: Equal to seventeen, because you have to see the sign, 17 is equal to 17, okay now let's do this one. Okay [Student name], great

Student: Easy peasy

Teacher 2: Wow yes, one million, alright. Great, good job, good job, okay now let's continue. What is it Leonor? you raised your hand

Student: My connection it's not good

Teacher 2: It's not good? Okay sweetie

Student: Repeat please

Teacher 2: We're going to continue, then you can practice and participate, okay the next one.

Teacher 2: Greater than and less than. Follow the examples and work out the sums, okay? Here it says, by how much is 6 greater than 3? By how much is 6 greater than 3? So as you see we have here six and then three, so what would be the answer?

Students: Three

Teacher 2: Three, so let's write the answer here, three, that is the answer. Okay, now number two, Vicky, can you please read number two?

Student: Yes

Teacher 2: Okay go ahead

Student: By how much is 9 greater than2?

Teacher 2: Okay, by how much is 9 greater than 2? What do we have to do now here? okay Martín yes.

Student: Nine and two

Teacher 2: Okay, so what is the answer? Who wrote that symbol? [Student name] stop. So, what is the answer?

Student: Seven

Teacher 2: Okay, so can anybody write the answer here?

Student: Yes! I can miss

Teacher 2: Okay, somebody did, it was [Student name], okay great. Now [Student name], can you read number three please?

Student: By how much is 8 greater than 7?

Student: It's one

Teacher 2: It's one, can you please write the answer?

Teacher 2: Easy, uh? Easy, uh?

Student: Easy

Teacher 2: Easy peasy

Student: Easy peasy

Teacher 2: Comparing word problems, ready everybody? [Student name], I want you to read the first one. [Student name]? [Student name]? It's [Student name] here? Okay, there she is, you are going to read the first one.

Student: Ummm I need to read the first one, yeah?

Teacher 2: Yeah

Student: [Student name] has five valentines. Sara has nine...eight

Teacher 2: No

Student: Ten, sorry, ten valentines. How many more valentines does Sara have?

Teacher 2: How many more valentines does Sara have?

Student: five

Student: I think she have five

Teacher 2: Okay, can you please write the answer? Do you know how to do it?

Student: Yeah, I know how to do it.

Student: Where I need to write the answer?

Teacher 2: Write it right next to Sara, right below. [Student name] we're waiting for you now

Student: I need to put five more, right?

Teacher 2: Okay, we barely see it. Five, how many more valentines does Sara have? Five. Number two [Student name], can you read number two please?

Student: Emma has 8 candies. Daniel has 3 candies. How many less candies does Daniel have?

Teacher 2: How many less candies does Daniel have? What do we have to do there? What? Alright, alright

Student: It's [Student name]

Teacher 2: Okay [Student name], great. Now [Student name], can you please read number three baby?

Student: Yes

Teacher 2: Okay, go ahead

Student: Gabi has 10 hearts. Juan has 4 hearts. How many less hearts does Juan have? Six

Teacher 2: Does Juan have? Six. Who wrote the answer before?

Student: I don't have idea

Teacher 2: Umm okay, Now Martin write it down, [Student name] write it down, [Student name] write the answer now. [Student name] do you think this six number is correct?

Student: Yes

Teacher: Okay, okay, now let's continue here with number four, [Student name] can you please read this one?

Student: [Student name] has 7 chocolates. Giulia has 6 chocolates. How many more chocolates does [Student name] have?

Student: One
Teacher 2: What could be the answer?
Students: One
Teacher 2: Simple, huh?
Students: Yes
Teacher 2: So simple, easy peasy, right?
Student: Easy peasy
Teacher 2: Easy peasy, easy peasy. Yes, [Student name]?
Student: How do you say this in English?...
Teacher 2: Don't know
Teacher 2: Let's continue then, okay now number three, by how much is 8 greater than 7? I need you to come and complete this part here, somebody come and write here and somebody come and write here. By how much is 8 greater than 7? So difficult, uhu?
Student: No
Teacher 2: And the answer? and the answer? and the answer?
Student: One
Teacher 2: Alright, okay great. Now number four it's already done but I'm going to read it, it says, by how much is 4 less than 5? Five minus four is one, okay. Now let's go to read number five. Alfonso, can you read number five please?
Student: Yeah, by how much is 1 less than 3?
Teacher 2: What is the answer?
Student: Two
Student: Two
Student: Is very easy miss
Teacher 2: Very easy, I know.
Student: All one, one and one
Teacher 2: Okay, so let's continue. Compare using signs up to 100. In each set mark the correct sign, ready everybody? We need to say if it is less than, equal or greater than, okay? So I'm going to read the first one, 90 what? 89. Which one is the right answer? Greater than or less than?
Student: Greater than
Teacher 2: Greater than [Student name], excellent. Now let's see the next one, 22 and 11, what is that? is less than or greater than or equal to? What is it?
Student: Greater than
Teacher 2: Greater than, now let's see the next one
Student: Less than
Teacher 2: 73 and 83
Student: Less than, less than
Teacher 2: What is the answer? Less than
Student: Less than
Teacher 2: Okay [Student name], excellent, 73 is less than 83. Okay, next one
Student: Less than
Teacher 2: [Student name] please stop, 10 and 13
Student: Less than
Teacher 2: What is the sign? Less than, 10 is less than 13. Alright, oh my god, I see that you understand this topic so well.

Teacher 2: Okay so Greater Than and Less than, workout the sums. By how much is 8 less than 16? Who wants to do this?

Student: Victoria

Teacher 2: Okay, but we cannot start with number 8 here, no [Student name] we cannot start with 8 here, it has to be the opposite, [Student name]

Student: The opposite, the opposite

Teacher 2: Uhmm

Student: The rest is eight

Teacher 2: The answer is eight but what about the process? Yes [Student name], excellent Jose, alright

Student: Yes [Student name]

Teacher 2: Alright, now let's go to do number two okay, by how much is 10 less than 13?

Students: Three

Teacher 2: Alright. great. Now let's see the next one, number three, by how much is 16 less than 25?

Student: I am writing, wait me a second

Teacher 2: Okay, what is the answer? Nine? Nine it's not the answer, nine it's not the answer, no, no, no, what is the right answer? nine is not the right answer

Student: It's five

Teacher 2: Five? Are you sure?

Student: Six?

Teacher 2: Yes! nine is the right answer

Students: Miss Martha!!!

Teacher 2: I was trying to see if you were paying attention, look at [Student name] face she's like. Why, if you know that is right, you have to say, no miss is right, okay let's continue here, four, by how much is 18 greater than 10?

Student: Eight

Teacher: I want the process, okay thank you [Student name]

Student: You're welcome!!

Teacher 2: Number five, by how much is 12 greater than 8?

Student: Four, four

Teacher 2: So simple, uhu?

Student: Yes

Teacher 2: Let's see this one, okay so the numbers we have here 42 and 36, what is the sign we need to use? Greater than, equal to or less than?

Student: Greater, Greater than

Teacher 2: Greater than, excellent. Now here, 66 and 58, what is the? Greater than or less than?

Student 2: Less than

Teacher 2: Okay and now the most difficult one, this is the most difficult one, 91 and 91

Students: Equal

Student: It's not difficult, it's equal

Teacher 2: Let's do the next one, let's go with the next one, it says 10 and 40, is that less than or greater than?

Student: Less than

Teacher 2: Less than, okay. Miss I think I'm going to give some Dojo points, because they are participating

Students: YES!!!!

Teacher 2: Listen, listen, the person who answers the next problem it's going to have three more Dojo points. You need to read, okay? and think, okay?

Teacher 2: Miss, but you are going to say who say the answer or they?...

Teacher 2: No, the person that wants to do it because they need to read, I'm going to read but they need to see and then like, you know, have the process and the answer, alright?

Student: Alright

Teacher 2: Ready?

Student: Ready

Student: Yes

Teacher 2: I'm thinking of an odd number. It's greater than six but is less than nine. What could my odd number be?

Student: It's seven

Student: Eight

Students: Seven

Students: Eight

Teacher 2: You remember what is an odd number?

Students: Seven

Teacher 2: And what is an even number?

Students: Eight

Teacher 2: Who wants to tell me what are the odd numbers? [Student name], go ahead

Student: 1, 3, 5, 7 and 9

Teacher 2: Excellent, those are the?

Student: Odd numbers

Teacher 2: Odd numbers, yes?

Students: Yes, miss

Teacher 2: Okay so and what are the even numbers then?

Student: Me, me miss

Students: 2, 4, 6, 8 and 10

Teacher 2: What is this? Wait, what is the answer here? I'm thinking of an odd number. It's greater than six but is less than nine.

Student: Seven

Teacher 2: The answer is seven. All of them did it. Miss can you please write the names just to have the Dojo points of this. Okay pancakes, ready?

Teacher 2: Word problem review, I am greater than 60 but less than 80. The sum of my two digits is 9. My ones' digit is an even number. What number am I?

Students: Eight

Teacher 2: No

Students: Seventy

Student: Seventy-two

Teacher 2: I'm sorry but I have to do this, no, you are not listening. I'm going to share the screen again, I'm going to read the problem and if you need a pencil and a paper to do this please do it, okay? I'm going to do it again okay.

Teacher 2: I am greater than 60, I am greater than 60 but less than 80. The sum of my two digits is 9. My ones' digit is an even number. What number am I? So, what do you have to do first? You have to do a number line, right? Yes?

Student: Yes

Teacher 2: Okay, and what do you have to write in the number line? 62?

Student: 60

Teacher 2: 62? From 62 to 80. Excellent [Student name] but not 90, not 90. Not forget that a number line comes like this, so we go like 60, we go like 60 then 61, 62, 63, 64, 65 and it goes up to 80, right? Yes?

Student: Yeah

Teacher 2: And it says that the sum of the two digits is nine, so my ones' digit is an even number, so we go closing the path and we need to find out the number.

Student: 66

Teacher 2: Don't forget, don't forget that the sum of the two digits is nine, you see?

Student: Miss I know the answer

Teacher 2: Don't forget this

Student: Ninety

Teacher 2: No, it's six, how much is six plus one?

Student: Seventy-two miss, is 72

Teacher 2: Who said that? Who said that?

Student: [Student name]

Teacher 2: [Student name], awesome, great, good job [Student name]. What did you do [Student name] to find the answer? What did you do to find the answer [Student name]?

David: Because two is an even number

Teacher 2: Did you understand Miss? I couldn't understand what he said

Teacher 2: OH because seven plus two is nine.

Teacher 2: Okay, thank you so much, thank you so much, okay, great, good job, okay now, wow this is, we are going to finish today with this. You can come here and we have here this one.

Teacher 2: Right here, so it says less than, greater than games and practice, okay? So, you can come to the presentation is the 040, you click here, okay game, when you come here to the game you click here, math games, okay? And then you find the less than, greater than games and practice, okay? And when you are there you can come here and name to appear on title, let's say game or 2A, second A, okay and here minimum number let's say…

Student: A million miss, a million

Teacher 2: No, let's say ten and the maximum number let's say one hundred. You can do this, I show you here and then you have the game.

Teacher 2: Greater than and less than game, so what is the answer here? 94 is greater than or less than?

Student: Yeah, good [Student name]

Teacher 2: So we have to click here and it says, you did it, you earn one star, and you create your own game, okay? You can create your own game. Who is in the game now? Did you see how I set the game?

Student: I'm in the game

Teacher 2: Yes, generate, click and then you have your own game. What is the answer there?

Student: Is very easy [Student name]

Teacher 2: Now you can do it according to the numbers you want.

Student: You can help me?

Teacher 2: Yes, okay click game one or game two

Student: Game one

Teacher 2: Yes, click, math, click math games, click math games, wait let me circle the
Teacher 2: Were you are going to click
Teacher 2: Here
Student: Is very smaller
Teacher 2: Now here you have, is this one? yes, this one, click. Now you can write here [Student name] for example. [Student name]?
Student: Sorry, sorry, sorry
Teacher 2: Where it says name to appear on title, let's write [Student name]. Now the minimum number, what is the minimum number you want for your game? Okay and what is the maximum number? Now click generate, okay then you have your own game.
Teacher 2: You can practice this the way you want.
Students: It's so simple
Teacher 2: It's time to go to sports class, okay, we can practice next class. So everybody bye, bye.
Students: Bye, bye miss

Appendix 5: Observation 1 – Teacher 3 – Third Grade

Third Grade
Observation 1
Teacher 3

Teacher 3: For today we have, remember that Miss said that we were gonna have a math challenge at the beginning of the class, remember? about multiplication and then we are going to continue with how to solve word problems.
Here in you google classroom remember that we had this activity yesterday, remember?
Students: Yes!
Teacher 3: What was the idea? Yesterday Miss said that we were gonna start with these five first multiplications as a math challenge, right? So all of you in a piece of paper or in a notebook let's start solving this in like a challenge. The first one, 628 multiplied by 8. Please all of us, quickly. Time is running.
Teacher 3: Ok [Student name], because you are the number one, 8 times 8, can you give the answer please?
Student: 64
Teacher 3: So we pull the number 4 here and the number 6 on the top. 8 times 2, Samantha.
Student: 16
Teacher 3: Uhm, plus 6 on the top?
Student: 22
Teacher 3: 22 so I put the number 2 here and the other 2 on the top, the last one 8 times 6
Student: 48
Teacher 3: 48, plus 2 on the top?
Student: 50
Teacher 3: So we put the number 50 here, and the last one because we only have two multiplications as a math challenge. The last one is one, 388 times 5. Hurry up.
Student: I know, I know
Teacher 3: [Student name], you said that you have the answer, 5 times 8[Student name]
Student: 5 times 8 is 40
Teacher: 40, so we put the 0 here and the number 4 on the top, okay. Next [Student name], again, 5 times 8.
Student: 40
Teacher 3: Uhm, plus 4 on the top?
Student: Yes, 44
Teacher 3: Yes, so 4 here and 4 on the top. And the last one 5 times 3.
Student: Is 15
Teacher 3: Is 15, plus 4?
Student: 19
Teacher 3: 19, it's okay. So it's 1.940, good. So I'm going to erase these two math challenges, remember that each class we're gonna have one, two or three different multiplications to practice as a math challenge.
Teacher 3: Okay, yesterday Miss said that we were gonna have a special activity, remember? activity about what?
Students: How to solve a word problem

Teacher 3: My first question is; did you see the video yesterday?

Student: No

Teacher 3: So no because we didn't have the time but what happened? Miss Angie has here, she's a girl, she is the same age as you, she's nine or ten years old and she's here because she wants to share with you the steps for solving word problems, okay so everybody please be careful, pay attention.

(Video starts playing)

Teacher 3: Remember that Miss said that it was not always gonna be an additional problem, you need to read and understand the word problem, the information that the problem is giving so you can see and identify the operation then you pursue the solution of the problem, not always is an addition, right?

Teacher 3: Why is it important to write a number sentence? Because I don't know if you really know the process and then you just have the answer maybe Miss Angie said the answer is fifteen and then you copy fifteen but you don't know what is about the whole process to get the answer so for me as a teacher it is absolutely important to see your process okay? and also for the English skills, oral and writing skills you need to copy the long answer.

Teacher 3: Here we have four different steps. Now, yesterday you had to copy these seven strategies in your notebook. 1. Read the entire word problem. 2. Think about the word problem. 3. Write on the word problem. 4. Just if you want to, you can draw a simple picture and label it. 5. Estimate the answer before solving. 6. Check your work when done. And finally and for me one of the most important, practice word problems often.

Teacher 3: Good. Here I said that in all the word problems, we always notice some key words, right? always, to make you understand the word problems. Here we have some examples of addition key words, for example. Can you read the first one please?

Student: Sum

Teacher 3: Next

Student: More, in all, altogether, plus, combined, total, more than, increased.

Teacher 3: These are specific keywords if you are talking about addition word problems, okay. Just keep that in your mind. For example: There are seven pencils on the desk. John drops off two more pencils. Easy word problem. How many pencils are there in all?

Teacher 3: Before giving the answer we have to read the word problem, as you can see here there is a keyword, in all, is one of the examples of keywords additions word problems. When you see in all it means that you have to do an addition, okay?

Students: Okay

Teacher 3: Now we have the answer, we have the number sentence, 7+2=9, okay? easy. Let's move on.

Teacher 3: Subtraction keywords, take away, fewer than, less than, difference, less, shared, gave away, decrease, change and left. Isabel when you see or hear "how many are left?" means that you have to do a…

Student: Subtraction

Teacher 3: Subtraction. Yes, very good. Let's see the example: there are nine pencils on the desk. Alison comes along and takes five pencils. How many pencils are left?

Teacher 3: You see the word "left" here in the word problem immediately you realize, okay that is a subtraction word problem. Probably you are not gonna say" suma" "resta" no, you are not gonna find those words but yes of course you're gonna find in each word problems and specific words, keywords, that make your life easy to solve word problems, okay? And here Miss Angie

has the number sentence, 9-5=4, easy, I know that addition and subtraction for you it's totally easy.

Teacher 3: Let's practice, pay attention, you guys at home. Here Miss has four different exercises. The first one: there were 507 crows in a field. A loud noise scares 224 of them away. How many crowds are left? Let's try to understand the word problem. Let's see if there is a keyword here that would help me to understand what kind of word problem is here. What about "left"? Is "left" related to an addition or subtraction?

Student: Subtraction.

Teacher 3: Subtraction, so immediately you do a subtraction 507-224 can you do it for me please?

Student: 223

Teacher 3: Are you sure?

Student: Yes, I'm sure.

Teacher: No, it's not 23. Check your answer. 7 minus 4 equals 3. 0 because 0 it's 0 I have to knock my friend; number 5 can you please borrow me one. So then it's not gonna be 0 anymore it's start being a 10 and the number 5 it's not gonna be number 5 anymore so it becomes 4. So now 10-2 equals 8 and 4-2 equals 2 the answer is 283. So in the complete answer form: There are 283 crows left, Easy right?

Teacher 3: Number two: Frazer and Newton collect coins. Frazer has 378 coins. Newton has 443 coins. How many coins do they have altogether? What is the keyword in this problem?

Student: Altogether.

Teacher 3: Very good. And altogether is related to addition or to subtraction?

Student: Addition

Teacher 3: To addition very easy, so I have to add 378+443, who can give me the answer?

Student: Me.

Teacher 3: Give me the answer please.

Student: 821

Teacher 3: It is, that's the answer very good. There are 821 coins altogether.

Teacher 3: Practice number three: A market sells 476 apples in one week and 342 apples the next week. How many apples have been sold in total? What is the keyword in the word problem?

Student: In total

Teacher 3: And in total is it for addition or subtraction?

Student: Addition

Teacher 3: Good job, so you have to add 476+342

Student: Teacher I know the answer.

Teacher 3: Give me the answer

Student: 818

Teacher 3: Let's see, 6+2=8, 7+4=11 and 4+3=7. So it equals 818, yes. And the long answer is, the market sells 818 apples in total.

Teacher 3: And the last one, a sea turtle lays 615 eggs in the sand and buries them. 522 eggs hatch after 60 days. How many eggs are left in the sand? It is a subtraction or an addition?

Student: Subtraction

Teacher 3: So you have to subtract 615-522, if you have the answer let me know

Student: 103?

Teacher 3: I don't think so, let's see is less than 100

Student: 93

Teacher 3: That's correct. There are 93 eggs left in the sand. You were asking "Miss when do I have to copy?" Now is your time to copy, all of you please open your notebook and here we have one, two, three and four different word problems. And Miss Angie put here the keywords, addition keywords and subtraction keywords. Just copy the word problem and of course you have to show me the process, I need to see your number sentence and then your answer.

Teacher 3: The first one: There are 315 roses in a rose garden. The gardener plants another 74 roses. How many roses are there in total? "In total" is that for addition or subtraction?

Student: Addition

Teacher 3: Hurry up, this is for today not for tomorrow. You have to do the number sentence, 315+74 because is an addition word problem and then you put the total. [Student name] you said that you have the first answer, can you give the first answer?

Student: Yes, is 389.

Teacher 3: Okay, is that true? Yes, 389 that's the first answer. Good job [Student name]

Student: Miss I know the second one.

Teacher 3: The second one, okay let me read it: Sally and Tyger go spider hunting, Sally finds 375 spiders. Tyger finds 497 spiders. How many more spiders did Tyger find? Nicolas is this for addition or for a subtraction?

Student: Addition

Teacher 3: Are you sure?

Student: Yes, because he put more and in the table "more" is in addition.

Teacher 3: Uhm, what do you think?

Student: And the answer is 872

Teacher 3: Let's read again the word problem, meanwhile the rest of your friends continue coping. Sally and Tyger go spider hunting, Sally finds 375 spiders. Tyger finds 497 spiders. How many more spiders did Tyger find? I ask you again, is this a subtraction or an addition problem?

Students: Addition

Teacher 3: Uhmmm, it is not an addition, it is a subtraction, it's not an addition. If the question would be like who many spiders they have altogether, yes probably is gonna be an addition, but when you say "how many more" is because you need to make a difference in this case Tyger and Sally, okay? so it is a subtraction, so this is not the answer. You have to subtract 497 minus 375 and then you have the answer.

Student: Teacher I think that I have the answer.

Teacher 3: Give the answer, let me know

Student: I think that is 122

Teacher: Yes, you have the answer, 122 [Student name], good job. Next the number three, 522 adults and 243 children go to watch a show at the theatre. How many people is this altogether? Is it an addition or a subtraction?

Students: Addition

Teacher 3: Altogether is an addition keyword, so that one is easy, copy here the number sentence 522+243

Student: I know the answer

Teacher: [Student name] you can now give others the opportunity. If we don't have time to complete the answer for problem number three and problem number four we continue tomorrow. You can finish these two at home and then in my class tomorrow we can check the answer. Time is over, don't forget to practice multiplication and word problems.

Appendix 6: Observation 2 – Teacher 3 – Third Grade

Third Grade
Observation 2
Teacher 3

Teacher 3: Good morning!
Students: Good morning miss!
Teacher 3: So let's start with the class. So yesterday, let's talk about yesterday we had a grade activity, you yesterday had the opportunity to create your own word problem and I will see that activity in yours google classroom and I told you that today we were going to continue explaining and working on word problem, okay? But there's something that I wanna show you.
Teacher 3: Here we have the most common verbs used to create word problems, most of the times in the word problems he has given, buy, uhm for example: Michel gives 225 chocolates to his brother, Michel buys 2.435 stickers, Michel has 755 pencils, Michel collects 235 coins, Michel makes, etc.
Teacher 3: So here there are the most common word problems verbs that we use at the moment that we need to create our own word problem, okay so if today Miss Angie says "Now everybody opens your notebook and let's start creating or writing our own word problem" here you have an example of some of the verbs that you can use, okay? So that is gonna be the first part of the class, I wanna do my first experiment today. So please all of you open your word problems. Miss is gonna give you a word problem and you're gonna copy, como un dictado and then the number three is gonna be your creation, okay? but the first one and the second Miss is gonna give you the information, you copy because also that is one of the other skills that you need to practice because is in   ension.
Teacher 3: Okay let's start, word problem number one, are you ready? Margarite has 2,492 flowers in the garden and her mom has 567 more flowers in the yard. What do you think would be the question?
Student: I think it is an addition.
Teacher 3: No, I didn't ask if it is an addition or a subtraction, I said what would be the question?
Student: How many they have in total?
Teacher 3: Yes, how many flowers do they have in total? That's good. And that is the word problem number one. And what do you have to do after?
Student: Add the two numbers.
Teacher 3: Uhm, you have to add obviously 2,492+567, remember that the order and the position is absolutely important, this is the number sentence for you, 2,492+567, how much is that?
Students: 3,059
Teacher 3: Uhm, 3,059, and how is gonna be the answer? They have 3,059 flowers in total. Exactly that is the way that you have to create your own word problem and solve your word problem, okay?
Student: Miss I finished the first one.
Teacher 3: Excellent
Teacher 3: As you can see, let me show you something that is here, okay? involved in this exercise. We always have, always guys, we always have, if we are working on word problems,

we always have information, what is the information? that Margarite has 2,492 flowers and the other information is that her mom has 567 flowers. We always have information; we always have questions. So you have to solve the information, the word problem and obviously you need to give me the answer.

Teacher 3: Word problem number two: Camilo collected 897 stamps but his brother sold 463 of Camilo's stamps. What would be the question?

Student: How many the brother of Camilo sold?

Student: No

Teacher 3: We have the amount there, 463.

Student: I think the question is How many stamps Camilo got left? Something like that.

Teacher 3: Okay so, how many stamps are left? can be the question, good question, solve the word problem please.

Student: Miss I know the answer

Teacher 3: Okay, wait a second, let me copy first the word problem and then you can see if you have the correct words, okay? Cause I told you, here we are learning English and learning math at the same time.

Teacher 3: What do we have to do?

Student: We have to subtract.

Student: Miss I know the answer; I can say it?

Teacher 3: Yes, [Student name], wait a second. Now we have to subtract 897- 463. Everybody let's do the subtraction all together. Seven minus three is four, nine minus six is three and eight minus four is four, 434, okay that's the way that you have to do your word problems, okay? Any questions so far?

Teacher 3: Word problem number three. Felipe eats 287 cookies during the weekend and his sister eats 155 more cookies. The question is, how many cookies do they eat during the weekend?

Student: Teacher I know the answer.

Teacher 3: Did you copy like this?

Student: Yes!

Teacher 3: Very good, okay now you have to solve the word problem. What do you have to do?

Student: Add

Teacher 3: An addition, right? An addition, good job. So we have to add 287 plus 155.

Student: Miss, can I say it?

Student: Miss I know the answer.

Teacher 3: Okay, but wait a second, let that the whole class complete the word problem, let them finish.

Student: I finish.

Teacher 3: We need to wait for the rest of your friends.

Teacher: When you are creating word problems or writing word problems you are practicing English as well, so that's why it is absolutely like 100% important to know how to write a word problem. So here, the answer, let's do the answer: seven plus five is twelve, eight plus five is thirteen plus one is fourteen, four here and one on the top and two plus one is three plus one is four. So the answer is they eat 442 cookies during the weekend, that's the answer not just the number. If you don't copy the complete answer, it means that your word problem is incomplete, okay?

Student: Okay

Teacher 3: Good. So don't forget in page 155 all of you guys, you have some, not all, but some common verbs that we normally use at the moment that we want to work on word problems, okay? So let 's move on.

Teacher 3: The second part of the class is about multiplication and division word problems, is the same but we are not going to work with division yet, but in this case if you know the multiplication tables means that your division process is gonna be easy. Let's pay attention to this video.

Teacher 3: You see guys, probably at the beginning you said "miss multiplication word problems or division word problems seems or look different than subtraction or addition" no, obviously they have a different process because they are for different operation, but the thing is that when you are working or solving word problems you have to take in count the keywords and Miss is sharing with you in your notebook, in your virtual notebook, the keywords, for example: share, product, times, in total, minus, left, if you have these keywords, means that you're gonna be the one at the moment to solve word problems.

Teacher 3: These are the words at the moment to solve word problems, multiplication word problems, okay? About division don't worry, we are not going to work with division word problems yet, okay?

Teacher 3: Here we're gonna have some multiplication exercises for tomorrow. "Miss, tengo que hacerlo en casa?" ¡No! this is gonna be during our class tomorrow and then finally we can start two-digit multiplication, okay? Because there's a lot of activities that we have to do. Do you have any questions so far?

Students: No

Teacher 3: Tomorrow we are going to use our workbook, okay? Let me show you the activities that we have for tomorrow and it's only two minutes.

Teacher: You can go, our class finish.

Students: Bye miss.

Appendix 7: Observation 1 – Teacher 4 – Fourth Grade

Fourth Grade
Observation 1
Teacher 4

Teacher 4: Hello guys!
Students: Hello Miss.
Teacher 4: Okay guys, so for today, what are we gonna do today?
Student: We are gonna see the money.
Student: The money glossary.
Teacher 4: Did you guys print the glossary?
Students: Yes, miss!
Teacher 4: Excellent.
Teacher 4: Okay so today we're gonna start the topic money, so the glossary that you have there is more like a support, okay? So if maybe you don't understand one word you're supposed to use the glossary as a help, to help you understand okay? So probably we will see some of those words when we start the topic.
Teacher 4: So this topic money is part of topic 8, remember that we saw time and now we're going to see money and remember that this topic is going to be evaluated as a quiz on Friday and it will include the two topics, time and money, okay? A quiz on Friday evaluating you time and money, so now let's start with the video, this is kind of the introduction and so let's look at the video and then we start with the rest of the information.
Teacher 4: Okay guys, so on the video we saw that before money, people used different stuff to buy or to get the stuffs that they needed, for example let's say that German has chickens and Tomás he has rice, so if Tomás wants a chicken from Germán he would give him rice and the other way. That is how people trade or exchanged their needs before money, so they exchange stuff and then the money was created as a medium of exchange, so you can use money to exchange for other things, for example let's say that Sophie S is selling notebooks so I need a notebook so I will give Sophie S money to get a notebook in return. So I exchange money for stuff that I need.
Teacher 4: So the money can be defined as a medium of exchange used to pay for commodities and services. In Colombia we use the Colombian pesos, so the money that we use in Colombia is Colombian pesos, that is the official currency, so "currency" is kind of the first word that we see here from the glossary, so who can look at the glossary and tell me what is currency?
Student: A system of money in general used in a particular country.
Teacher 4: Okay, so look that currency is the system of money that we use, so for example the currency in Colombia is Colombian pesos, the currency in the United States is dollars, what is the currency in Europe?
Students: Euros
Teacher 4: Yes, and what is the currency on British?
Students: On what?
Teacher 4: On England, on England.
Student: Miss that has a name, how do you say como rarito?
Teacher 4: Yes, is Libra Esterlina, that is the one in England.

Student: Miss I wanted to say that in Spain they have two types of currencies. Centavos and Euros.

Teacher 4: Oh I didn't know that, I thought it was only euros, okay, good.

Teacher: Okay guys so those are the currencies, the currency is the monetary system that each country uses, so in Colombia we have the Colombian pesos and here we're going to see, hum, the Colombian pesos, so let's look at them.

Teacher 4: First we have the coins, so how many coins do we have in Colombian pesos?

Student: Like one hundred.

Teacher 4: No, don't tell me the amount but how many there are?

Student: It's like five

Teacher 4: Is five, yes. So we have five coins that we normally use right now because of course before we had other coins but right now we only have five useful coins. the first one, which one is the first one, the smallest?

Student: 50

Teacher 4: Fifty yes, so the smallest coin is the fifty pesos, the next one is the hundred pesos, that is this one, the next one, the two hundred, the five hundred pesos is this one and the one thousand pesos' coin, okay so right now we have five coins. So again we have five coins, 50 pesos,100 pesos, 200 pesos, 500 pesos and 1000 pesos.

Teacher 4: Now the bills, so the bills are the paper.

Student: Billetes.

Teacher 4: Yes, billetes in   ension. Okay so the smallest bill that we have right now is the two thousand pesos, the one thousand pesos bill is an old kind of version, that one is supposed to get out of the market, so in the future we will not have one thousand pesos bill only the coin, the smallest one that will remain is the 2000 pesos, the next one is the five thousand pesos bill, the next one the ten thousand pesos bill, this one is the twenty thousand pesos bill, this one fifty thousand pesos bill and this one is the one that has Gabriel García Marquez I like this bill because of that and the biggest one, that is the new one because it didn't existed before is the one hundred thousand pesos.

Teacher 4: Do you guys need all these coins and bills?

Students: Yes

Teacher 4: Okay so these are really important because of course is the money that we're going to be using in Colombia, if you want to buy anything in cash you will need these bills and coins so that is why we need to familiarize with this, the 2,000 pesos' bill, the 5,000 pesos' bill, the 10,000 pesos' bill, the 20,000 pesos' bill, the 50,000 pesos' bill and the 100,000 pesos' bill. Does someone have a question about the coins and the bills?

Students: No.

Student: So why do the bills have this thing?

Teacher 4: Oh, so that is the number of the bill. so all the bills have a different number, they cannot have the same number and is one way to track the bill, so with that number you can know where that bill was printed and was sent to which bank initially, okay?

Student: Okay.

Teacher 4: So every bill has a different number there, when they create fake money sometimes you can know because these numbers are weird or different or sometimes repeated, normally that happens with fake money. You have to be careful with the fake money, I mean you need to know it, sometimes just touching it you will know if it is fake or real. You can ask your parents to help

you and teach you how to identify the real money or the fake money, that is a really important knowledge.

Teacher 4: The Colombian bills are printed in El Banco De La República.

Student: Miss can you teach us how to identify the fake ones?

Teacher 4: No because it is more about touching the bill, some like in person teach you how to identify because normally is like touching so far, okay?

Student: Okay.

Teacher 4: Okay guys, we use money in normal life to three main things, the first thing that we use for money as a medium of exchange, so we will exchange money to get another stuff, so we use it for buying and selling things, that is the first use of money.

Teacher 4: The second one is as a unit of account so to compare values, for example if I have two houses, the money will help me compare the value of the houses, so this house is 300 million and this one is 350 million. So the money helps me compare the value of things, it can also work with the small stuff like a water bottle, so this one is 30,000 pesos and another one is 20,000 pesos. So the money helps us compare the value of stuff.

Teacher 4: And the third one is as a store of values, so to keep the values of things, for example if I buy this tablet, it's a tablet but my money keeps its value here because I can sell it in one month and I would be getting money again, so money is used to keep value of things.

Teacher 4: Okay now, the money flows, so how the money flows to the people. So first we have the earnings or incomes, it's the same, so who can read me in the glossary what is income?

Student: Money earned from investments and employment.

Teacher 4: Yes, so the income or earnings is the money you earn from an investment or from your job, mainly and most of the people have their income from a job and of course you can have multiples incomes, a good advices is that you should have more than one income, all the persons should have more than one income, why?, because for example [Student name], the job that [Student name] has when he's a grown-up will be an engineer, so if he only works as an engineer and that is the only income that he has when he lose his job, he will be struggling to get the money, so that's why is advised that people should have two incomes, so if you lose one job, you would be able to still get money from a different stuff, so for example [Student name] can also sell some shoes, maybe he every Saturday goes and sell shoes to his friends and he has an additional income from that.

Teacher 4: [Student name] do you have a question?

 Student 4: Miss income is ahorros or is seguro?

Teacher 4: No, income is the money that you get, the money that you earn, ingreso.

Student: Salario.

Teacher 4: It's not salary, salary it's different. Income es como ingreso de dinero, okay?

Student: Okay

Teacher 4: In earnings and incomes we can have several incomes, and here we can have active and passive incomes. The active income, can you read the active income please?

Teacher 4: So the active income is the money that you earn when you perform something, for example right now I'm making an active income, why? because I need to be doing my job constantly to earn that money, that is active income, because I need to be here everyday teaching classes to earn the money.

Teacher 4: Passive income, read please

Student: Passive income, money earned on a investment or work completed that continues to make money without any additional effort.

Teacher 4: Okay good, so passive income is the income that some people receive when the job is already done so you don't need to be doing the job like constantly, for example the singers, so the singers they do a song once, so they do a song today and in the next two years they will continue earning money because of that song, so they do the job maybe once in the past but they will continue earning money for several time with that job. La   ension is also one kind of a passive income because when you stop working, when you get to several years working, you will start getting that money, that is also a passive income and another one is when someone writes a book, when you write a book, again the book you did it in six months, one year, but after you finished, you finish the job you will continue earning money for several years just because you did that book. So that is a passive income, the money that you would get when the job is already finish. In passive you only do it once in the past and continue earning money over time.

Teacher 4: Now the second box we have here are the expenses, so the expenses are the money that is spend, that you spend buying things, that is the expenses, the money that you spend, the money that you use when you buy something, okay? Normally we use it to access goods and services, for example the internet, the light, the water, those are services.

Teacher 4: And we would have a problem when our expenses are greater than our earnings. If you spend more than the money that you're making you would have monetary problems, you will be in debt, so every time you should spend less than what you're earning.

Teacher 4: Now, the savings, savings is the third box and here you can see the piggy bank. So savings is the money that you put apart, setting one income aside for future spending, so is the income that you don't spend, the money that you don't spend and you save for future spending. Saving is ahorro, ese es el dinero que ustedes ahorran.

Teacher 4: And the fourth box that I think is the most important one is the investing, why it is the most important one, because if you save money probably you will spend it on the future but if you invest that your money will continue growing and growing every time, so in investing you purchase securities for profit like for example stocks, stocks are the most common one, this two are not that common. Do you guys know what stock is?

Students: No

Teacher 4: No one? in Spanish stocks.

Teacher 4: Stocks son acciones, las acciones, el mercado de valores, el mercado de acciones. Have you heard that some people invest in some companies, they buy like a fraction, una acción de la empresa, so they buy a stock of a company to make money. So let me show you here one example really quick.

Teacher 4: Tell me a company, any company that you want to see the stocks of.

Student: Ecopetrol

Teacher 4: No, I don't like Colombian ones.

Student: Tesla

Teacher 4: Okay, let's look at tesla. So look right now the Tesla stock, oh my god is a really good price actually, 639.30 USD, and we can see it over time, let me put it a month. So the Tesla stock has been changing, so in November 2020 the price of the Tesla stock was 400 USD, right now is 638 USD. So imagine that someone buys this stock 400 and now they sell it at 638 so they're making money, right? Because they buy it cheap and they sell it at a higher price, so that is more or less the stock market, that is what people do when they invest in the stock market and here you can see also for example the apple stock, right now is 120 USD. Google is expensive, look, 2,000 USD. And look at Amazon, look Amazon stock is right now at 3,000 USD.

Teacher 4: Okay guys so this is the stock market, this is what a lot of people do to invest their money to make more money, okay? So sometimes it's no enough just saving money it is really advisable to do investing. If you want to grow your money you should do smart investments.
Teacher: The class is over so, see you guys, Bye, bye.
Students: Bye.

Fourth Grade
Observation 2
Teacher 4

Teacher 4: Hello guys, I'm here.
Students: Hi miss.
Teacher 4: So remember guys that we have the quiz tomorrow about time and money, okay?
Teacher 4: So yesterday we saw our topic money, I will share the screen because we haven't copy what we saw yesterday so first we're going to start copying that, we're going to have around ten minutes to copy that.
Teacher 4: Okay guys, so please start copying this. Last class we saw this part, so the earning, remember that the earnings are just the same as incomes so is the money you earn from a job, you can have multiples incomes, we have active and passive incomes, the active are the ones that you have to be doing the job constantly to earn the money and the passive income is the one that you do once in the past and you will continue earning money for that work that is already completed in the future.
Teacher 4: Here we have the expenses, so is the money you spend to access goods and services, the problem is when the expenses are bigger than the earnings, okay? because you will spend more than you earn and of course that would be a problem because you will be in debt.
Teacher 4: The savings is setting income a side for future spending, so is the income you don't spent and investing is purchasing securities for profit and here we talked about the stock market, remember that we saw for example Apple stock or Mc Donald stock or Tesla stock so you can invest in the stock market to earn money, okay so we will have until 2:30 pm to finish copying this.
Students: I finished.
Teacher 4: So guys after this we're going to do some practice exercises about where we can apply the expenses, the earnings, the incomes, the savings, okay?
Student: Okay miss.
Teacher 4: So uhm, do you guys have a calculator, I think in between the things the school tells you that you can have is the calculator, so for these problems you can use the calculator. Meanwhile we do the exercise we'll be using the calculator because we'll be using big numbers, so for the quiz tomorrow you guys please bring a calculator.
Teacher 4: So, let's do some practice exercise, you don't need to copy the words on your notebook but if you need to do any processing do it on your notebook. So let me put the problem, I would ask one of you randomly to answer, randomly, okay? So again I will be asking randomly you don't need to be raising your hand, I will call any of you to give me the answer so all of you should be doing the exercise and again you can use your calculator.
Teacher 4: So purchasing word problems: Alejandro loves eating fruits. He paid $12,500 for apples, $8,000 for berries and $10,000 for bananas. In total, how much money did he spend? Please all of you do it and I will ask one of you.
Student: Miss I have a question.
Teacher 4: Yes, tell me.
Student: Is that if we need to add or subtract?
Student: You need to find it on the problem.

Teacher 4: Yes, you need to know that. So let me ask [Student name], [Student name] are you there?

Student: Yes, miss.

Teacher 4: So [Student name] what do you think you need to do here? which operation, addition, subtraction, multiplication or division?

Student: Addition.

Teacher 4: Addition? Okay good. So if you add the three numbers what is the result? Remember that you can use the calculator, do you have the answer?

Student: Yes.

Teacher 4: How much is it?

Student: Three...three thousand… five fifty

Teacher 4: Ummm no…probably you're reading incorrectly, probably you are just reading it incorrectly. So [Student name] do you have the answer? So we already know is addition, [Student name] told us but [Student name], do you have the answer?

Student: I don't have it.

Teacher 4: Okay. [Student name], do you have the answer?

Student: Yes, miss, is thirty thousand, five hundred.

Teacher 4: Yes, thank you. So look guys, in this one you know is addition because they tell you "in total, how much money did he spend?" So look if you use your calculator, you will put here the number, so in the calculator you put 12,500, you don't need to put the dot or the coma they just put it right away, so 12,500 plus 8,000 and plus 10,000 and then the equal sign and here you have it, look this is the answer 30,500. I know [Student name] probably had it correct but she read it wrong, so this is thirty thousand five hundred, okay?

Teacher 4: [Student name] went to the mall to buy clothes. She spent $86,000 on a jacket, $70,000 on pants and $ 34,000 on a shirt. How much money did [Student name] spend on clothes? So again I will give you around one minute for all of you to do it and I will call some of you randomly, okay? So all of you should be doing this one.

Teacher 4: [Student name], do you know the answer?

Student: No

Teacher 4: No, you don't know it yet, all of you should be doing this. Mm [Student name], do you have the answer?

Teacher 4: Okay, [Student name] didn't answer me. [Student name], do you got it?

Student: No…

Teacher 4: Not yet, okay. [Student name], do you got it?

Student: No yet miss.

Teacher 4: Okay, umm [Student name] do you got it?

Student: Forty-nine, six hundred

Teacher 4: Forty-nine six hundred? no… but tell me, which operation did you do?

Student: Addition.

Teacher 4: Okay addition, so the addition is correct but the answer that you give me is not correct, I don't know maybe you read it incorrectly. [Student name], how much?

Student: It give me, one hundred, ninety thousand

Teacher 4: 190,000 is the answer that [Student name] has, I think is correct let's check. So again you have here the calculator, let's delete here this answer. So as [Student name] tell me I need to add this numbers, so 86,000 plus 70,000 plus the last one 34,000 equals 190,000, good [Student

name], thank you so that is the result and you do addition, okay? because again [Student name] was buying clothes and that is the amount that she spent at the end, $190,000.

Teacher 4: Okay the third one. [Student name] got fast food for lunch. He spent $7,000 on fries, $25,000 on a sandwich and $12,000 on a salad. What was the total of the lunch bill? You should all be doing this one, again I will give you around one minute and then I will start asking you guys. Let me start asking some of you, [Student name] you have the answer?

Student: Forty-four thousand

Teacher 4: Okay. [Student name] tell me 44,000, let's check, probably is that one. So here in the calculator, oh [Student name], which operation did you do?

Student: Addition

Teacher 4: Addition, okay yes, so [Student name] did addition, why addition? again you're buying, [Student name] is buying several stuff that are accumulating and at the end you need to pay by the total. So let's add, so you add 7,000 plus 25,000 plus 12,000 equals 44,000, okay good [Student name], again is an addition and you can use your calculator as I'm showing you on the screen, okay? Questions about these exercises?

Students: No

Teacher 4: Okay let's look at another type of example, so this one, in this one we're going to compare the income and the expenses, the one that we saw before were only like expenses, only purchase, only buying stuff so only spending money. So in this one we have income and expenses in the same problem so let's look at them.

Teacher 4: So in this one: Andrea works as an engineer. She earns every month a salary of $4,000,000 pesos. Her expenses each month are around $2,800,000 pesos. Which includes rent. food, transport, bills, among others. And the first question is: How much money is she saving every month? so remember that the savings is the money that people don't spend, the income that she doesn't spend, so the income is four million and the expenses are two million and eight hundred.

Teacher 4: So you can apply this formula and please write this formula in your notebook. So savings is equal income minus expenses, so please all of you write this in your notebook.

Student: So you need to do a subtraction.

Teacher 4: Yes, so you need to do a subtraction in this one look, please copy the formula savings= income-expenses, so here you already have the income and the expenses, okay? and you need to find out the savings. Please copy the formula and try to solve it, of course again you can use your calculator.

Teacher 4: Okay so let me start asking some of you, [Student name], do you got the answer?

Student: Yes, miss

Teacher 4: How much is it?

Student: One million two hundred thousand.

Teacher 4: Yes, perfect, you say it just correctly, so let me again show you the calculator, so in the calculator what you needed to do is income minus expenses, so the income is 4,000,000 minus 2,800,000 and now I click equal and that gave me $1,200,000 pesos and they are saving every month 1.200.000, okay? So please again all of you should have this formula on your notebooks.

Teacher 4: Now part b tells you: Andrea wants to learn English. The English course has a monthly cost of $800,000 pesos. Can she pay for this course? All of you think it about it, so here you know how much she's saving and the English course has a cost of eight hundred thousand, so can she pay for the course? Okay, [Student name] told me.

Student: Yes, she can

Teacher 4: Okay, I want someone at home to give me the explanation, someone at home for example [Student name], so [Student name], can Andrea pay for the course?

Student: Wait miss

Teacher 4: No, wait no, so you know it or not? I can someone else

Student: No

Teacher 4: Okay, [Student name], what do you think? Can she pay for the course?

Student: Yes.

Teacher 4: Why?

Student: Because she saves 1,200,000 pesos and if she wants to learn English she has to pay 800,000 pesos and 1,200,000 are more than 800,000.

Teacher 4: Okay good, perfect [Student name]. So yes she can pay it, why? because every month she's saving $1,200,000 and the course is only $800,000 per month, so this value, the savings, is bigger than the course, so even though if she pays the course, she will be saving some money, you will have some spare money around four hundred thousand, so that is why she can pay for the English course, Okay? Questions about this type of examples?

Students: No

Teacher 4: No? Okay so let's look at another one...yes we still have enough time. So in this one: Every month Sara has the following fixed expenses. So fixed expenses are the expenses that you cannot change, like for example the rent is fixed, you cannot change the rent, the rent you need to pay it every month and is the same amount, so she pays on rent $200,000 COP, in bills, housing bills, like water, light, gas, she pays $400,000 COP, on internet she pays $150,000 COP and others she spends $600,000 COP.

Teacher 4: So the first question is. how much money does she spend every month in fixed expenses? All of this are fixed expenses, so how much money does she spend on fixed expenses? So think which operation you should do and do the operation in the calculator, okay?

Teacher 4: [Student name].

Student: Miss, Sara spent one million nine hundred and ninety thousand money.

Teacher 4: Did you include also the others?

Student: Yes, the others miss.

Teacher 4: No, so maybe you have a mistake, which operation did you use?

Student: Addition

Teacher 4: Okay so you got the first part correct you need to do an addition but is not one million and something, okay? So please check, I will give some points for the addition but the answer you have it incorrect. So let me ask [Student name], how much is the total? How much do you have in the total?

Student: Two millions three hundred fifty thousand.

Teacher 4: Okay, this has more sense, okay so let's do the addition. So we add 1,200,000 pesos plus 400,000 pesos plus 150,000 pesos plus 600,000 pesos, yes [Student name] so you got it correct, thank you. $2,350,000, okay? So in this one you needed to add all the expenses because all of these are expenses and you need to add them, so [Student name] I think maybe you forgot to add the six hundred, did you see it [Student name]?

Student: Yes, miss, I think that...that was that.

Teacher 4: Okay and the last question to finish: If Sara has a salary of $3,000,000 COP, how much money can she save every month? So let me copy the answer that we had in the first one, it

was $2,350,000 the first answer. So her expenses are $2,350,000, so how much can she save if she has a salary of $3,000,000?

Teacher 4: So [Student name] asked me what is a salary, on English. So a salary is the money that you earn monthly for the job you do.

Teacher 4: [Student name], do you got the answer on this one?

Teacher 4: [Student name] didn't answer me

Student: Miss because I don't have the question

Teacher 4: So answer me, you always need to answer me. But you don't know which operation you need to use?

Student: In this, no.

Teacher 4: No? Okay. Ummm [Student name].

Student: I think is six hundred fifty thousand.

Teacher 4: Which operation did you do?

Student: Subtraction.

Teacher 4: Yes, so is a subtraction because remember every time the save, they are asking you the save, so the savings is the incomes minus the expenses, so the income is $3,000,000 and the expenses are $2,350,000 so we need to do the subtraction, let's see it here on the calculator, so we have three million minus the two million three hundred fifty thousand and equal look the answer is that, 650,000, okay, thank you Luna you got it correct.

Teacher 4: Okay guys so again, tomorrow we will have the quiz about the topic time and money.

Teacher 4: See you guys.

Fifth Grade
Observation 1
Teacher 4

Teacher 4: Yesterday we finished the time topic, right? And today we're going to start our money topic, which is the 7.2. Remember that the two topics, time and money, will be evaluated on a quiz next week, that is the next Thursday the 25th of march. So let me share screen to start with our topic: money.

Teacher 4: Okay this topic money is part of the topic seven which includes time, we already saw time and this time we're going to start with our topic money. So guys you know that money, actually we kind of use it like everyday, really important because is something you would use even though any profession you choose we will always use money, so it's really, really important to understand how we can use it in the everyday life and of course we're going to see some problems applying those money, buying and selling so you can kind of familiarize with the use of money in real life.

Teacher 4: So as an introduction to this topic we're going to start with this video, so please the people who were already on matific I really need you guys to finish already matific because I need you to watch this video so please all of you come back here to the zoom meeting and let's see this video.

Student: Too short the video.

Teacher 4: Yes, it was very short. Okay guys so money as you saw that before money existed, people simply just like exchanged stuff like they needed for daily life. So for example if Josue in his farm he has tomatoes but he also needs meat, so he goes to Carlos because Carlos has like a lot of cows and he produces meat so they both could like exchange the production to have what they want to the daily life

Teacher 4: Then they created money so the exchange will be easier and you can exchange everything using money. So money is a medium of exchange used to pay for commodities and services, again is a medium of exchange, we use it to exchange to stuff, so when you buy a hamburger with money so you're exchanging money with the hamburger, it is a medium of exchange.

Student: Or trading

Teacher 4: Or trading yes. In Colombia we use the Colombian pesos, so here we have this word that is currency, I don't know if you guys saw, I put you like a glossary with words related to money so you would always have that as a support if you don't understand any of the words, so this word "currency" is actually at the glossary so you can see it there. Currency is like the money the countries use, so in Colombia the common money, the common currency that we use is the Colombian pesos, for example the currency in the US, in the United States is the US dollar. What is the currency in Europe?

Student: Euros

Teacher 4: Euros, yes. What is the currency on the United Kingdom? On England.

Student: Libras

Student: Pounds

Teacher 4: Libras, yes, libras esterlinas, yes perfect. So that is a currency, a currency is like the money people use in a specific country, so in Colombia is Colombian pesos.

Teacher: Okay? And of course you can see here the bills, the new bills that we're using, so let's kind of familiarize a little bit with the Colombian pesos. I know a lot of you already know them but let's look at them.

Teacher 4: So first we have the coins, I the coins we have the fifty pesos that is the small one, really, really small one, this one is 50 pesos, the next one is the hundred pesos, so is this one, the next one is the two hundred pesos, this one the five hundred pesos and the one thousand pesos. Remember that these are the new coins and I think from now on you would mostly see these coins, Okay? So, all of you need these coins?

Student: Yes, miss, but the 500 pesos was different.

Teacher: Yes, yes because maybe you have the one before that it was only gold, this one has a gold color and a silver color in it. Okay so we have five coins, 50 pesos, 100 pesos, 200 pesos, 500 pesos and 1.000 pesos.

Teacher 4: And with the bills, we have six bills because the one thousand pesos in the new bills they didn't print it, in the new bills we don't have the one thousand pesos' bill, that is the old one. So in here we have the two thousand pesos, that is this blue beautiful bill, the five thousand pesos, ten thousand pesos, twenty thousand pesos, fifty thousand pesos, that is the one with García Marquez, that is the one that I most like and the hundred thousand pesos.

Student: Miss

Teacher 4: Yes?

Student: Miss I have a bill of 100

Teacher 4: Yes, okay, that is no common and they're really cool. I remember the first time I saw it because everyone was expecting that bill, because of course that is new before we didn't have a bill of one hundred thousand.

Student: The cajero give her the bill.

Teacher 4: Yes, this was like a new thing for us because before that didn't exist, before the biggest bill was fifty thousand pesos.

Student: And the smallest one?

Teacher 4: The smallest one was the one thousand but right now it doesn't exist, at least in the new bills, it doesn't exist. So all of you knew these bills?

Students: Yes, miss

Student: I can tell you something about the new bills?

Teacher 4: Yes, tell me [Student name].

Student: That my mom actually, she hates the one of 100 because like the money goes like super-fast.

Teacher 4: Yes, I know, because it's a lot of money

Student: It doesn't rinde.

Teacher 4: Yes

Student: Miss, this is the one of one

Teacher 4: One thousand, yes that is the old one, probably that one will stop existing because we don't have a new bill of that one.

Student: I am not going to do something with this

Teacher 4: You're going to save it, okay nice. So yes guys, like for the rest of your life you will be using this currency, these bills, these coins, this is the money we use in Colombia. Okay?

Student: Miss wait, what?

Teacher 4: What?

Student: Is that I've never seen the bill of 100.000 pesos like that.

Teacher 4: [Student name] can you show it again please? [Student name] has one there. You can pin [Student name] to see it bigger.
Student: Oh yeah, yeah, I see it.
Teacher 4: Can you show the back part?
Student: I didn't knew they exist, I didn't knew they exist
Teacher 4: Yes, that is new, is so new I think it's like two or three years ago these bills up here.
Student: In the quarantine it appears
Teacher 4: Okay yes
Student: No miss, they were like two years ago.
Teacher 4: Yes, I think it was like two or three years ago that they start existing, but I remember that the 10,000 bill it takes like a little bit to be printed, I think it was like the last one to be printed and everyone was like just waiting for it because it was like the new thing.
Teacher 4: Okay so, new words and please remember this on English, coins are this ones, bills, this is the name of this paper, bills, currency, so the currency in Colombia, Colombian pesos, so let's remember those words.
Teacher 4: Now, so we use money for three main things, the first one is as a medium of exchange, so as I told you before you exchanged for stuff you want to buy, like a car, like food, like a house, like clothes, like a cell phone, so you exchanged for stuff, okay? So we use it for buying and selling, that is as a medium of exchange.
Teacher 4: The second one is like a unit of account, so to compare values, for example if someone is selling me these two cups I use money to compare the value of it, this one can be $15,000 pesos and this one $10,000 pesos, so I use money to compare the value of stuff. Okay? That is another use of money, compare value of stuff.
Teacher 4: And to store value, so to keep the value of stuff, you know that some people like buy lands, like as an investment to keep the value of their money they will sell it years after that, so money is also used to keep value, keep the value, store value, okay? Like if you have savings, I don't know maybe some of you have savings every year like to buy something nice on Christmas, so we use money to store value.
Student 4: For a lot of years I've been saving money.
Teacher 4: So all of you know what means saving money? Because that is another financial concept in money. What is it?
Students: Ahorrar.
Teacher 4: Yes, ahorrar is in Spanish, ahorrar is saving money. So it's kind of putting money like a store, to store money, that like you would not use, at least not right now maybe you would use it on the future, so that is saving, like keeping money apart without spending them to maybe buy something on the future.
Student: I'm saving for a play station
Teacher 4: Okay, so you're saving money for a play station, good. So saving money is a really good habit, like all of you, I will advise you to start saving money, even though can be small amounts because it's just a nice habit for you to have.
Teacher 4: So guys in here we have some important aspects and in here maybe we will use the glossary that you have there. Did you guys print the glossary?
Student: No
Teacher 4: But you can maybe open there the glossary there, there to have it in your computers, so if you need to search for any word, you can have it there to search it, so please if you didn't print it, please open it there on your computer so you will have easy access to it.

Teacher 4: So the money flow, first we have the earnings, so earning or incomes, so the income or earnings is the money you earn from your job, okay? That is the earnings or incomes. Income, that is another word you have there in the glossary, so the money you earn from a job or also from an investment. We can have multiple incomes, actually that is advised, so it is advised to people to have multiples searches for incomes, for example, not only depending on your job, you can have a work as a teacher but maybe you can also, I don't know sell t-shirts online and you can make as an additional money income, you know? So it's really good to have several incomes so you will not only depend on one thing, and we have passive and active incomes, so I know you have those words in the glossary, so who can please read me the active income?

Student: Me

Teacher 4: [Student name]? Okay [Student name] please read the active income.

Student: Okay miss so, active income, money earned for performing a services

Teacher 4: So is money you earn when you do a service, and you need to be active on it, so for example, me as a teacher I have an active income, why? Because I need to be doing this, I need to be teaching class everyday, so it's active because I need to be doing stuff to earn the money, okay? So you need to be actively doing something to earn the money, like for example like a lawyer, so a lawyer is also on active income because he needs to be like with his clients, talking about the problems, going to the court and defending his clients, that is active because he needs to be doing something to earn the money.

Teacher 4: So who can read me the passive income?

Student: Okay miss, Passive income, money earned on an investment or work completed in the past that continues to make money without any additional effort.

Teacher 4: Okay so look, in this one you don't need to be constantly doing the work, you just do it once on the past and you continue earning money in the future, a good example of this is the people who write books, so you know? If you write a book, you will do it today, you finished today and printed, so the work is done already but you will continue earning money from that book for several years and you don't need to be writing the book every time someone buys it, no, you just did the job once in the past but you will continue earning money over the years, okay? So that is passive, so you don't need to be doing the job everyday, you just do it in the past and you will continue earning money in the future, okay? Like artists also do that, like singers also have passive incomes, like with the movies, the actors also have passive incomes, I don't know another example right now, but do you guys understand the differences between an active income and a passive income now? Guys?

Student: Yes

Teacher 4: Does someone have a question about that?

Students: No

Teacher 4: So the first box we have here is earnings or incomes, again, the income is the money you earn from a job and you can have passive income and passive income. Now the second box we have here are the expenses.

Student: Miss, could you please repeat the passive income please.

Teacher 4: Okay so [Student name], the passive income is the one that you did once in the past and you would like continue earning money in the future for it, you don't need to being doing the job.

Student: Like a   ension

Teacher 4: Ummm not necessarily as a   ension, well a   ension can be a passive but it's more related like as I tell you like for example like a singer, so a singer released a CD with music, so

he did the work in the past but he will continue earning money in the future every time someone buys.

Student: Okay, thank you miss.

Teacher 4: Okay you're welcome. Okay the expenses, so the expenses you also have this word in the glossary but I have here also the meaning, so it's the money you spend to access good and services, so good and services can be food, the electric bill that you use at your house, the water you use at your house, the phone like the minutes that you use to call people, the internet service, umm what else?, the clothes that you buy, maybe the notebooks, pencils, everything, maybe you need a computer, all of those are expenses, so the money you use to buy stuff, okay? Those are the expenses, so income or earnings is the money that you got in, that is money that you received and expenses is the money that is out, so the money that you spend. Income money that you received, expenses money that you spend, okay?

Teacher 4: Now the third box is the savings, so the savings is setting income aside for future spending, so it's an income that we don't spend, okay? That is saving, saving is money that we received that we're not spending, we're just keeping it there for future spending, okay? Questions until here? No? Okay, good.

Teacher 4: And the last one, I think is really important, do you guys know which one is the last one? Maybe with these images you would see, you can get an idea, what do you guys think is the last one?

Student: Maybe investment.

Teacher 4: Yes, investment. Okay so we earn money, we spend money, we save money and we can also invest money. So the investment is purchasing securities for profit, so when we do investment, when we invest our money, we buy some things that you can see there the options, we can do any of those to secure profits, do you guys know what is a profit? Who can read me the word profit on the glossary?

Student: Me miss

Teacher 4: Okay [Student name], tell me.

Student: Okay profit, the positive difference between total… and total expenses of a business or investment.

Teacher: So the profit it's like the positive money that you have, what means positive? That is the money that you earn, okay, so profit is when you're earning money, that is being profit, so for example if in a business, you have a business of selling lemonade, if you sell or you received more money that the one that you spend, you're being profitable, you're making money, that is being profit, okay? So we invest money to have future profit, to secure profit, we can invest money on stocks, do you guys know what is stocks? On Spanish, what is stocks? No one?

Student: The bolsa

Teacher 4: Yes, so the stocks on Spanish son las acciones and that is related to the market, to the investment market, la bolsa de valores. Have you guys heard about the bolsa de valores? The stock market.

Student: No, but it is one application that appears in all phones.

Student: Yes, miss, and one day I want to work on that.

Teacher 4: Okay nice, I actually learning how to invest in the stock market. It's really interesting, it's really, really interesting. So in the stock market you can invest by buying stocks from companies, like for example, you can buy a stock from Apple and of course you will have revenues if Apple is going good, you will get revenues from that, you will earn money because

of that, because you buy a stock from a company, okay? That is stock, acciones, like buying a small part of a company, that is stocks.

Teacher 4: Bonds, this is a little bit advanced, I will not be talking to much in bonds and mutual funds are like funds that people use to invest the money, for example the banks can offer you mutual funds, so it's kind of giving the money to the banks so he will do investments and of course you would earn money, make profit from it, okay? These are the different types of investing and this is really important because normally they teach us to only save money, but you need to save money and also invest money because if you're only saving it, as I tell you probably at the end you will just spend it, like I did when I was a kid, I save money for like the whole year but in December I spent my money, okay? So it's really good to invest some part of that saving and you would earn, continue earning money, okay? Does anyone have a question about this? No? Actually I want to show you what the stock market looks like.

Teacher 4: Okay guys, so this is more or less the stock market, this is an app you can use to follow how the stock market goes.

Student: Miss I know what is that, I know what is that.

Teacher 4: Yes, what is it?

Student: Is an application that I always see it when I play games, that you see how much money you have, if it goes up then you're good but if it goes down then you're bad.

Teacher 4: Umm not necessarily but yes, so in the stock market for example this is the Apple stock, so this is Apple, this is the company Apple, all of you know Apple, right? Is the one with computers, cell phones and all of that.

Students: Yes

Teacher 4: So for example right now the Apple stock has a value of one hundred twenty-two, okay? Right now is that and you can see that is constantly moving look, right now is going up and if we see, let me put maybe a daily chart, look so the stock of apple has been changing a lot, look like in February, in January the price was in one hundred forty-three, right now it's kind of cheap because is in one hundred twenty-one, one hundred twenty-two, if you see maybe on the past it was cheaper because of course Apple is getting bigger and bigger every time. You can see here that this was small and it's just increasing the price over time because it's a profitable company, it's making money, so look you can see here it's so profitable, look at this rise, it's making money, Apple is making money.

Teacher 4: So that is more or less the stock market, in here people invest money to earn more money, for example if someone buys, if someone bought a stock around here like on January of 2019 the stock of Apple was forty-four US dollars and if that person just keep the stock there, look only one stock in 2019 was forty-four dollars but know it's one hundred twenty-two, so of course that person made money because it increased the value of his money, he made money because of that.

Teacher 4: So that is investing and a lot of people invest in the stock market, that is the one that I just show you and there you can find companies like Nike, Apple, google, like the airlines, the united airlines, what else? Some banks, like city banks, banks of America, you can also find...let me see in here I have a lot of examples, some companies, look here I have eBay, intel, twitter, Facebook, you will have all of this apps, normally they are in the stock market.

Teacher 4: I'm very happy that you guys follow the stock market because it's really, really nice to learn that and it's so useful for your future. Good for that. Does someone else follow the stock market?

Student: Nop

Teacher 4: No?

Students: I actually knew about it, but I didn't know how to get on the apps.

Teacher 4: Ohh okay, so an easy app to look is google, google has google finance and in google finance you can follow the stock market or you can just find like any stock app on the app store, but google finance is easy, it's from google and it would show you enough information.

Student: Miss I actually like to see the price of the dollar to see if I have more money than before.

Teacher 4: Uhu, okay let me, let's, please start copying this, that is the information that I just give you, so yes Angie that is another type of market, because the stock market is only for stocks, the one that you're saying is related to currencies is the forex, that is called forex.

Teacher 4: So please guys take out your notebooks and please start copying this, that is the information we just saw about earnings, expenses, savings and investing.

Teacher 4: And we actually in this money topic we're going to see how to use the exchange rate, from US dollars to Colombian pesos because of course it's really important also to know how to exchange, to do that exchange. Of course google can tell you but it's also important for you to know how to calculate.

Teacher 4: Guys remember that for next class we will be doing some word problems exercises using money, of course finances, hypothetical, hypothetical exercises, we will not be using real money, but I need you guys to bring a calculator, you can use the one in your computer because we will be using big numbers and I don't want use to spend like so much time doing the operations and we will be using the calculator, okay? So please for the next class you need to have a calculator.

Teacher 4: So guys if you didn't finish copying don't worry next class I will give more time to finish copying this because I know it's a lot of information so probably another ten minutes I will give you next class to finish copying this and remember we will continue with the topic and with some practice exercises, okay? And you will need the calculator please. Okay guys so the class is over, see you guys tomorrow, bye, bye.

Fifth Grade
Observation 2
Teacher 4

Student: Currency depending of the country, also we saw the active income and the passive income and the profit.
Teacher 4: Okay good yes, so we saw the currencies, we saw what is income, the different incomes and what is profit, what else? What else do we saw yesterday in the money topic? Who can remind me?
Student: Miss I remember that it was something that you show, something like statistics and you put the example of Apple.
Teacher 4: Yes, that is the stock market, yes the stock market.
Student: Yes, the stock market.
Teacher 4: And do you guys remember the four boxes that I show you at the end, that you were copying that.
Student: Yes, salary, uhm it was like when you, when you save money, saving
Teacher 4: Uhu so we have savings, what else? There were four.
Teacher 4: Earnings, I think [Student name] said earning on the chat, yes so earnings, what else?
Student: Miss I don't remember.
Teacher 4: When you buy something…
Student: Miss I know
Teacher 4: Yes
Student: Expenses
Teacher 4: Expenses, yes, and the one about the stock market…
Student: Investing
Teacher 4: Investing yes, thank you [Student name]. So we have the earnings or income, the expenses that is when you spend your money, the savings and the investment. Okay so let me share you guys the screen because I know some of you didn't finish copying that, so I would let you around five minutes, maximum ten minutes for you to finish copying this, okay? Because I know some of you couldn't finish.
Teacher 4: So again I would just repeat it meanwhile you're copying this, please all of you take out your notebooks and finish copying this, so in here we have like four different things we can do with money, so first the earnings is when you have an income mostly from your job, and of course here we have the active and passive income, we also have the expenses that is when you spend money buying stuff or services, savings, when you put money away like for future expenses, is the income that you don't spend and the investing is when you purchases securities for profit, for making additional money and in here we talk about the stock market. Okay so please finish copying this. And after you finish copying this we're going to do some practice exercises, okay?
Teacher 4: Who is still writing this or all of you finish?
Teacher 4: Time is done. Okay guys so now we're going to do some practice exercises, specially focusing on expenses and some of them are also incomes, okay? So let's see those types of exercises.

Teacher 4: The first one, this is about purchasing word problems, so William loves eating fruits. He paid $12,500 for apples, $8,000 for berries and $10,000 for bananas. In total, how much money did he spend? So please all of you try to do it on your notebook, try to solve it and one of you will give the answer, I will tell you who.

Students: Miss

Teacher 4: Please don't write the answer on the chat, I will be asking you guys.

Student: But I know it Miss.

Teacher 4: Okay

Teacher: Remember that in this topic you can use calculator, so in your notebook you can just do it like number one and the answer, because you can do it with the calculator.

Student: Miss, but that much money? Oh my gosh

Teacher 4: Uhm

Student: Miss, that is in dollars or in pesos?

Teacher 4: No, in pesos of course

Student: Ohh, in dollars would be too much

Teacher 4: Okay, so who wants to give the answer? please raise your hand, if you wanna talk please raise your hand in the zoom, I will the word. Josue give me your answer.

Student: I got thirty thousand five hundred pesos.

Teacher 4: $30,500 pesos, I think you're correct, let's check.

Student: Yes, miss, I got the same.

Teacher 4: So you needed to add 12,500 plus 8,000 plus 10,000, so 12,500 plus 8,000 that is 20,500 right?

Student: Yes

Teacher 4: Plus 10,000, $30,500, good.

Student: Yes!

Teacher 4: Yes, [Student name], again guys you can do that on the calculator, remember in this topic you can do it, you can use your calculator. Okay, the next one.

Teacher 4: Gaby went to the mall to buy clothes. She spent $86,000 on a jacket, $70,000 on pants and $34,000 on a shirt. How much money did Gaby spend on clothes?

Student: I know Miss.

Teacher 4: Okay wait, let's wait a second because I want people thinking about it, so please all of you do it, again you can use your calculators. Okay remember if you want to talk you need to raise your hand, who has the answer of this one?

Student: Me miss

Teacher 4: Raise your hand [Student name] please. Okay [Student name] tell me your answer.

Student: One hundred ninety, hay. I don't know how to say it

Teacher 4: You need to know how to say it

Student: One hundred ninety thousand pesos.

Teacher 4: $190,000 pesos, okay let me check. So let's add the numbers, so how much is 86,000 plus 70,000? It is 156,000 plus 34,000 it would be 190,000 good, one hundred ninety thousand. Okay I will be copying the answers on the chat, so the first one was 30,500, the second one is 190,000 pesos, I'm writing that on the chat, so good [Student name] that was correct.

Teacher: The last one, [Student name] got fast food for lunch. She spent $7,000 on fries, $25,000 on a sandwich and $1,000 on a salad. What is the total of the lunch bill? How much did she pay? again, try to do it and one of you would give me your answer.

Student: Miss I have it.

Teacher 4: Okay, wait.

Student: Miss but I want to say it.

Teacher 4: Okay wait, wait, I've been waiting, I have to give at least a minute to the rest of the class to do it. Okay [Student name] give me your answer. [Student name]?

Student: I write it in the chat.

Teacher 4: No you need to say it to me, remember that the participation is for me hearing you how do you say the numbers and all of that.

Student: Miss meee

Teacher 4: You're not raising your hand so I cannot give you the word. David, are you going to tell me the answer?

Student: Me Miss

Teacher 4: [Student name]?

Student: Miss I want

Teacher 4: Okay [Student name] is not giving me the answer, [Student name]?

Student: Miss can you hear me?

Teacher 4: Yes, I can hear you

Student: I'm not sure if it's like that but I think is forty-four thousand?

Teacher 4: Okay, let's check 44,000, so 7,000 plus 25,000 is 3,000 plus 12,000 is 44 good 44.000, good [Student name] that is correct, again let me send you the answer on the chat, so the answer to the third one is forty-four thousand. Guys you need to practice how to read the numbers, all of you should know how to read these numbers already. Questions about these types of exercises?

Student: Nop

Teacher 4: No? Okay, so please all of you lower your hand to see the next exercise please.

Teacher 4: So this one is about like income and expenses so we would be mixing the two of them, so the last one were just like about the expenses, like buying stuff and this one we will also consider the income, so let's see the example.

Teacher 4: So Andrea works as an engineer. She earns a salary of $4,000,000. That is the income, she has a salary of four million pesos. Her expenses each month are around $2,800,000 pesos. Which includes rent, food, transport…

Student: Miss what is

Teacher 4: I haven't finished [Student name], please don't interrupt me, please don't interrupt me. So this expenses that she has include rent, food, transport, bills, among other stuff. So the question is, how much money is she saving every month? Tell me Salazar what you were telling me.

Student: No nothing miss, that I read it again. Miss but I know the answer, can I say it?

Teacher 4: You need to raise your hand honey.

Student: Miss I have, I really have it

Teacher 4: Wait, wait, wait, again I always give some time for the rest of the class to try to calculate it, so let's wait a minute and I will hear you out. So again the income from Andrea is four million pesos and the expenses is two million two hundred thousand, so how much can she save? Remember that the savings are the incomes that are not spent, the money that she didn't spend, Okay, [Student name] tell me.

Student: One million and two thousand, ehh two hundred

Teacher 4: Okay, how did you solve that one? How did you solve it [Student name]?

Student: I take the four million and I like, I subtract two million and eight hundred and that gives me the answer.

Teacher 4: So yes, what you needed to do there and I'm writing in to the chat. You need to do a subtraction; the operation is a subtraction. You need to do the subtraction between 4,000,000 minus 2,800,000 and the result of that subtraction is 1,200,000, okay? I just put it there on the chat, 4,000,000-2,800,000=1,200,000, okay? that is how much she saves, again that is the money that she didn't spend from her income.

Teacher 4: Now, question b: Andrea wants to learn English. The English cost has a monthly cost of $800.000 pesos. Can she pay for this course? Mario?

Teacher 4: No [Student name], you already talk, sorry. [Student name]?

Student: Yes, miss, sorry my computer needs to charge.

Teacher 4: So why he can pay that course? How do you found out that she was able to pay it?

Student: No, no miss, wait is that I was charging my computer, can you repeat please?

Teacher 4: Okay so, we already found out that Andrea is saving every month $1,200,000 pesos, so now she wants to learn English but the course has a cost, a monthly cost of $800,000, so, can she pay it?

Student: Ummm wait, umm...yes miss.

Teacher 4: Why?

Student: Because each month she has left one million two hundred pesos, right? so for each month would be enough since is only eight hundred thousand pesos but she also wins four million pesos each month which from that she only gets one million two hundred pesos each month so it would be enough.

Teacher 4: Okay yes, that is correct, so right now she's saving 1,200,000 so from that million two hundred she would be able to pay the 800,000 from the course right? because is less than that. So if you take out that expense, if she starts doing the English course, she would still have some savings, right? How much savings she will be having after she pays the course? How much would be the subtraction?

Student: Me miss

Teacher 4: [Student name]?

Student: Five hundred thousand

Teacher 4: How much?

Student: Five hundred thousand pesos

Teacher 4: No, it's close but it's not 500,000

Student: Me, me, me, me, me

Teacher 4: [Student name]?

Student: Four hundred thousand

Teacher 4: Yes, it's four, it's 400,000. So she can pay easily the course and she will still have some savings right?

Student: Yup

Teacher 4: Yes

Student: So it would be enough

Teacher 4: Yes, it would be enough and again she will still have some savings, it's really good to always consider to save like some money, it's not like advisable to spend all your money because you will not be able to save anything, it's really advisable for every month for you to save something. Okay so she will be able to pay the course, so let me put another example. Does someone have a question about this example?

Student: No miss

Teacher 4: No? Okay good, remember, the important thing here it's to notice which one are incomes and which one are expenses, okay? so how much she's earning and how much she's spending.

Teacher 4: Now the next example, every month Sara have the following fixed expenses, do you guys know what is fixed expenses? I think I didn't put it on the glossary, what is fixed? what it means fixed?

Student: Arreglado

Student: That you don't waste any more money that's left.

Teacher 4: No, do you guys know what is fixed on Spanish?

Student: Arreglar

Student: Arreglado

Teacher 4: Umm that is one meaning but It has another meaning.

Student: Miss, fija

Teacher 4: Fijo yes, fijo. So are expenses that don't change, they don't change every month, they're fixed, they're always the same, so every month she has the same expenses that is why they're fixed, son fijos okay? That is fixed expenses, the one that people need to spend every month.

Teacher 4: So look, she has the fixed expense of rent because every month she needs to pay the same rent, it doesn't change, of $1,200,000 pesos, this COP represents Colombian pesos, okay? So every time you see COP is Colombian pesos, housing bills, like for example water, the gas, the light it would be $400,000 pesos, the internet is $15,000 pesos and others $600,000 pesos. So my question is, these are the fixed expenses that Sara has, how much money does she spend every month in fixed expenses? How much money does she spend every month in these fixed expenses? Wait, wait, wait, remember that I will not be hearing the people who already talk so Mario sorry but I cannot hear you, you already talked and Juan Jo also, sorry [Student name] I cannot hear you because you already talked.

Student: Okay miss.

Student: Miss the fixed expense is the rent, the housing bills, the internet and the others

Teacher 4: Yes, these four are fixed expenses that she has, so how much she spends after all? Yes, [Student name]?

Student: Yes, I got the answer

Teacher 4: Okay, tell me how much she spends

Student: Two millions three hundred and fifty thousand pesos

Teacher 4: Yes, two millions, can you repeat it? Two millions

Student: And three hundred thousand, and three hundred fifty thousand pesos

Teacher 4: Good, perfect, yes, which operation did you do? How did you solve that?

Student: I add one thousand two hundred by four hundred thousand by one hundred fifty thousand by six hundred thousand

Teacher 4: Okay good, so Mauricio did the addition of these four values to find out the total, okay, that is correct because you need to find how much she spends over all, so in the overall you need to do an addition, okay good, let me copy that answer there on the chat, so this is the five a, so five a, the answer is $2,350,000 pesos, okay? and you do that doing an addition.

Teacher 4: The next question will be, if Sara has a salary of $3,000,000 COP, how much money can she save every month? So we already know the expenses, now we're seeing the income, so how much money can she save every month? Yes, [Student name] you can go, [Student name]

you can lower your hand please, okay so, who wants to give me the answer? The people who hadn't participate on this class, the income is three million and we already know the expenses, the fixed expenses, so how much money can she save? [Student name] you already gave me one answer, [Student name] as well

Student: Miss please!!!

Teacher 4: You know the rules honey, okay, someone else? [Student name].

Student: Ehh miss I'm not sure but I think that is six hundred and fifty thousand

Teacher 4: Okay, let me check...yes, perfect. How did you find out that number?

Student: I subtracted three million from two million and thirty-five thousand

Teacher 4: Perfect, good yes, that is correct, okay so I will put that on the chat, so the operation you needed to do guys is do the subtraction of the income, and the income is 3,000,000 minus the expenses that she has every month, so 2,350,000 and that will give you the result of 650,000, okay so that is the money that she saves. So the savings, we've already seen this, is common right? The savings is the income minus the expenses, right? Savings, let me copy that, savings is equal, oh let me do it the other way, so income minus expenses is equal to the savings, okay? Please all of you copy that on your notebook in a small box or something like that so you will remember it, the formula I just put you, income minus expense are equal to savings, okay, please all of you copy that on your notebook, let me copy it here as well, so income-expenses=savings, please all of you copy that in your notebook in a small box or something that you will see it. Okay, all of you copied already? Ready? All of you copied on the notebook?

Student: Yes, miss, at least me.

Student: Yes, miss

Teacher 4: Okay, I also write it on the chat so please all of you, income minus expenses are equals to the savings.

Teacher 4: Okay let's look at the next example, so in this one I want you guys to be creative, so let's create our own exercise. With a family budget, so you can give me, I don't know, random numbers, so at the end we will try to find out if the family, we're trying to do like the budget, it's profitable or on debt, okay?

Teacher 4: So, let's put here some numbers, again you would be giving me the numbers and we will be doing the calculations together. So tell me, this family, family X, how much incomes will we have? How much incomes we're going to put it?

Student: Ten thousand million per

Teacher 4: Okay so ten, ten thousand million?

Student: Ten millions, ten millions

Teacher 4: Okay, 10,000,000 yes because that is, that is huge, they would be super rich. Okay so with ten thousand million they would be super rich but with ten millions is normal. Okay so the income is ten millions, which expenses this family has? Which expenses can we put here?

Student: Twenty million pesos

Student: The water

Teacher 4: Okay let's put here, so the water, how much will the water cost for this family?

Student: Four hundred thousand

Teacher 4: 400,000 okay, what else?

Student: The light

Teacher 4: Ange tell me

Student: The light

Teacher 4: Okay the light, how much would be the light?

Student: Umm one hundred twenty thousand pesos

Teacher 4: 120,000 pesos, and [Student name] I'm going to mute you honey because you have a thing back there. Okay thank you. [Student name], tell me another expense

Student: Ehh miss the gas, one thousand pesos

Teacher 4: Okay the gas, one thousand, one thousand? Okay, that is really cheap, the gas is cheap but I think it's not that cheaper but it's okay, this is an imaginary example. Umm [Student name], which other expense we can put there?

Student: Miss I think that you can put the internet

Teacher 4: Okay the internet, how much would be the internet?

Student: Uhh two hundred thousand pesos

Teacher 4: 200,000 okay good and we will do another something else?

Student: No, I was going to say maybe the gas is so cheap because they only cook in an electric stove.

Teacher 4: Ohh yes, so that would be the light expenses, okay. What about the rent? Or they own the house that they live? They don't have rent because they own the house?

Student: Yes

Teacher 4: Or should we put the rent? Okay so they own the house, so they don't have rent. So now try to find out the total of expenses, who can tell me the total, how much would be this total? Again please someone without participation points in the total.

Student: Me

Teacher 4: [Student name], tell me how much would be the total

Student: It will be, wait I'm gonna, Im gonna, it's that Iam in the phone of my mom

Teacher 4: Ohh okay

Student: It's seven hundred thousand twenty-one pesos

Teacher 4: Okay, you read it wrong, it would be seven hundred twenty-one thousand because the thousand is after the twenty-one, okay so yes that is the total expenses so, is this family profitable, they're saving money? Or they are spending all the money that they earn?

Student: Super profitable

Teacher 4: Yes. they are super profitable, probably this is, they're super profitable because they already own the house that they live in, because normally the biggest expense that a family has is the rent, normally is the biggest one. Ohh we're missing something really important

Student: The food

Teacher 4: Wait, wait. Wait, in this case the family is profitable, in this case the family is profitable but I think we're really missing a really important spend that is the food, the food is another expensive thing to buy, so what happens if we add here the food? How much a family can spend in food?

Student: One day my father went to do a market for the week and it was like four hundred thousand pesos, I don't know why.

Teacher 4: Okay so, four hundred thousand times four weeks per month

Student: One million six hundred thousand pesos

Teacher 4: Yes, perfect. Okay so let's say that the food for this family is 1,600,000 pesos, so let's find again the total and let's see if they're still profitable, how much is the total now?

Student: Can I say it?

Teacher 4: Who? [Student name]? No, [Student name] you already have the participation point. I don't know if [Student name] is raising the hand now or it's raising from before

Student: No miss, no miss, I'm sorry

Teacher 4: Okay, so how much it's the total expenses now? A lot of you haven't participated, like [Student name] already did and [Student name].

Student: I already know it but I already talked

Teacher 4: Yes, so guys the rest of you, how much it's the total expenses? [Student name] do you know it? [Student name]? What about [Student name]? [Student name], do you know the total expenses?

Student: No miss, I don't know it

Teacher 4: Okay, remember that you can use a calculator, you guys shouldn't be spending too much time because we are using our calculators.

Student: Miss I actually used logic

Teacher 4: Ohhh okay yes, so you can do it really easily as well with logic, Umm [Student name] do you got the answer? [Student name]? Okay so someone with points because the rest of the people are not there

Student: Me, me miss

Teacher 4: Okay [Student name], tell me what is the answer here

Student: I said it on the chat

Teacher 4: Again I need to hear you guys, sorry [Student name] if you want the points I need to hear you reading the number please

Student: Okay

Teacher 4: Wait, so let me see [Student name] can you read it to me...please

Student: Miss I know it but I don't know how to read it because it's too long

Student: Me too miss, I don't know how to read it

Teacher 4: So tryit, it's better for you to have some points that not points and of course I will correct you if you have a mistake

Student: Uhmm I don't know, two million three hundred twenty-one thousand?

Teacher 4: Yes, you say it just perfectly, that was correct

Student: Yes?

Teacher 4: Yes, so 2,321,000, good [Student name] so you got your point, your full point, you see it's better to try it, it's better to try it. Okay so, it's this family still profitable?

Students: Yes, miss, a lot

Teacher 4: How much money is saving every month this family?

Student Miss I know

Student: Miss I know

Teacher 4: Tell me [Student name], how much is saving?

Student: Two million three hundred twenty-one thousand

Teacher 4: No, that is the expenses, the savings, I'm asking for the savings

Student: Ummm okay

Teacher 4: So, how much is saving this family?

Student: Me

Teacher 4: Who? No you already talked. [Student name] I don't know if you have this answer

Student: Wait a minute miss, I am calculating

Teacher 4: Okay. again guys a lot of you are still missing points, like for example... [Student name] you also haven't talked.

Student: Miss I think that I know this. Miss I think that I know this. Miss it's like the total plus the income, right?

Teacher 4: It's income minus the total, remember savings is always income minus expenses is equal to savings, it's the subtraction.

Student: Okay

Teacher 4: Okay? So you don't have it yet or yes?

Student: No

Teacher 4: Okay. yes, remember the formula that I put you there, that is why you need to write it on the chat, income minus expenses is equal to savings, so [Student name], [Student name] ...yes [Student name]?

Student: They earn that for a month or for a year?

Teacher 4: No, for a month, we're doing everything monthly

Teacher 4: What?

Teacher 4: Monthly

Student: Miss, miss, you need to put a zero, you need to put a zero, you just put two zeros

Teacher 4: Oh yes, thank you, yes thank you, I was missing here a zero. [Student name], you got it? Ohh but you already participated, sorry honey, yes you already participated. Okay one last chance, ohh Samuel, you got it? no, I think you were stretching your head, sorry I thought you were raising your hand.

Student: Miss I think that I got it but I don't know

Teacher 4: Okay, tell me [Student name] again is always better to try

Student: I don't know if I got it good

Teacher 4: It's okay

Student: I don't know, I don't think so

Teacher 4: Is what?

Student: I don't think so, that I got it correct

Teacher 4: Tell me

Student: No miss, I don't think so

Teacher 4: Tell me [Student name]., probably you have it correct

Student: Noo…

Teacher 4: Okay, so let me hear [Student name], [Student name] tell me

Student: Okay miss, seven million six hundred seventy-nine thousand

Teacher 4: Perfect, yes. So each month this family is saving 7,679,000 pesos, that is a lot, it's a good saving right?

Student: Miss, that family in five years they're not gonna need to worry

Teacher 4: But again, it's better if they invest some of that money because normally the money that you save, you would spend it really easily, so they need to invest so the money would be profitable and more profitable.

Student: Miss, if we can put another thing, we should put the other things

Teacher 4: Yes, let's create another one, let me delete it and we create another one. Wait, wait, wait, so let me, let me start here, so I will put the income, I will put a smaller income because this one was like huge. So let's put like a, something small, let's say that a family earns two millions five hundred thousand pesos, okay? And you will give me the expenses, Mario, tell me one expense

Student: Food, one million pesos

Teacher 4: okay so in food they spend 1,000,000 pesos, what else? [Student name], another expense?

Student: We also would have to put this expense in the other table because even, also the richest families need to pay a higher tax, but also the taxes like the two

Teacher 4: Yes, that's true, that's true we didn't include the tax in the last one, the thing is that normally tax is expense you pay like one per year, it's not like a monthly expense, you pay one per year

Student: I say they have to pay it

Teacher 4: But in this one, you want to pay it in this one the taxes?

Student: Ok, no

Teacher 4: I think they don't earn a lot of money so let's not put the tax, probably this family is like a lower income but in the last one we should have included it yes. Okay let me hear [Student name], [Student name] you have another expense for this family?

Student: Miss I think in the house is a lot of money because the water, the lights…

Teacher 4: Uh Huh so let's put services, how much this family will spend in this services? How much would be the total in the services?

Student: I think like more than one hundred because it's a lot of water that we use

Teacher 4: Uh huh, so, how much I put? One hundred or a little bit more?

Student: A little bit more like...I don't know how much

Teacher 4: Just give me one number, it's okay, we're just making the exercise

Student: I think like one hundred fifty

Teacher 4: Okay, one hundred and fifty good, for all the services, so here we have light

Student: Sorry miss, sorry miss, one million fifty

Teacher 4: No, one million fifty would be too much for services because they are around less than three hundred

Student: No because it's the water…

Teacher 4: But the water bill normally is around eighty thousand, maximum one hundred and fifty, one million it's a lot for services to be honest, like maximum a family would pay four hundred thousand or five hundred thousand. [Student name], do you got another expense here?

Student: Yes, miss

Teacher 4: which one?

Student: The internet

Teacher 4: Okay, internet, how much would be for internet?

Student: One hundred thousand

Teacher 4: One hundred thousand, good and let's say also I will include one that is the rent, let's say that this family doesn't own a house so they have the rent and the rent is, let's put one million four hundred pesos and let's leave it like that, so can someone tell me how much would be the total expense for this family?

Student: But miss

Teacher 4: Yes?

Student: So they're like guardando dinero for one year

Teacher 4: I don't know, let's see, let's see how much is the total expenses, [Student name], do you have the total expenses?

Student: Yes, I need to put on the chat because that I forgot

Teacher 4: No, you need to try to say it please, I know probably you would say it correctly

Student: I hear it on Spanish so I then, you know, I don't know why I think like a weird way. Two million, ay no miss, I told you that I needed to write it on the chat

Teacher 4: But try it, I know you can do it, so two million and the next number

Student: Miss can I do it?

Student: Can I do it?

Teacher 4: Let me, let me hear [Student name], because [Student name] doesn't have points, let me hear [Student name], [Student name] tell me

Student: I think that is two million six hundred fifty thousand?

Teacher 4: Yes, perfect, so 2,650,000, so now my question is, is this family profitable or on debt?

Student: On debt

Teacher 4: On debt, right, they're spending more money than the one they have as an income

Student: Yeah they would go on banckaroup

Teacher 4: So they need to borrow some money to be able to pay their monthly expenses because they don't earn enough money, probably they're on debt.

Student: uhum

Teacher 4: Okay so do you guys see the difference between being profitable and being on debt?

Students: Yes

Teacher 4: Okay yeah

Student: On debt is en deuda, no?

Teacher 4: Yes, so normally people on debt spend more money than the money they earn, like this family look the expenses of the family

Student: They need to someone to borrow but then they cannot give the money back to them because they don't have enough money to pay the rent, the internet, the service, the food so they are in debt.

Teacher 4: Yes, so this family spends more money than the money that they earn, so as [Student name] tells us, they need to borrow some money to be able to pay these expenses, okay? Or the only solution that they should have it's to increase another income, they should have here another income to be able to be profitable, so maybe I don't know, sell something every month so they would generate a little bit more income and they would start being profitable and not in debt, okay?

Teacher 4: Okay, good guys that was really fun, thank you so much for participating, see you on Tuesday because Monday it's a holiday and to continue with the money topic okay?

Students: Okay, bye miss.

Appendix 11

Interview - Teacher 1

Setting: 1st Grade

Code: Teacher (T), Interviewer (G)

Turn #	Participant	Participation
1	G	Muchas gracias por permitirme este espacio. Le voy a hacer unas preguntas relacionadas a los problemas matemáticos. La primera pregunta, como para romper el hielo es ¿cómo enseña usted a los estudiantes a comprender y resolver problemas matemáticos?
2	T	Okey listo, la metodología que me encanta para enseñarle a los niños los word problems es a través de propia vivencia, llevarlos a su contexto, llevarlos a lo que ellos tienen ahí a su lado y decirles que es un problema y decirles que es lo que podemos hacer para solucionarlo. Durante las clases jugamos ¿quién cogió mis galletas? ¿quién me las robó? Entonces, cada uno dice "yo, tú" y luego ya ellos vieron que era un problema. Posteriormente, les enseño cómo se resuelve ese problema. ¿Qué debemos hacer? Preguntarnos ¿qué tengo del problema? y ¿cómo lo resuelvo? Ya ellos identificaban que tipo de operación es, si es suma o si es resta y a medida que me van dando la respuesta, el problema también se iba poniendo un poquito más complejo.
3	G	Perfecto. Bueno, ahora voy a preguntarle a usted como docente, durante todos sus años de experiencia, ¿cuál considera que es la dificultad más grande que los estudiantes enfrentan, al momento de entender y resolver un problema matemático?
4	T	Exactamente, bueno, primero su pensamiento lógico, ¿verdad? Sabes que la metodología y enseñanza nuestra es a través del inglés, el inglés no es su idioma materno, entonces si tú lo haces lúdico, si tú se lo expones a ellos en su medio, lo van a encontrar y si les das unas palabras claves y los estudiantes se dejan llevar, ¿verdad? El estudiante empieza a emplear lo que tú le estás pidiendo y es importantísimo que comprendan lo que leen, que el vocabulario que yo les emple en el problema sea familiar para ellos, no puedo ponerles un tiempo gramatical dentro del problema que ellos ni entienden qué es lo que quiero decir, ¿ves? Otra cosa es lograr captar la atención de los niños, wow y a través de la virtualidad muchísimo más, ese instrumento que yo voy a utilizar de mi diapositiva, hacerla interactiva, hacerla viva, que vaya apareciendo lo que le

		vamos pidiendo al niño, que el niño se sienta que es una pista lo que él tiene que encontrar entonces él está jugando y él se deja llevar, entonces el proceso de atención es muy importante, el cambio del tono de la voz, el usar diferentes estrategias y el niño se siente muy bien, en su ambiente, en su juego.
5	G	Es decir, hay que tener en cuenta esos factores que usted acaba de mencionar, especialmente con los más pequeños.
6	T	Si, para la edad de niños. pequeños no puedes exponerte como el docente de alta experiencia, y aquí está el problema y qué se debe hacer para solucionarlo, no, es un juego pero el niño conoce el vocabulario, el niño comprende y se pretende que él sienta que es un reto que él tiene que cumplir, y no uno eso se lo disfruta y entonces ganarle la atención, ganarles la atención porque sabes que no todos los niños tienen el mismo proceso de atención.
7	G	Lo anterior fue desde una mirada desde el estudiante, ahora como docente, ¿qué es lo más difícil que usted ha visto de enseñar estos word problems?
8	T	Okay, lo más difícil es cuando uno tiene la clase y no está en el mismo nivel, ¿si me hago comprender? Hay niños que dentro de tu grupo están por encima del nivel, pero hay otros que no, entonces estos les restan fuerza al que ya sabe. Uno nunca se debe de vencer y decir "no es tan difícil" no, lo importante es perseverar, seguir avanzando, ¿verdad?, seguir dándole. Para el maestro nunca está definido, tú haces la planeación y dices "voy a enseñar word problems en dos tres clases" pero la misma clase te dice "falta una más o te faltan dos, y ¿qué tal si hacemos un review?" y tú te cercioras. Entonces con los niños jugar a la ruleta y elegir el turno, es importante. La participación de los niños, no importa cuántas veces te equivoques, lo importante es aprender; él va tomándole toda lo lógica del pensamiento numérico y se va involucrando y le va dando solución y hay unos que hasta te proponen, en la virtualidad me pasó, "Miss pero yo también lo sé hacer de otra manera", deberás, entonces te proponen y te dicen "si porque yo redondeo el número, cuando el número se pasa de diez entonces yo lo redondeo y digo si hay diez y siete diecisiete" para no tener que decir nueve y ocho.
9	G	Correcto.
10	T	Así es, es magnífico.
11	G	Perfecto, todo eso sería referente a la dificultad que como docente usted puede notar. Ahora, digamos que hay un niño que presenta una dificultad, uno de esos niños que no está tan aventajado, ¿cierto?, entonces ¿qué hace usted usualmente cuando llega un niño y le dice, Ms, no entiendo que debo hacer en este problema, ¿qué hace usted para ayudar a ese estudiante?

12	T	Excelente, yo lo tomo como materia prima, lo tomo como mi principal objetivo porque es ahí la labor de educador, el reto con el que tienes que poner toda tu funcionalidad a potencializar a ese niño y llevarlo, lo necesito, si en el momento de la clase él no me da entonces yo lo uso para otra cosa, pero luego yo lo tengo que coger aparte. En la presencialidad, había esos momentos en el tú te quedas a solas " ven mi amor yo te voy a explicar" tú lo haces un poco más detallado, al nivel de él, te bajas porque bueno él todavía digamos que la descomposición de un número no la conoce o todavía no maneja bien el vocabulario entonces tú lo vas a repetir, entonces tú le dices "y si yo digo que tú tienes seis lápices" yo cojo sus mismos lápices "y yo tengo cuatro más, ¿cuántos hay en total? en total, mira la clave, en total, ¿qué operación debo? suma, excelente y ¿será que podemos escribir esta suma, será que tú te atreves a escribirla en el tablero?" "Si miss" y toma el marcador "bueno yo te dicto el número, seis más cuatro es igual a?" y luego viene otro hasta el momento en que él lo hace y esa alegría de ellos cuando ya te han entendido "Miss gracias miss, ya lo entiendo, lo sé hacer" y cuando está delante de los compañeros levanta la mano ansioso, que él quiere mostrarle a los demás de la clase que él también ya sabe porque antes su miedo, su frustración era no entiendo, ¿ves?, entonces importante el maestro ser perseverante, que el niño sepa, mi miss está ahí cuando yo la necesito, ella no solo reconoce al que siempre participa sino que también se brinda para aquel que siente miedo, que siente frustración.
13	G	Claro y que usted en ese caso viene siendo el apoyo que él necesita en ese momento.
14	T	Así es.
15	G	Perfecto. Usted estaba comentando algo acerca del programa en inglés, ¿considera usted que el idioma inglés es un limitante o genera dificultad en los estudiantes al momento de entender el resolver problemas matemáticos?
16	T	No, no creo que es un limitante. Cuando el colegio es bilingüe nosotros sabemos que no se enseña aisladamente, no es un conjunto de palabras que el niño tiene en su cabeza, sino que siempre el inglés va enfocado en su contexto. Tú le vas a enseñar los colores "what colors have you chose today?" o "look at this" y tú le muestras o sea le estás hablando de la situación que tiene a su lado sin necesidad de decirle "okay, tell me the colors, blue, yellow, red" no, no, no, entonces los problemas en las unidades de aprendizaje de matemáticas jamás es el primer tema, como lo dice el tema "word problems" ¿verdad? entonces el niño necesita como unas peldañas que vamos construyendo a iniciar; la matemática es como un collar siempre. Nunca dejan de sumar ni de restar ni de multiplicar ni de dividir, ¿si ves? entonces es eso, no es una limitante pero si es muy importante cerciorarse el maestro que lo enseña en inglés que el niño lo está comprendiendo.
17	G	Correcto. Aquí hay un puntito que quiero preguntarle, yo sé que bueno los

niños son bastante pequeños y que se encuentran en el proceso de la lectura, pero ¿alguna vez ha suspendido la explicación de un contenido o en este caso usted está explicando el problema matemático y usted ha tenido que suspender para explicar algo relacionado de gramática?

Turn #	Participant	Participation
18	T	Bueno en realidad digamos que directamente cuando se enseña un problema, no ha pasado, y otra de las cosas es que los niños cuando incluso son nativos o los niños han vivido tiempo en Estados Unidos y que manejan muy bien expresarse en inglés, ellos no conocen qué es gramática, ellos no conocen la escritura, ellos solo sabe hablar, ¿si ves? entonces digamos que el que lo está aprendiendo o el que el papá, el guía le está enseñando, porque eso sí nosotros tenemos que tenerlo claro, no haces parte tú sólo del proceso sino que también están sus padres o el tutor que le ponen en casa y si de ser así el niño si te va preguntar "miss pero ¿qué significa?" entonces ¿qué hay que hacer?, no, sácale todo, la lúdica. Es imposible que un maestro no les haya enseñado a los niños los W questions así como ellos se llaman, what, where, when, y entonces tú te sacas una gráfica "do you remember? Where is, look at me, is place, yes and how may, ohh wow how many, look at this, how many fingers" entonces ya el niño se va viendo, siempre hay que explicar, no explicarle que how significa cuantos o como no, no, no sin involucrar lo que le estas dando con lo que él ve "ahh okay, ya lo entiendo miss"
19	G	Con un contexto en específico.
20	T	Exactamente.
21	G	Para que él las pueda asociar.
22	T	Exacto.
23	G	Excelente, bien, muy bien, por eso le hice la pregunta porque en grados inferiores la estructura obviamente es diferente, ¿listo? Dos últimas preguntas
24	T	Claro.
25	G	¿Usted le enseña a los niños a crear sus propios problemas?
26	T	Uy fantástico, claro que sí, claro que sí, me encanta hacer proyectos, de hecho la edad se permite entonces hacemos el proyecto de shopping con money y ahí tienes la moneda y ahí tienes el problema, entonces ¿qué venden? y entonces ¿qué tienes que comprar? y entonces ¿cuánto dinero te tienes que llevar de vuelta? ese también hace parte de nuestro mapeo en grado primero y así se enseña.

27	G	Perfecto y ya la última pregunta, yo sé que usted me estuvo diciendo que usted no enseña directamente el tema de las estructuras gramaticales, así como propiamente ellas se llaman, pero usted de pronto antes de presentarle a ellos un problema ¿analiza qué estructuras se encuentran allí, sea para verificar que está en el nivel o simplemente se lo presenta a los niños y dentro de la misma clase lo desarrolla?
28	T	Si, los word problem tienen unos contenidos básicos, un vocabulario básico que el niño tiene que conocer y es ese vocabulario de ¿cuánto hay en total?, si sumo, si se suma más, si me crece el valor o ¿cuánto me queda? ¿cuánto me quitaron? Entonces existen canciones bien bonitas ¿verdad? que tú haces el gesto y tú le dices entones al niño "¿cuánto tengo en total?" "oh no ¿cuánto me quedó? porque tenía eight y se fueron three, one, two, three, ¿cuánto me quedó?" Ya ellos empiezan a contar, ¿ves? Es muy importante realizar esto porque te puede pasar con niños muy aventajados, que siempre han estado súper activos, pero en cualquier momento tiene una confusión; entonces que ellos sientan que tú estás ahí. El trabajo de pares es excelente, ¿qué te quiero decir con el trabajo a pares? que a veces el niño entre niño se entiende un poco más, que cuando tú como maestro siempre quieres tomar la palabra "miss, miss yo le puedo explicar" okay déjalo. El niño lo organiza a su manera y le explica a los demás. Él puede identificar que hay un paso a paso, la lectura, la comprensión, los elementos que forman a ese word problem que está acompañado del número, ¿qué operación voy a hacer? y el signo interrogante de cómo hago, ¿verdad?, entonces ya ellos cuando están en grados avanzados ya están familiarizados con eso.
29	G	Eso que acaba de explicar hace referencia a la gramática. Adicionalmente, se hacen este tipo de actividades para mantener la motivación y crear interés por resolver lo que se le está preguntando.
30	T	Así es.
31	G	Bueno gracias miss, muchísimas gracias por compartir su experiencia.
32	T	Todo un gusto. Siempre a la orden en lo que necesites.

Appendix 12

Interview - Teacher 2

Setting: 2nd Grade

Code: Teacher (T), Interviewer (G)

Turn #	Participant	Participation
1	G	Hola profe, gracias por este espacio. La idea principalmente es hacerle unas cuantas preguntas relacionadas a word problems. Su información es muy valiosa para este estudio.
2	T	De acuerdo.
3	G	Bueno la primera pregunta es para tener un panorama más claro sobre los word problems ¿qué hace usted cuando va a enseñar word problems? ¿Cómo enseña usted los word problems? ¿Qué hace primero, que hace después, como finaliza? Cuénteme.
4	T	Bueno, en cada clase que tenemos se les plantea una situación, procuramos que sea algo real, algo que sea vivencial; los niños que tienen mayor habilidad matemática son los que obviamente apoyan en la situación, tratamos de poner algún video o cosas reales si se puede, si tenemos la facilidad de hacerlo, cosas vivenciales con los que están en el colegio pues se hace si no pues se les proyecta la situación, obviamente forma virtual. Se les explica, se les hace gráficas, dibujos, a veces son cosas reales que tengo a la mano y que se pueden mostrar, ellos mismos pueden hacer sus dibujos, si necesitan hacer, graficar algo para poder entender las cosas, se la operación que sea. Obviamente se les da el tiempo para que lo analicen, para que lo piensen; al final obviamente pues se llega a la respuesta, puede ser apoyada por varios niños a la vez, de pronto el que está equivocado el otro lo apoya, le explica cómo de pronto se llegó a esa conclusión de esa respuesta y ya esa es la forma que se hace prácticamente en todas las clases.
5	G	Okay, perfecto, gracias. Bueno la segunda pregunta está relacionada, un poco a todos sus años de experiencia enseñando matemáticas, ¿cuál considera usted que es la dificultad más grande que enfrentan los niños al momento de entender y de resolver un problema matemático?
6	T	Ay Dios mío, es que hay tantas cosas que influyen en eso.
7	G	Mencione las que más sobresalen.

8	T	Bueno es que yo lo veo como un todo, es decir, hasta la parte emocional para mi es importante en un momento de esos de las clases. Si el niño no está emocionalmente listo, disponible, dispuesto para la clase, es muy difícil que uno pueda captar la atención del niño entonces son muchos factores que pueden intervenir en el proceso de aprendizaje de los niños, puede ser esa parte emocional, pueden ser vacíos académicos que tenga de años anteriores, puede ser hasta de problemas cognitivos que puedan tener también los niños entonces son muchos factores que pueden no interrumpir sino como interferir en el proceso de aprendizaje de los niños .
9	G	Okay, okay listo. Y ahora como docente ¿cuál es la dificultad más grande al momento de enseñar los word problems?
10	T	A ver, yo creo que justamente esos vacíos que acabo de mencionar, sobre todo, uno puede ganarse el cariño y la parte emocional se puede sobrellevar, pero si hay vacíos de antes, cuando no se tiene la base necesaria para el nivel en el que se está trabajando en ese momento o el nivel requerido en ese momento, tenemos que echar para atrás y volver a retomar lo que se debió haber enseñado en un año atrás o dos o tres años atrás que son obviamente las bases. Por esta razón, creo que ese es uno de los grandes problemas. Lo otro es que a veces ellos, dentro del sistema familiar o algo, no los incluyen, no los envuelven en las situaciones cotidianas que de pronto les puede ayudar a que sean capaces, a que pueden resolver situaciones cotidianas lógicas entonces eso también puede influir y si no los dejan como ser independientes entonces es le hacen todo y no tienen como esa habilidad de lógica.
11	G	Muy bien y ahora viene una pregunta relacionada un poco con eso y es ¿qué hace usted cuando un estudiante le dice "no entiendo este problema" ¿qué es lo primero que hace usted para ayudar a ese estudiante?
12	T	Le pregunto qué parte exactamente no entiende, obviamente los que me contestan "todo" pues tengo que volver a empezar desde el principio, trato de mostrarles exactamente bien, como desmenuzar el problema y como mostrarle donde están las palabras claves, como en que se tiene que enfocar para poder entender primero y poder desarrollarlo, obviamente lo que va relacionado a lo que acabé de decir, hay muchas situaciones que son lógicas para uno o para algunos niños porque han tenido de pronto mucho más contacto con esas situaciones entonces obviamente se les facilita pero a los que de pronto justamente se les dificulta pues el trabajo se agranda un poquito y es más dispendioso pero es satisfactorio al final cuando ellos logran entenderlo.
13	G	Perfecto. Ahora pasemos a un contexto bilingüe, ¿considera usted que el idioma inglés es un factor determinante o un limitante en los estudiantes para comprender y resolver los problemas matemáticos?

14	T	En algunas ocasiones sí porque de pronto se enfocan en la palabra que no entendieron y no en el contexto en sí. Me ha pasado por ejemplo, en un problema que les presenté a los estudiantes "la profesora de cuarto grado tiene algo" y ellos se confundieron porque decía el número cuatro y yo les decía "no importa, puede ser de kinder, primero, segundo, tercero, cuarto no pasa nada, ese número es irrelevante" tiene que enfocarse justamente en lo que, en la key del ¿cómo se dice eso?
15	G	¿La palabra clave?
16	T	Si, la palabra clave del problema. Son situaciones de pronto obviamente, no son todas la veces pero si hay momento en que la parte del inglés, deben enfocarse en lo que verdaderamente es importante, pues se pierde de pronto el hilo un momento, ya entra la parte de la angustia porque no entendí entonces hay que calmar los ánimos y hay que empezar a decirles "vamos a mirar, esta palabra es esto, esto es lo otro" ya después del momento de la angustia ya viene otra vez la calma y seguimos.
17	G	Y continuando con esa misma idea, alguna vez ¿ha suspendido la explicación del contenido matemático de la clase para explicar algo relacionado con gramática o un vocabulario específico?
18	T	Sí, obviamente sí. De hecho, les hago mucho énfasis en la comprensión de lectura y les refuerzo diciéndoles " ¿ven que es mucha comprensión de lectura? tenemos que entender lo que estamos leyendo para poder entenderlo, para poder saber que tengo que hacer, si tengo que hacer una suma o una resta o una multiplicación o una división porque es que el problema me lo dice pero si yo no lo leo bien, no lo voy a entender" entonces a veces he leído un problema o lo hemos leído, porque lo leen los niños, lo leo yo, tres, cuatro, cinco veces y les digo "no importa vamos a leerlo las veces que sea necesario para poder entender" y si, obviamente la clase como tal de matemática si se ha detenido para poder explicar algo gramatical.
19	G	Perfecto, y ¿enseñas a los estudiantes a crear sus propios problemas o siempre los traes tú?

20	T	No. Por ahora los he llevado yo.
21	G	Okay, ellos no han creado su propio problema.
22	T	No, de pronto lo crean, pero solamente unos dos o tres niños, no todos. No se ha dejado como una tarea, una actividad de clase o algo. Algunos de pronto, uno o dos niños si han intentado hacerlo. Lo dicen obviamente oralmente pero no se ha escrito y no se ha dicho.

23	G	Y ya un poco más a nivel de planeación o de algo antes de la clase, ¿cierto?, ¿has analizado la estructura gramatical del problema antes de presentarlo a los niños?
24	T	Se desarrolla en la clase, o sea, si lo leo antes pero obviamente yo lo entiendo y también sé que cuando llegue el momento lo voy a explicar, pero si lo leo antes y se desarrolla en la clase. En algunas ocasiones les he puesto al ladito como la palabrita y el significado al lado pero muy de vez en cuando.
25	G	Bueno profe muchísimas gracias por su tiempo. Sus respuestas han sido muy valiosas.
26	T	Bueno con mucho gusto.

Appendix 13

Interview - Teacher 3

Setting: 3rd Grade

Code: Teacher (T), Interviewer (G)

Turn #	Participant	Participation
1	G	Hola, ¿cómo estás?
2	T	Excelente.
3	G	Bueno, te voy a hacer unas cuantas preguntas relacionadas a los problemas matemáticos. Con toda la confianza y sinceridad puedes responder. En caso que necesites más tiempo o no entiendas alguna pregunta, me lo haces saber y con gusto te la repito o te la reformulo, ¿vale?
4	T	Okay
5	G	La primera pregunta y creo que va a servir como para romper un poco el hielo es ¿cómo enseñas tu word problems? ¿Cómo enseñas los problemas matemáticos?
6	T	Hay muchas estrategias para enseñarlos pero también es importante tener en cuenta el tipo de clase que tú tienes, porque para unos es más fácil de pronto ir de una vez a un problema y empezar a identificar una estrategia que a mí me gusta mucho que se llama, cubes y tú le puedes ir enseñando esa estrategia y bueno le resulta; para otros es comenzando de pronto con el vocabulario, con las keywords que son importantes dependiendo de cada operación que quieras desarrollar en el word problem, entonces hay como diferentes estrategias, entonces básicamente es mirar que tipo de clase, a qué tipo de clase se le va a enseñar la resolución de problemas. Pero en general es una que uno siempre utiliza que es primero identificar, identificar con los niños las keywords o las clue words para que ellos dentro de un problema identifiquen de una vez y sepan qué tipo de operación van a realizar. Me gusta hacerlo guiado, yo los guio con eso, luego que ellos participen hasta llegar al último punto que es la creación de ellos mismos de sus propios problemas, que me parece un punto interesante también dentro de todo el tema de word problems.
7	G	Perfecto, para allá vamos no te preocupes, esta era solamente la primera pregunta. Bueno, teniendo en cuenta tus años de experiencia enseñando matemáticas ¿cuál consideras que es la dificultad más grande que enfrentan

		los estudiantes al momento de entender y/o resolver un problema matemático?
8	T	Yo creo que es la comprensión del mismo texto porque el alumno inmediatamente en un problema lo primero que hace es irse a los números, no se toma el tiempo de ver que le está pidiendo el problema, si es una suma, una resta, una multiplicación, es lo primero como instantáneo. Es importante hacer ese pare al alumno y recordarle "espera, vuélvelo a leer" y por eso es que resultan las estrategias del paso a paso, de que encierra esto, subraya aquello, vuélvelo a leer, edita sobre la pregunta, entonces para mi es lo más difícil que yo creo y que es la rapidez de alumno, el no tomarse el tiempo para leer y analizar lo que el problema le está diciendo.
9	G	Okay, perfecto. Y desde el lado del docente ¿cuál crees que es lo más difícil al momento de enseñar problemas matemáticos?
10	T	Desde el lado de uno como docente yo creo que la angustia que le da a uno como maestro es el no saber hacerse entender a la hora de explicar algo que es tan fácil pero que para ellos lo ven muy complejo. En el caso de nosotros que somos un colegio bilingüe, el uso de obviamente el inglés entra dentro de esa categoría. Se necesita que el alumno tenga un nivel para entender todo lo que le está tratando de decir el problema y yo creo que es eso, es como más la angustia de uno como docente hacerse entender, poder ampliarle las diferentes formas de resolución de problemas, no quedarse solo con una, creo que por ahí va el asunto.
11	G	Okay y pues con lo que me has mencionado ¿consideras que el inglés es una limitante para que de pronto los estudiantes entiendan o resuelvan los problemas?
12	T	No. Más como una limitante, en el caso particular de un niño que no venga con un buen nivel obviamente va a ser una limitante, pero tampoco es algo definitivo porque por ejemplo una de las estrategias que también se utiliza y que yo la uso es, dentro del vocabulario también le pongo de manifiesto esas acciones o que uno le llama las actions verbs que siempre o por lo general, aparecen dentro de un problema, comprar, vendió, compartió, coleccionó. Eso hace que aquel que de pronto tiene un nivel diferente, más bajo, simplemente por el hecho de recordar su significado puede llegar a resolver un problema, entonces es, si tiene algo de intencionalidad ahí pero, pero tampoco sería imposible que no lo resolviera.
13	G	Okay, perfecto y retomando para el tema de la creación que me estuviste mencionando, tú les enseñas a ellos a crear problemas, ¿cierto?
14	T	Sí, es muy importante, para mí es muy importante.
15	G	Y cuando les estás enseñando a crear esos problemas, ¿enfatizas en algunos

		aspectos del lenguaje? por ejemplo las estructuras gramaticales o por ejemplo el vocabulario, ¿en qué haces énfasis tú cuando ellos están creando esos problemas?
16	T	Si, o sea vuelvo y comparto esa estrategia, que se llama cubes.
17	G	¿En qué consiste?
18	T	Consiste en que cada sigla de la palabra te lleva a una acción particular dentro del problema, de pronto para nosotros que ya tenemos conciencia de la resolución de problemas es fácil solucionarlo pero cuando ellos están haciendo apenas el entrenamiento necesitan que tú les digas " la c de circles, circle the numbers" entonces ellos tiene que ir "primer paso encierra el número" "la u de underline the question" entonces que subrayes la pregunta o las palabras claves que te determinan si es una multiplicación, each, sí es share equally, división; entonces ellos con el paso a paso, ellos se van dando cuenta al final de que es una división, una multiplicación o una suma porque no falta el alumno que te pregunta "¿ay miss esto es para multiplicación o para división? entonces la idea es que la misma clase, el mismo proceso lo lleve a él a entender que tipo de proceso tiene que hacer, ¿sí?, entonces sí, las palabras claves son importantes a la hora de crear un problema, como tú lo decías, la gramática porque si lo está haciendo en presente o en pasado o incluso los mismos adverbios hacen, por eso te digo que el inglés es fundamental para nosotros, que somos un colegio bilingüe. Para los que no son bilingües pues de igual manera porque lo hacen en español y en español también existe gramática como verbos, como adverbios que facilitan todo ese proceso. Entonces es muy importante que tu como docente guíes el paso a paso de la creación, que modeles, sobre todo, a mí me gusta como modelarle mucho el cómo se hace, el cómo lo hago yo, cómo lo harías y le voy dando como unos pequeños insumos para que él simplemente vaya completando hasta llegar al punto en que tú ya no le das insumos y él termina creando su propio problema. No sé si me hice entender.
19	G	Claro que sí, perfectamente.

20	T	Vale.
21	G	Pues para finalizar te voy a hacer dos preguntas más. La primera está relacionada con ¿alguna vez te ha pasado que durante una clase has tenido que para el contenido matemático que estás enseñando para enseñarles un poquito a ellos la parte del lenguaje como tal? estructuras gramaticales, vocabulario, ¿te ha tocado hacer, suspender una clase donde estés trabajando solamente contenido de matemáticas para explicar algo relacionado con el inglés?
22	T	Déjame ver, que yo recuerde este año, que yo recuerde quizá este año de

		pronto no, pero me parece que hubo una oportunidad hace muchos años, en el que sí tocó como hacerle ese pare ahí un momento para explicarle porque yo como lo dije en una reunión de área, el inglés es el todo y en este caso en colegio bilingüe, las matemáticas hacen parte de un todo, una fracción del todo; entonces nosotros vamos a ir la dando en el inglés y las matemáticas se enseñan a través del inglés también. Entonces sí, creo que sí y cuando toca, toca.
23	G	Me imagino, así es. Y ya para finalizar, ya es un poquito más de análisis, de la preparación de tus clases. Antes de presentarles a los niños los problemas matemáticos ¿ tú haces alguna evaluación o haces un análisis con respecto a esas estructuras gramaticales que ellos se van a enfrentar o simplemente se las presentas y trabajas sobre la clase?
24	T	No, yo nunca hago eso, nunca. Si es incorrecto pues bueno me enseñas enseguida si hay que hacerlo, pero no, yo entro con los warm ups o la actividad que uno tenga para enseñar el word problem pero no, de verdad que no. Simplemente entramos al tema, el mismo problema encierra la parte matemática y la parte del lenguaje y creo que ahí se van desarrollando todas las cosas. Como tú enseñas un vocabulario o entregas un vocabulario al principio, el alumno se va como acostumbrando o entiende que es muy importante las palabras o las expresiones que tú le enseñas y lo tiene en cuenta para aplicarlo.
25	G	Vale, bueno muchísimas gracias por tus respuestas.
26	T	De nada.

Appendix 14

Interview - Teacher 4

Setting: 4th – 5th Grade

Code: Teacher (T), Interviewer (G)

Turn #	Participant	Participation
1	G	Hola profe ¿cómo estas?
2	T	Hola. Muy bien, gracias.
3	G	Gracias por este espacio, dentro de tantas ocupaciones. Tengo una serie de preguntas respecto a word problems. Espero que me puedas ayudar a entender el comprender la labor de un docente de matemáticas, ¿vale?
4	T	Okay.
5	G	La primera pregunta es, durante todos estos años de experiencia ¿cuál consideras que es la dificultad más grande que enfrentan los estudiantes al momento de entender y resolver un problema matemático?
6	T	Creo que lo que más he podido evidenciar es como estructurar en la cabeza de ellos el paso a paso que deben seguir, porque normalmente el estudiante tiende a leer la pregunta y quiere hacer el proceso rápido y muchas veces ellos tiene que detenerse a pensar, ¿qué me están preguntando?, ¿qué tengo que hacer?, ¿qué tengo que hallar?, para después sí empezar a resolver. Entonces creo que la mayor dificultad de ellos es cómo hacer un plan, ellos no están acostumbrados a hacer un plan para desarrollar el word problem sino que sencillamente se quiere lanzar de una vez a encontrar la respuesta. Considero que esa es la mayor dificultad de la mayoría de los estudiantes.
7	G	Perfecto. Ahora vamos a pasar a los docentes, ¿qué es lo más difícil de enseñar word problems, los problemas matemáticos?
8	T	Creo que está relacionado también con lo mismo porque es como enseñarles a pensar, no es solamente enseñarle las operaciones, esa es la cuestión con word problems. No es necesariamente enseñarles a hacer la suma, la resta, la multiplicación o la división, tenemos que enseñarles a que lean el enunciado y piensen. Esa es la parte más difícil porque igual cada uno tiene sus habilidades en las que son fuertes entonces cada estudiante va ver el problema de una forma diferente, por eso hay que enseñarles como ellos tienen que pensar para poder solucionar el problema adecuadamente.

9	G	Perfecto. Vamos a colocar una situación ¿ qué haces tú normalmente cuando llega un estudiante a ti y te dice, no sé qué hacer, ¿qué es lo primero que tú le aconsejas o le recomiendas a ese estudiante?
10	T	Normalmente le recomiendo dos cosas, una que relea la pregunta porque la idea es responder la pregunta, ¿sí?, entonces que lea la pregunta muy bien y segundo que mire qué datos tiene porque teniendo en cuenta esa pregunta hay que mirar y analizar qué datos tenemos para ahí sí empezar a buscar la respuesta. Considero que esas son las dos preguntas que normalmente les hago, ¿qué te preguntan? y ¿qué datos tienes?
11	G	Okay, bien. Estamos en un contexto bilingüe, ¿cierto?, ¿consideras que el idioma inglés, pues entendiéndolo como un segundo idioma para ellos, es un limitante en los estudiantes al momento de entender y resolver problemas matemáticos?
12	T	Si creo que es una dificultad adicional y creo que lo mismo va relacionado de la parte de pensar porque es su segundo idioma y normalmente, excepto que ya tenga un nivel muy conversacional, sigue pensando en español, entonces y como te decía, en los word problems muchas veces necesitamos pensar antes de resolver. Ahí sí creo que pueda ser una dificultad, no tanto una limitante pero si es una dificultad.
13	G	Okay, y normalmente cuando te llega ese estudiante con esa dificultad ¿qué es lo primero que tú le dices para que pueda en este caso solucionar la dificultad?
14	T	Pues si evidencio que está relacionado con el tema de inglés le preguntó qué palabras de pronto no entiende y le intento explicar, ya sea el significado en inglés, obviamente todo en inglés o como en un contexto para que ellos pueden entender un poco más a fondo y después de hacer esa explicación pues uno siempre debe preguntar de nuevo como, repíteme lo que te dije para asegurarnos que el estudiante si entendió lo que uno le está explicando.
15	G	Okay, y ¿alguna vez te ha pasado este tipo de casos?, es decir, ¿has suspendido alguna clase, pues has parado una clase de pronto para tratar de explicar un contenido relacionado al lenguaje como tal, es decir, gramática, vocabulario?
16	T	Durante las clases no tanto pero sí muchas veces evaluando, o sea ya en el proceso evaluativo, como en la solución del word problem tiene que ser una respuesta completa no solamente los números, entonces ahí sí muchas veces me toca detenerme a de pronto revisar si está utilizando la conjugación correcta del verbo al dar la respuesta, entonces no solamente me enfoco en el número que es el resultado matemático pero también como en la respuesta completa y ahí sí me toca detenerme a veces a verificar el inglés del estudiante.

17	G	Okay, perfecto. Y otra cosita que quería preguntarte es relacionado a que si ¿tú enseñas a los estudiantes a crear sus propios problemas?
18	T	Si. Durante varias clases, tuvimos un proyecto enfocado en eso, que el estudiante pudiera diseñar problemas matemáticos enfocados en un tema específico.
19	G	Okay, ¿y utilizabas algunas reglas gramaticales, pues es decir, de estructura, de forma, del lenguaje para que ellos pudieran crear su propio problema?
20	T	Si, el consejo que se les doy es que primero, estructurar el problema donde van ellos a decir los números o los datos que se tienen que utilizar o los datos disponibles para el problema y por último la pregunta.
21	G	Tengo curiosidad por saber ¿cómo un docente evalúa las estructuras gramaticales de un problema? ¿analizas tú la estructura gramatical del problema antes de presentarlo a los niños?
22	T	No, yo simplemente me fijo al menos que no tenga errores gramaticales. que esté bien escrito, que conserve al menos la misma estructura que te dije ahorita, que plantee primero un problema incluyendo los datos y que luego este como la pregunta de cierre, y también intento incluir, no lo incluyo en todas pero intento incluir que en la pregunta o en el problema esté la palabra clave, tu sabes que hay algunas palabras claves en matemáticas que representan suma, resta, multiplicación o división entonces, no en todos de nuevo porque también ellos deben a veces identificar del contexto que operación pero en la mayoría de problemas incluyo esas palabritas para que también ellos aprendan a identificar con solo la palabra clave qué operación deben hacer.
23	G	La pregunta de cierre, ¿cómo enseñas tú los problemas matemáticos? ¿Qué haces primero, que haces segundo, que haces tercero? Ya para hacer un resumen de todo lo que te he preguntado.
24	T	Okay, pues bueno digamos cuando, normalmente lo empezamos cogemos como al principio suma luego resta, multiplicación, división, entonces siempre se hace como un recorderis porque igual ellos ya vieron suma, resta, multiplicación, división en años pasados, entonces se recuerda que es cada operación, ¿cuál es la utilidad detrás de la operación?, se recuerdan de nuevo las palabras claves para identificar las operaciones dentro de los problemas y bueno ya ahí como que si ya les empiezo a plantear los problemas y de nuevo, primero les pregunto siempre, pues les releo la pregunta como dos veces y les digo "bueno ¿qué datos tenemos?" y por ejemplo si es división entonces ¿cuál es el dividendo? ¿cuál es el divisor? y con eso ellos ya como que planteen la operación. Eso es lo que normalmente hago y ahí si ya los dejo a ellos que solucionen.

25	G	Muchas gracias por este espacio y compartir tus más sinceras experiencias enseñando word problems.
26	T	Con todo gusto.

Appendix 15

Lesson Plan 1st Grade - Term 1

CLASS: Addition word problem	
DATE: Term I	
Learning objectives	• Use addition within 30 to solve word problems involving situations of adding to, putting together, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem • Students will be able to use addition to solve word problems.
Lesson focus / success criteria	I start by asking the questions: • What information do we need to find out? • What information do we have?
Prior knowledge / Previous learning	For each problem, I ask a volunteer to present his or her solution and explain the reasoning for each step that was used. After the presentation, I elicit comments or questions from other children. Then I ask if anyone used a different way to solve the problem. I have that child present his or her work and follow up with another class discussion. I continue the presentations and discussions as both opportunity and time permit.

Plan

Lesson	Planned activities	Notes
Introduction	Create a scenario to introduce the concept of word problems. Singing and act it out Who took the cookies from the cookie jar? Motivate the students to participate by calling their partners. Ask essential questions about it.	Slide presentation Interactive exercises Worksheets / jam boards
Main activities	Then introduce similar activity but using words problems by slide presentation Call on different students to answer the problem to promote class participation. Tell students they became a part of a word problem. Ask students to reflect on what word problems are and have a class discussion. Remind the class that a word problem is a situation explained in words that can be solved using math. *During the activity time* Our students have an individual time to read the problem, to identify the key words problems and solve each story	
End/Close/ Reflection/ Summary	Before the class ends, the teacher gives them an opportunity to share their screen in order to check and review their results. Review any missed problems, and show how to solve for better understanding. Ask students to share what they learned in today's lesson.	

Appendix 16

Lesson Plan 1st Grade - Term II

CLASS: Subtraction solving problem
DATE: Term II

Learning objectives	• Use subtraction within 30 to solve word problems involving situations of taking from, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. • Read and define the problem • Be able to back up the way they solved the problem the way they did • Correctly set up the mathematical problem • Become a problem solver
Lesson focus / success criteria	• Understand what the question is and underline important information. • Presented my solution in an organized manner. • Use one or more strategies.
Prior knowledge / Previous learning	• Use a problem solving words like: • Understand • Plan • Solve • Check to make sure

Plan

Lesson	Planned activities	Notes
Introduction	Solve to create a turkey First we're going to dance as a turkey After that each students open his or her envelope with some words problems,	

Main activities	Share your word problem to your friends Then solve the six task (1-2-3-4-5-6) After that Decorate your turkey with each solving problem like this: Model photo	
End/Close/ Reflection/ Summary	Write the addition or subtraction sentences on each stick Before the class end everyone shows their turkey	

Appendix 17

Lesson Plan 1st Grade - Term III

CLASS: 2D and 3D shapes	
DATE: Term III	
Learning objectives	• Use accurate language related to 2D and 3D shapes features. • Identify, describe and sort 2D shapes by their characteristics or properties, including reference to the number of sides and whether the sides are curved or straight. • Identify, describe and sort 3D shapes by their properties, including reference to the number of faces, edges and whether faces are flat or curved.
Lesson focu7 / success criteria	• Students will identify and draw 2D and 3D shapes. • Students will classify the shapes according to the numbers of sides, and vertices. • Students will be able to identify and use the shapes to build a robot using 2 or 3 D shapes.
Prior knowledge / Previous learning	• Name and sort commonly found at school or home 2D shapes or/and 3D shapes. • Through an investigative question when starting the lesson students will share their previous knowledge.

Plan

Lesson	Planned activities	Notes
Introduction	• Warm up: the teacher will start the lesson by showing students a picture of some basic and well known 2D shapes. (Circle, square, rectangle, triangle, oval) The teacher explains that no matter what the position is, the shape will be the same shape. e.g.: an inverted triangle, a rectangle in a vertical or horizontal position. • Then, there will be a song about shapes. "Shapes	Google slides Youtube

	everywhere"	
Main activities	• Guided Activity. The teacher will ask students to go around the house or classroom to find and bring (if possible) something with the required shape. The teacher will encourage them to play. The students need to know that they can spot those shapes on everyday objects. E.g.: the microwave, the clock. • Right immediately the number of sides will be introduced, explained and recognized up to 10 sides. • Irregular and regular shapes to see characteristics and properties of the shapes. • Specific vocabulary will be shared about the sides of the shapes, angles, symmetry. • The teacher will share a video about the 2D and 3D shapes. The teacher will share a matching activity to identify those shapes with their names. • Draw the other side of the picture (robot) • The teacher will show a video about polygons and will discuss it. • We will discuss the differences between 2 and 3D shapes. Three dimensional shapes will be explained using the real objects shown at the beginning of the lesson. (cube, sphere, cylinder, rectangular prism, cone, pyramid) • A video about faces, edges and corners of the 3D. • Workbook time to solve word problems, identify shapes definition. • Guide to draw 3 D shapes. Video.	Youtube Google slides
End/Close/ Reflection/ Summary	• The teacher shows examples and explains how to build a 2 D or a 3D robot. • Notebook time • Online games to practice	Google Slides Notebook Online games

Appendix 18

Lesson Plan 2nd Grade - Term I

CLASS: Addition with and without regrouping	
DATE: Term I	
Learning objectives	• Know addition facts for all numbers to 100. • Add single-digit numbers to/from three-digit numbers - Regrouping. • Make sense of and solve word problems, single operation and begin to represent them, e.g. with drawings or on a number line.
Lesson focus / success criteria	• Students will learn how to solve addition using notes to support and number equations. • Students will learn how to solve word problems related to addition using real life context.
Prior knowledge / Previous learning	• Understand addition as counting on and combining two sets • Begin to use the +, – and = signs to record calculations in number sentences • Understand that changing the order of addition does not change the total • Explore number problems and puzzles • Choose appropriate mental strategies to carry out calculations and explain how they worked out the answer

Plan

Lesson	Planned activities	Notes
Introduction	• Warm up: • Video:	Google slides Youtube

Main activities	• Guided Activity. The teacher models 3 exercises and 3 word problems. Teacher explains the procedure to solve the exercises using addition. Teacher provides strategies to solve word problems. • Independent Activity: Worksheet where 5 exercises and word problems are included. Teamwork is allowed. • Matific: Educational platform. Independent practice using addition concept. Complete level 1 to 3	Google slides Liveworksheet Matific
End/Close/ Reflection/ Summary	• At the end of the lesson, through interactive games and worksheets, students will acquire the knowledge hands on. • Teacher will guide students to reflect on their learning, evaluate their own and each other's work through word problems activities. • Liveworksheet evaluation.	Google Slides Google forms

Appendix 19

Lesson Plan 2nd Grade - Term II

CLASS: Greater than and Less than	
DATE: Term II	
Learning objectives	• To identify and compare greater than, less than and equal to numbers. • Identify the symbol corresponding to greater than, less than and equal to. • Select the correct symbol that matches the value of the given numbers
Lesson focus / success criteria	• With the use of books and videos, students will be able to understand and learn the concept. • Through interactive games and worksheets, students will acquire the knowledge hands on.
Prior knowledge / Previous learning	• Through an investigative question when presenting the symbols students will share their previous knowledge.

Plan

Lesson	Planned activities	Notes
Introduction	• At the beginning of the lesson the teacher catches learners' attention by asking them if they recognize the symbols shown in the google slides. • According to their responses the teacher establishes the context of the lesson and how much they need to learn. • Teacher shares objectives of the lesson and sets expectations for the class.	**Use the Greater Than and Less Than Signs to Compare Numbers** • Youtube • Google Slides

Main activities	• During the lesson, learners will develop skills and knowledge with the use of books and videos allowing them to understand and learn the concept. • Through practise techniques using a variety of examples, learners will apply existing knowledge and skills while exploring concepts bringing them to solve word problems.	**Monster knows - More than Less than** • MyOn **The greater than and less than song** • Youtube **Comparing Numbers - Greater Than Less Than** • Youtube
End/Close/ Reflection/ Summary	• At the end of the lesson, through interactive games and worksheets, students will acquire the knowledge hands on. • Teacher will guide students to reflect on their learning, evaluate their own and each other's work through word problems activities. • Liveworksheet evaluation.	• Notebook • Matific • Online Games • Boom Cards • Liveworksheets

Appendix 20

Lesson Plan 2nd Grade - Term III

CLASS: Fractions	
DATE: Term III	
Learning objectives	• Define and use fraction notation recognizing that fractions are several parts of one whole. • Identify and find the whole, halves, quartes, thirds, fourths, etc • Solve word problems representing them with drawings or numbers and identifying the key words.
Lesson focus / success criteria	• Students will learn how to find the wholes, halves, quartes, thirds, fourths, etc • Students will identify the vocabulary related to fractions - numerator and denominator. • Students will recognize parts of a whole. • Students will learn how to solve fraction word problems using notes to support and using real life context.
Prior knowledge / Previous learning	• Understand division: 2 Digits numbers by 2, 4, 5, 6, and 10. • Understand halves of bigger numbers. • Choose appropriate mental strategies to carry out calculations and explain how they worked out the answer

Plan

Lesson	Planned activities	Notes
Introduction	• Warm up: the teacher will start the lesson, reading a book called "Fractions", from the platform MyON. Here, students will have a first slight approach to the terms and vocabulary related to fractions, such as wholes, parts, half, halves, thirds, equal parts, etc.	Google slides MyOn

Main activities	• Guided Activity. The teacher will show a video introducing fractions. The teacher will pause the video when necessary to explain the terms, the way we use to find the whole, the half, the thirds and so on. Interactive participation needed. • Right after the video, the teacher will share a slide with the definition of fractions with real life examples and pictures like "playing the first half of the match", "showing the time: quarter past twelve", "Sara is 2 ½ years old", "somebody has already eaten three quarters of this pizza" • Then, the teacher will share a matching activity to identify the halves, thirds and quarters with the corresponding picture. • We will follow with another book from MyOn, called "Half you heard about fractions? that contains more specific and deep information about fractions. Questions and answers at this level are required to understand and clarify concepts. • After the reading, an interactive PowerPoint transition will be shown to start practicing fractions. Interactive participation needed. • The teacher models 2 exercises and 4 word problems. Teacher explains the procedure to solve the exercises using all the information given. Teacher provides strategies to solve word problems and cheer students up to participate and write on the board and on the screen the possible answers and processes of the word problems. Teamwork is allowed.	Youtube Google slides Matific Notebook
End/Close/ Reflection/ Summary	• At the end of the lesson, through interactive games and worksheets, students will acquire the knowledge hands on. • Teacher will guide students to reflect on their learning, evaluate their own and each other's work through word problems activities. • Liveworksheet evaluation.	Google Slides Online games Liveworksheets

Appendix 21

Lesson Plan 3rd Grade - Term I

CLASS: Units of Measurements	
DATE: Term I	
Learning objectives	4MI1 Choose and use standard metric units and their abbreviations when estimating, measuring and recording length, weight and capacity. 4MI2 Know and use the relationship between familiar units for length, mass and capacity, and know the meaning of <u>kilo,centi and milli.</u>
Lesson focus / success criteria	- Students will learn how to estimate measures in real life objects comparing them with non- standard units. - Students will learn how to measure by using their correct standard units and their equivalences. - Students will read and solve word problems where measurements are part of real life and in different contexts.
Prior knowledge / Previous learning	In a worksheet previously created based on the game "teacher says", they must fill the blanks with their answers about the measures their teacher is asking for. First students will estimate their own measures about their body parts, toys or containers at home then they will use the correct element to measure, weight or identify the real amount. Once they complete the first part of the activity they will solve oral questions during the class. For example: How long is your left hand? How heavy is your math notebook? To measure both the notebook and your hand, did you use the same element to get the answers?

Plan

Lesson	Planned activities	Notes
Introduction	At the first moment the teacher will share some images of real objects to the class asking some questions about length, weight or capacity. Then, the presentation will start exploring the metric system, identifying vocabulary or keywords through an image from the book. Finally, the objectives and expectations of the class will be shared with the students then the class will start.	A metric tape, Ruler, A scale, Notebooks, books, shoes, a bottle of water, paper clips, colors
Main activities	Here, students will identify vocabulary related to the topic including other math's expressions for measures We will have the opportunity to know more about these units of measures, equivalences, elements to measure and how to solve word problems. The teacher will present some videos with the topic and students will take their notes on their notebooks. To practice they have a worksheet of previous knowledge. To check the learning, they will solve a liveworksheet.] This activity can be extended by [This topic will be extended for six day - a cycle]	Some videos about measurements for kids **Activity 1** Introducing Worksheet to measure parts of your body and different objects around you. **Activity 2** Check your knowledge solving this live worksheet.

End/Close/ Reflection/ Summary	At the end of the lesson, students will learn: How to create their own balance scale to measure at home? How to identify and read measures at the supermarket or in a local store. How to develop a final project where topics like measurements and word problems are part of it? How to express situations exposed in real word problems adding or subtracting amounts.	How to create a simple balance scale at home? Classwork about weight

Appendix 22

Lesson Plan 3rd Grade - Term II

CLASS: Handling Data	
DATE: Term II	
Learning objectives	• 4Dh3 Use Venn diagrams or Carroll diagrams to sort data and objects using two or three criteria. • 4Pt3 Check the results of adding numbers by adding them in a different order or by subtracting one number from the total
Lesson focus / success criteria	• Students will apply their previous knowledge classifying, counting and representing different data numerically and graphically. • Students will use other graphs to sort information • Students will solve word problems according to the information given or represented in the new graphs .
Prior knowledge / Previous learning	The teacher will ask a statistical question and a non-statistical question to collect the information and then will explain the difference between those types of questions and the result. They will answer the **survey** about their favorite food and sport]

Plan

Lesson	Planned activities	Notes
Introduction	The teacher will share a live worksheet that contains an example of A graphic used to represent information collected. After students completed the activity, the teacher will share a presentation and a video with vocabulary, keywords, concepts and examples of different graphics and their characteristics.	**PREVIOUS ACTIVITY** Liveworksheets Youtube

Main activities	At this time of the topic, students will create their own survey and collect information. They will read and understand the types of questions made to be answered by adding or subtracting data Students will classify and compare information or data according to the suggested characteristics.	**CREATING BAR GRAPH**S Youtube **CLASSWORK** Live worksheets
End/Close/ Reflection/ Summary	Students will write similarities and differences of the information obtained in a chart Students will organize their information or data combining concepts and topics seen before and now. They could represent information based on statistical research and develop short projects in classes.	**WORKBOOK ACTIVITIES** **WORKSHEET ACTIVITIES**

Lesson Plan 3rd Grade - Term III

CLASS: Problem Solving	
DATE: Term III	
Learning objectives	4Ps1 Make up a number story for calculation. 4Ps2 Explain the reason for a choice of strategy when multiplying or dividing. 4Ps3 Choose strategies to find the answers to addition or subtraction problems; explain and show working
Lesson focus / success criteria	- Students will read, create, understand and solve problems. - Students will recognize what, how, and why to do at the moment of solving a problem. - Students will solve problems by following steps to do it.
Prior knowledge / Previous learning	The teacher will share with the student a situation which needs to be solved as a word problem and they explore the different ways of solutions At this time, The teacher will ask some questions about keywords, amounts, strategies among others.

Plan

Lesson	Planned activities	Notes

Introduction	At the beginning of the class the teacher will share a video where we can identify keywords to solve the problem. Step by step, students will identify and apply the method **CUBES** CIRCLE THE NUMBERS UNDERLINE THE QUESTION BOX THE KEYWORD EVALUATE AND DRAW SOLVE AND CHECK The teacher will guide the students to read and apply the method during the process of acquisition.	**KEYWORDS PROBLEM SOLVING** Youtube **C.U.B.E.S STRATEGY** Youtube
Main activities	Here, the teacher will introduce the class with a live worksheet about word problems. Once they finish they will check the results and watch them carefully to see the steps and the way of solution students would have. During the classes, the teacher will explore more evidence and videos as a helping hand to understand **what** type of word problem is, **how** to solve it and **why** it should be solved like that. This activity can be extended by some days, probably two cycles because the idea is work on addition, subtraction, multiplication and division process.	**ACTIVITY 1** Liveworksheet **CLUES TO SOLVE PROBLEMS** **PART A** Youtube **PART B** Youtube

End/Close/ Reflection/ Summary	Students will have the opportunity to create their own word problems, solve and check it, explaining how he or she gets the answer.	**NOTE BOOK**
	They will have the possibility of solving problems about any topic they would have seen in class.	**WORKBOOK**
		VIRTUAL NOTEBOOK
		GOOGLE DOCS
		LIVE WORKSHEETS
		VIDEOS
		GOOGLE CLASSROOM PLATFORM TO EVALUATE THEIR WORKS AS A DAILY EVIDENCE

Appendix 24

Lesson Plan 4th Grade -Term I

CLASS: Decimal Numbers	
DATE: Term I	
Learning objectives	• 4N Number: Number and the number system (Nn)
Lesson focus / success criteria	• Use decimal notation and place value for tenths, hundredths and thousands.
Prior knowledge / Previous learning	Whole numbers notation and place value.

Plan

Lesson	Planned activities	Notes
Introduction	The topic will be introduced by playing an animated video about decimal place value.	Youtube video
Main activities	• Introduction of the decimal number notation. • Explanation decimal number place value. • Application of existing knowledge of whole number notation.	Google Slide presentation
End/Close/ Reflection/ Summary	At the end of the class the students will solve some practice exercises with the decimal place value chart. Then, they will share their results to find as a group the right answers.	Google Slide presentation

Appendix 25

Lesson Plan 4th Grade - Term II

CLASS: Currency
DATE: Term II

Learning objectives	• 4N Number: Calculation (Nc). • 4P Problem solving: Using techniques and skills in solving mathematical problems (Pt).
Lesson focus / success criteria	• Recognize Colombian money. • Identify some concepts of money management in their real life.
Prior knowledge / Previous learning	Basic mathematical operations: addition, subtraction, multiplication and division.

Plan

Lesson	Planned activities	Notes
Introduction	The topic will be introduced by playing an animated video about the history of money, to catch the student's attention.	Youtube
Main activities	Introduction to Colombian currency: Colombian Pesos bills and coins. Explanation of basic concepts of money. Application of previous knowledge: mathematical operations.	Google Slide presentation

End/Close/ Reflection/ Summary	At the end of the class the students will identify the differences about income, expenses, savings and investment.	Google Slide presentation

Appendix 26

Lesson Plan 4th Grade - Term III

CLASS: Problem Solving	
DATE: Term III	
Learning objectives	- N Number: Calculation (Nc). 6P Problem solving: Using techniques and skills in solving mathematical problems (Pt).
Lesson focus / success criteria	Solve world problems using money.
Prior knowledge / Previous learning	Basic mathematical operations: addition, subtraction, multiplication and division. How to analyzed world problems exercises.

Plan

Lesson	Planned activities	Notes
Introduction	At the beginning of the class, the students will play a game on Matific related to the use of money, to catch the student's attention.	www.matific.com

Main activities	World problems including expenses and family finanzas. Application of previous knowledge: mathematical operations.	Google Slide presentation Glossary
End/Close/ Reflection/ Summary	At the end of the class the students will reflect on the importance of learning about money and finances, as well as identifying good financial habits in their day to day life.	Google Slide presentation

Appendix 27

Lesson Plan 5th Grade - Term I

CLASS: Percentage	

DATE: Term I	

Learning objectives	• 5N Number: Number and the number system (Nn)
Lesson focus / success criteria	• Understand percentage as the number of parts in every 100 and find simple percentages of quantities.
Prior knowledge / Previous learning	Fractions. Basic mathematical operations: addition, subtraction, multiplication and division.

Plan

Lesson	Planned activities	Notes
Introduction	The topic will be introduced by playing an animated video about percentages.	Youtube
Main activities	Introduction to percentages. Explanation how to find the percentage of a number. Application of existing knowledge using basic mathematical operations.	Google Slide presentation

End/Close/ Reflection/ Summary	At the end of the class the students will solve some real life problems including percentages.	Google Slide presentation Math Workbook.

Appendix 28

Lesson Plan 5th Grade - Term II

CLASS: Currency
DATE: Term II

Learning objectives	• 6N Number: Calculation (Nc). • 6P Problem solving: Using techniques and skills in solving mathematical problems (Pt).
Lesson focus / **success criteria**	• Recognize Colombian money. • Identify some concepts of economy and finance in their real life.
Prior knowledge / **Previous learning**	Basic mathematical operations: addition, subtraction, multiplication and division.

Plan

Lesson	Planned activities	Notes
Introduction	The topic will be introduced by playing an animated video about the history of money, to catch the student's attention.	Youtube
Main activities	Introduction to Colombian currency: Colombian Pesos bills and coins. Explanation of basic concepts of money and finances. Application of previous knowledge: mathematical operations.	Google Slide presentation Glossary

End/Close/ Reflection/ Summary	At the end of the class the students will identify the differences about income, expenses, savings and investment. The teacher will do an introduction of the stock market and their money charts.	Google Slide presentation

Appendix 29

Lesson Plan 5th Grade - Term III

CLASS: Problem Solving	
DATE: Term III	
Learning objectives	• N Number: Calculation (Nc). • 6P Problem solving: Using techniques and skills in solving mathematical problems (Pt).
Lesson focus / success criteria	• Identify some concepts of economy and finance in their real life. • Solve world problems using money.
Prior knowledge / Previous learning	Basic mathematical operations: addition, subtraction, multiplication and division. How to analyzed world problems exercises.

Plan

Lesson	Planned activities	Notes
Introduction	At the beginning of the class, the students will play a gam on Matific related to the use of money, to catch the student's attention.	www.matific.com
Main activities	World problems including expenses and family finanzas. Application of previous knowledge: mathematical operations.	Google Slide presentation Glossary

End/Close/ Reflection/ Summary	At the end of the class the students will reflect on the importance of learning about money and finances, as well as identifying good financial habits in their day to day life	Google Slide presentation

Author's Biography

Gerardo Núñez was born in Cartagena, Colombia. After completing his studies at De La Salle School in Cartagena in 2004, Gerardo entered the University of Cartagena. He received a Bachelor of Science degree in Food Engineering from the University of Cartagena in December 2014. In the following years, he worked as a math and science teacher in two bilingual institutions in Cartagena. In August 2016, he became a member of the language department of the University of Cartagena, where he continues to be active. In August 2018, he became part of the science department of the British School of Cartagena, where he continues to be employed.