Problem Solved, Better Grammar
A Proposal to Improve Spanish Grammar Accuracy through Math Content in a 6th-Grade Class of a Dual-Language Spanish Immersion Program

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Introduction

Imagine it is your first day of school. Your mom takes you to your classroom and hands you over to somebody you don't know. This mysterious woman looks a little different from the members of your family. Not only that, she speaks a different language. Thanks to the strange gestures and facial expressions she makes to help you understand what is going on, you make it through your first day. This routine occurs every day for a full academic year.

Throughout the year, she teaches you about preschool life. Because of her you learn many things. You learn what numbers are for; you can count, in your language and in hers.

After seven years, going to school is like being at home. Switching between science in English to math in Spanish feels like going from the living room to the dining room. Your test results show you have learned a lot. It seems like you are learning the same material in math as your neighborhood friends, only you are learning in it Spanish.

You really like school; you know your teachers and they know you. Sometimes it feels as if they can read your mind. When you try to express yourself and stumble, they help you to bring the message together. It is frustrating sometimes not to be able to say everything you want to say exactly the way you want to say it.

Why is it so hard to come up with the right word when it is time to use it? Why do you keep using the wrong verbal form? Why do you still get confused when using "*la"* or "*el"* (the)? Is this ever going to improve? Your hope that someday you would be truly fluent in Spanish seems to vanish with time.

Another school day starts...

Rationale

As a dual-language Spanish immersion math teacher I have been asking myself how I can help my sixth graders, whose L1 is not Spanish, improve their productive language skills. After working at Collinswood for six years, I have noticed how my students can read math word problems in Spanish and solve them using the appropriate math content. They also understand complex information they hear in Spanish from different media spoken at a fast native speed. However, when it is time to speak or write, their language ability is significantly limited. They usually struggle to communicate with grammatical accuracy. This can be evidenced in a math lesson when a student solves a mathematical problem. The teacher usually asks students to say the response aloud and to explain the series of processes they used to come up with the answer.

Students commonly start by saying "*yo hiciste"* (I did), using the form for the second singular person instead of the correct form for the first singular person.

At my school, it is very common for teachers to use recasts (Lightbown and Spada 2006: 124) to correct students' errors. In the previous example the teacher may interrupt the student to say "*yo hice*" (I did) using the correct grammatical form. However, students appear to be accustomed to this kind of corrective feedback, to the extent that they just repeat the words used by the teacher. It is very common that after the teacher has reformulated the student's utterance, another student who needs to explain the solution for a new problem, starts by using the same incorrect form used by the previous student. It has been my experience that the popular practice of using recasts, widely used as a teaching tool to help students internalize the correct grammatical form, has not been very effective in helping students produce language that is grammatically accurate.

My school is located in Charlotte, North Carolina. Collinswood is a very special school; students learn in two languages. "In Kindergarten, the entire day is taught in Spanish with the exception of 45 minutes of English Literacy. In grades 1-6, one-half of the day is taught in Spanish and one-half of the day is taught in English" (Collinswood webpage 2010). At Collinswood, students study Spanish literacy, mathematics and social studies in the Spanish language.

Students at the school, who have been taught math in Spanish, have performed exceedingly well in the math End of Grade Test (EOG). More than 96% of the student population is at or above grade level (Charlotte Mecklenburg Schools 2009). Collier and Thomas (2004) have found that dual-language programs have demonstrated to be effective in closing the achievement gap for all the participating student groups.

The school's math, social studies and Spanish committee, which consists of bilingual teachers who teach in Spanish, has assessed the students' proficiency in Spanish. The committee has found common patterns in the students' Spanish performance throughout their elementary studies. Their findings include the following. The average student's listening ability is rated highly proficient. This can be attributed to the school's rich cultural environment, including numerous multicultural activities and a diverse population of teachers whose different Spanish accents and vocabulary have helped students develop and improve students' listening skills. In addition, students whose native language is Spanish also provide opportunities for native English-speaking students to target language productively. (Genesee 1994)

Students can read certain academic selections with little or no difficulty. In mathematics specifically, students comprehend most word problems. They can also identify unknown words mentioned in the problems. This can be attributed to the fact that mathematical vocabulary is taught at the beginning of each class in both English and Spanish. On the other hand, students complain that the vocabulary used in the social studies book is somewhat complex. Dealing with scientific text like the one found in the social studies book has been found to be one of the main reasons why students show certain apathy towards this subject.

Many students in sixth grade love to read. At Collinswood, it is very common to see students reading mostly non-fiction books. Reading takes place both inside and outside the classroom.

Nonetheless, most books students read are in English. Even though Spanish teachers have strongly promoted reading in Spanish, students prefer to read in English because they find it more convenient. Students' lack of interest in reading authentic books in Spanish has led to poor vocabulary and deficient writing.

On the other hand, the average student's writing ability in Spanish is not as proficient as would be expected for a student who has been exposed to the second language for more than four years. Some students in the upper grades continue to struggle to write a paragraph containing a main idea with support and details. Difficulties using proper article-noun agreement, incorrect use of verb tenses, and lack of cohesive devices, have been found to be the most common errors made by the students.

Regarding speaking ability, most students are able to produce sentences to communicate socially or academically. However, they have difficulty using correct grammatical structures, especially verb conjugation, which can be difficult even for native Spanish-speaking students.

In the mathematics classroom, opportunities for students to speak are often restricted. Long math pacing guides, limited instructional time, and the need to prepare students for the final test are factors that affect the amount of class time teachers allow for students to speak. Consequently, activities in the mathematics classroom that promote students' oral production in Spanish need to be increased.

The students' high scores are evidence that the school is providing students with good comprehensible input. In contrast, the deficiency in the students oral and written production suggests that isolated the kind of comprehensible input prescribed by Krashen's natural approach (Krashen 1982) needs to be complemented with direct, explicit grammar instruction. Larsen-Freeman (2001) indicates that even if grammar is acquired naturally, it does not necessarily follow that it should not be taught. "Instruction can enhance the acquisition of grammar and speed up the process" (Mohamed 2001, 228).

In a dual-language program like the one at Collinswood, the need for integration of content-based instruction and language instruction is evident. Most teachers note that when students speak in class, the structure of their sentences often lacks coherence due to the incorrect use of Spanish grammar. Nevertheless, if the student is providing a solution for a math problem, or talking about a mathematical concept, the teacher usually overlooks the form errors and focuses only on meaning, i.e., the mathematical content. In that sense, Collinswood courses are no different than the courses in other immersion programs. "Student's success in these courses is often measured in terms of the ability to ¨get things done¨ in the second language rather than on their accuracy in using certain grammatical features" (Lightbown and Spada 2006, 110).

Abundance in grammatical errors produced by students in both oral and written form demonstrate the presence of fossilization in certain grammatical structures that students have learned throughout their school years at Collinswood. Over time, teachers have used specific grammatical forms to communicate with their students. This is the case of the use of imperative forms. Teachers may say "abre el libro en la página dos" (you) (open the book to page two) using the second person of the singular form. Students, who have heard the grammatical form

repeatedly from their teacher, are frequently inclined to generalize it and use it inadequately in their own speech. It is common to hear a student say "yo abre mi libro en la página dos"(I) (open the book to page two). The correct form "abro" (I open) is incorrectly replaced by the form "abre" (you open).

Fossilization is also evidenced in class discussions where students use grammatical forms incorrectly and the teacher or a peer does not correct them. Teachers often bias students' motivation to speak spontaneously, fearing that students can feel frustrated due to error correction and that in consequence, they will refrain from producing free speech. It is essential that teachers are attentive to students' grammatical productive errors. It is also the instructor's responsibility to make students aware of their errors through appropriate corrective feedback. This is supported by Alice Ommagio who states that there should be concern "for the development of linguistic accuracy from the beginning of instruction in a proficiency-oriented approach". (Omaggio, 1986, 36)

Cooperative activities where students are encouraged to produce speech in peer conversations are another scenario in which students at Collinswood demonstrate the presence of grammatical fossilization. Constant inaccurate grammatical forms are used in the students' dialogues. As a consequence of reduced teacher intervention, students' unrestricted speech contains more errors, which are often ignored by their peers. Since communication is possible, students internalize the error substituting it for the correct form and later replicate it in their speech. In this sense Valette asserts, "the two factors in the school environment that can lead to fossilization are the contact with inaccurate models and the acceptance (or non-correction) of inaccurate speech production" (Valette 1991, 326)

Diagnosing the types of errors produced by the students is the first step to combat grammar fossilization found in students' Spanish productive skills. Secondly, teachers should use diverse forms of corrective feedback to refine students' linguistic competence. Most importantly, teachers need to be conscious of the significance of their roll in helping students improve their grammatical accuracy. The implementation of language-driven lessons in all subjects will result in less grammar errors, and hopefully, the diminishment of fossilized grammatical structures.

Incorporating language instruction in the math lessons will provide students with linguistic resources they can use to communicate more effectively in Spanish. The implementation of this unit will facilitate such incorporation. "The integration of content and second language instruction provides a substantive basis for language learning. Important and interesting content, academic or otherwise, provides students with a meaningful basis for understanding and acquiring new language structures and patterns" (Genesee, 1994, 2).

I believe that when language teaching is embedded in other specific subject content, teaching the basic language structures is essential. This is supported by Nunemaker who agrees that the mastery of the grammatical basis of the language guarantees correct speech and understanding (Nunemaker 1992, 79). Once the students have reached a reasonable level of metalinguistic awareness, which is the case for most of my sixth graders at Collinswood, explicit grammar instruction can trigger the development of pragmatic associations. These associations will allow students to relate English and Spanish words, expressions and grammatical forms. As a

consequence, students will produce better-constructed sentences. Hence, the frequency of such sentences will result in a more fluent speech. The activities in this unit will state the specific Spanish grammar aspects that will be targeted.

This curriculum unit has been created to target the deficiencies found in my sixth grade L2 students' Spanish productive language skills. It contains a series of math activities, based on the problem solving objective 1.07 from the sixth grade math North Carolina Standard Course of Study (NCDPI 2003).

This unit will integrate Spanish grammar instruction with the math content objectives through diverse, engaging, language-driven activities, such us creating and solving problems, discussing strategies, comparing responses, analyzing data, etc.

My hope is that it will serve as a model for similar implementations throughout the school. This will increase teacher awareness of our students' second language development. The proactive intervention of Spanish teachers at Collinswood will result in the improvement of students' use of Spanish grammatical forms. This collaborative effort to eliminate grammatical fossilization through different forms of corrective feedback, and the use of language-driven activities in other subject areas, will consequently enrich their oral and written skills in Spanish. Lightbown and Spada (2006) state that instruction that focuses on form and corrective feedback within content-based second language programs helps learners improve their knowledge and use of particular grammatical features.

Strategies and Activities

The unit will be developed in three main stages: diagnosis, implementation and post-assessment. The activities will be described as follows:

Type of activity

The activities will be classified as tests, warm-ups, full-length lessons, or projects involving more than one unit of class. This classification will allow the teacher to implement the activities in diverse class scenarios.

NCSCOS (North Carolina Standard Course of Study) sixth grade math objectives

The math objectives correlated in each activity will be stated in its description. Every activity includes the mathematics objectives being targeted.

Grammar objectives

The specific Spanish grammar objectives used in each activity will be included in its description.

Estimated time

The approximate time needed for each activity will be specified.

Activity 1

Diagnostic test (Appendix 1)

Type of activity

Test

Mathematics Objective

1.07 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

Spanish Grammar Objectives

Identify and use "*era and fue"* (it was) in preterite indicative form.
Identify and appropriately conjugate the form "a mí me gusta"(I like) in simple present of indicative. Conjugate this form with singular and plural pronouns.
Identify and appropriately use "yo tengo"(I have) in simple indicative form. Conjugate this form with singular and plural pronouns.
Identify and conjugate the verbs: "*decir"* (to say), "*estar"* and "*ser"*(to be) in preterite, and simple present indicative forms.
Identify the correct adverb of time, given a sentence in preterite or simple indicative forms.
Identify the definite articles "*el*", "*la*", "*los*", and "*las*"(the) to use them properly in sentences that have correct noun-adjective, noun-verb agreement.

Estimated Time

60 minutes

Procedure

To start the unit, students will be given a pre-assessment in which they must solve, create and evaluate a series of mathematical problems. Students must also describe the processes used to solve these problems in Spanish. The pre-assessment will allow me to measure the efficacy of my approach by comparing it to the post-assessment.

Activity 2

"Yo tengo, el debe" (I have, he owes)

Type of activity

Warm-up

Mathematics Objective

1.01 Develop number sense for negative rational numbers.
Spanish Grammar Objectives

To use the forms "*yo tengo*"(I have), "*el debe*" (he owes) and find a pattern, in order properly to conjugate the simple present tense in indicative form.

Estimated Time

6 minutes for the first time. 3 minutes for the other 4 times.

Procedure

After a brief explanation of how to conjugate "*yo tengo*" (I have) "*ella tiene*"(she has) "*nosotros tenemos*" (we have), we will generate a discussion about the importance of using the correct form of the verb. I will ask students to think what their most common error is when they use such a form, and why. It is my objective to make them aware that they usually say "*yo tienes"* (I have, using the second person singular, instead of the first one) because throughout the years, they have heard form their teachers "*tu tienes*" (you have).

After the discussion, I will pass a soft ball to a student as I say either "*yo tengo*" (I have) or "*yo debo*"(I owe) and a number. Students are familiar with the relationship between the word have, as a positive number, and owe as a negative. The student will catch the ball and say "*el tiene*" (he has) or "*el debe*" (he owes) and my number, and then he will say "*yo tengo*" (I have) or "*yo debo*" (I owe) and the number he is thinking of, and pass the ball to another student. The last student will say "*ellos tienen*" (they have) or "ellos deben"(they owe) and the result of the addition of the two integers. After the student announces the sum of the numbers she will say her own number and pass the ball.

This activity is designed to review addition of positive and negative integers. It also emphasizes the correct use of the form "*yo tengo*" (I have), a form commonly used incorrectly by my sixth graders.

This warm-up will be used once per week for 5 weeks. After the first time, as students become more familiar with the activity, the estimated class time for the activity will be reduced.

Activity 3

"Obesidad Infantil" (Child Obesity)

Type of activity

Project

Mathematics Objective
4.01 Collect, organize, analyze, and display data (including box plots and histograms) to solve problems.

Spanish Grammar Objectives

To properly use the forms "*a mi me gusta*"(I like), "*a ti te gusta*" (you like, informal), "*a el/ella le gusta*"(he/she likes), "*a usted le gusta*" (you like, formal), "*a nosotros nos gusta"* (we like), "*a ellos/ellas les gusta"* (they like).
To generalize the use of this form and apply it to verbs: "*parecer"* (express opinion) as in "*a mi me parece*" (in my opinion), "*doler"* (hurt), "*molestar*"(bother) as in "*a mi me molesta*"(it bothers me).

Estimated Time

Two 70-minute class periods

Procedure

At home, students have researched child obesity prior to the presentation of this activity.

The teacher will start by asking students to define the word obesity. Once they have written their definitions, some students will read them aloud. After this, the teacher will show a video in which the child obesity phenomenon is presented.

Discussion of the main points of the video will be guided by the following questions:
1. "*Según la noticia, ¿Aproximadamente qué porcentaje de niños padece de obesidad*?"(According to the news, what is the estimated percent of children who are obese?)

Based on their knowledge of fractions and percentage, students should infer that if almost 1 out of 3 children are obese, around 33 percent of the children are obese.

2. "*¿Qué ha hecho la madre de Cristopher para ayudarlo a mejorar su alimentación?* (What has Cristopher's mom done to improve the way they eat?
She buys low fat milk, whole wheat bread, lots of fruits and vegetables.

3. *" ¿Por qué la madre cree que la escuela no ayuda a cambiar el problema de obesidad?"* (Why does the mother think that the school is not helping to improve the obesity problem?)

She says school's food is not healthy.

4. "¿Por qué el doctor considera que la obesidad es una epidemia?" (Why does the doctor think that child obesity is an epidemic nowadays?
He states that children are having the same health complications deriving from obesity that were traditionally found only in adults.

5. *"Según la periodista, ¿Qué cosas pueden hacerse para mejorar el problema de obesidad infantil?"* (According to the reporter, what are some measures that can be taken to attack the problem of child obesity?)

The reporter mentions that schools need to provide healthier types of food. She also says that food labels need to be more specific. Finally, she adds that parents need to be more educated about their children nutrition.

6. *"¿Cuál es el proposito de la iniciativa A Moverse lanzada por la primera dama Michelle Obama?"* (What is the purpose of the Let's Move initiative, organized by the First Lady Michelle Obama?)

Today's generation will become healthy adults through a change in school's menus, more sidewalks, and places where low-income families can get fruits and vegetables.

After the discussion, the teacher will ask students how to diagnose whether a child's obesity problem is affecting our school. The concepts of population, sample, and random sample will be reviewed.

To diagnose the phenomenon, we will analyze two of the main causes of child obesity: insufficient calorie expenditure through exercise, and bad eating habits. In pairs, students will design questions about these variables to include them in a general questionnaire.

The teacher will ask what type of questions can be asked so that they are written in a child-friendly language, since the questionnaire will be answered by randomly selected students from the school. To do this, the teacher will model the question *"¿Cuál es la comida que más te gusta?"* (What type of food do you like the most?), and show a visual representation of three different types of food including a vegetable, a fruit and a hot dog. (Appendix 2) Students are to choose one of the three.

The teacher will explain that when creating a question for a questionnaire, providing options to choose from, often called multiple-choice questions, will produce a number of limited answer choices. Using multiple-choice questions when collecting information will result in easier to analyze data.

At this time, the teacher will review how to use the verb to like in Spanish, in the present indicative tense. *"A mi me gusta"* (I like), *"a ti te gusta"* (you like informal), *"a el le gusta"* (he likes), *"a ella le gusta"* (she likes),*"a usted le gusta"* (you like formal), *"a nosotros nos gusta"* (we like), *"a ellos/ellas/ustedes les gusta"* (they/you like plural).

After reviewing the verbal form, the teacher will ask students what other verbs use this particular form. Some examples are "*doler*" (hurt, as in my leg hurts), "*parecer*"(state an opinion) and *"molestar"* (bother, as in it bothers me).

To practice this verb form one student will say something he/she likes *"A mi me gusta el*

fútbol" (I like soccer). Once that student says the phrase, the next student repeats what the previous student said by using the form he/she likes *"a ella le gusta el fútbol"* (she likes soccer) then, that student says something he/she likes *"a mi me gusta la comida mexicana"* (I like Mexican food). All the students will participate in the activity by saying something they like and rephrasing what the previous student likes.

Students will work in pairs to design one question that can be included in the general questionnaire. The question must be based on the two variables that affect child obesity. Other elements that need to be considered when stating the question are the multiple-choice style, and the verb "*gustar*" (like).

Questions designed by students will be collected and reviewed. After correcting the questions, 10 will be selected to design the survey questionnaire. Once the questionnaire has been designed, it will be used to survey randomly selected students from the school.
The results collected from the survey will be analyzed in class during the following lesson. Students will use computers to make a spreadsheet with the collected data. This spreadsheet will be used to create a graph to display the results, using bar graphs and histograms.

At the end of the project, each group will state 3 conclusions using the graphs and the histograms. The conclusions can be stated as *"aproximadamente a 30 porciento de los niños de la escuela les gusta la fruta más que los vegetales o el perro caliente"* (approximately 30 per cent of students at school like fruits more than veggies or hot dogs). The teacher will ask students to determine, based on the survey, if the school's population seems to follow the national trend of causes of child obesity.

Activity 4

"El espía" (The spy)

Type of activity

Lesson

Mathematics Objectives
5.03 Solve simple (one- and two-step) equations or inequalities.

1.02 Develop fluency in addition, subtraction, multiplication, and division of rational numbers.

Grammar Objectives

To use the verbs "*decir*"(say), "*agregar*" (add), "*preguntar*" (ask), and "*explicar*" (explain) in the Spanish preterite tense

Estimated Time

A 60-minute class period

Procedure

Students will be divided into 4 different groups. Each group will be given a word problem involving addition, subtraction, multiplication or division of rational numbers (Appendix 3).

The teacher will choose a student (preferably a student whose native language is not Spanish) who will be the spy. The group will meet and solve the problem using algebraic equations. The spy will be observing and recording on a piece of paper all the strategies used by the members of the group to solve the problem. Spies are encouraged to listen to and jot down phrases that students use to interact with each other, as well as explanations provided, comments made, and questions asked.

Once students are finished, the teacher will explain how the Spanish preterite is used to talk about an action that occurred in the past by citing the example *"yo le dije a los espías que escribieran todo lo que escucharan"*(I told the spies to write down all they were hearing). The teacher will show how to conjugate *"decir"*(to say) in the preterite form. In the explanation teacher will also explain that indirect objects are used when reporting, and that in Spanish, the indirect objects cannot be omitted.

Since spies were told to use the verbs *"decir"(*to say), *"añadir"* (to add), *"preguntar"* (to ask), and *"explicar"* (to explain) to report their observations, the teacher will show a conjugation chart (Appendix 4) and explain it.

After the explanation, the spies will report to the class what they observed and heard. If students that were in the groups want to provide explanations or comments about the observations mentioned by the spies, they need to use the same form of the verbs used by the spies.

For the following classes students will paraphrase another student by using the forms taught in this activity. Students are welcome to list other verbs that are used to paraphrase or retell. As these forms are mentioned, the teacher will complete conjugation charts for the preterite form.

Activity 5

"Elaloslas"(Elaloslas is a made-up word, using the Spanish definite articles *"el*", "*la*", "*los*", "*las*". These articles in English are replaced by the word **the**)

Type of activity

Warm- up

Mathematics Objectives

1.04 Develop fluency in addition, subtraction, multiplication, and division of non-negative rational numbers.

Grammar Objectives

To review the Spanish definite articles “el” (the, singular masculine), “la” (the, singular feminine), “los”(the, plural masculine), “las” (the, plural feminine).

To recognize which definite article must be used based on the gender and number of the noun.

Estimated Time

15 minutes

Procedure

The teacher will display a list of nouns on the board. The nouns will be feminine, masculine, singular or plural (Appendix 5). The teacher will quickly review the words’ meaning. As the teacher reads them, students must clap if the word is singular feminine, say oh if the word is singular masculine, knock on their desks if the word is masculine plural, and snap their fingers if the word is feminine plural.

A student will roll an operation dice that contains the addition, multiplication, subtraction and division signs. In pairs, students have to write and solve a problem using at least four words from the list. The problem needs to be solved using the operation displayed on the dice. Students will be told to write the problem on another sheet of paper using the wrong definite articles.

Once they are finished, they will switch papers with another pair of students. They will then solve the problems and write the correct articles. At the end of the activity, students will share how they figured out what the correct article was. It is expected that students generalize that feminine nouns usually end in a, masculine nouns often end in e, and plural nouns end in s. Some common exceptions will also be discussed.

Activity 6

“Paso a Paso”(Step by Step)

Type of activity

Assignment

Mathematics Objective

Develop and use ratios, proportions, and percent to solve problems

Grammar Objectives

To use verbs in imperative form

Estimated Time

1 hour

Procedure

After having worked on proportions and percentages, students will design a foldable step-by-step guide to find the percent of a number, and the percent of change of an amount. In class, the teacher will review the use of imperatives to give directions. Teacher will go over the conjugation forms for *"haz"*(do imperative), *"escribe"*(write imperative), "multiplica" (multiply imperative), *"divide"*(divide imperative), *"resta"*(subtract imperative), "suma" (add imperative)

The teacher will explain the form *"lo que"* (what, as in what I am trying to say), and the adverbs *"después"* (then), and *"finalmente"*(finally).
At home students will make the guide. At school, the students will display their guides and explain what steps they listed necessary.

Activity 7

Post assessment test (Appendix 7)

Type of activity

Test

Mathematics Objective

1.07 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators or computers, and paper and pencil.

Spanish Grammar Objectives

Identify and use "*era and fue"* (it was) in preterite indicative form.
Identify and appropriately conjugate the form "a mí me gusta"(I like) in simple present of indicative. Conjugate this form with singular and plural pronouns.
Identify and appropriately use "yo tengo"(I have) in simple indicative form. Conjugate this form with singular and plural pronouns.
Identify and conjugate the verbs: "*decir"* (to say), "*estar"* and "*ser"*(to be) in preterite, and simple present indicative forms.
Identify the correct adverb of time, given a sentence in preterite or simple indicative forms.
Identify the definite articles "*el*", "*la*", "*los*", and "*las*"(the) to use them properly in sentences that have correct noun-adjective, noun-verb agreement.

Estimated Time

60 minutes

Procedure

To finish the unit, students will be given a post-assessment in which they must solve, create and evaluate a series of mathematical problems. Students must also describe the processes used to solve these problems in Spanish. The post-assessment will allow me to measure the efficacy of my approach by comparing it to the pre-assessment.

Appendix

1. “Prueba” (Diagnostic test)

NOMBRE:_____
FECHA:_____

1. Usa la siguiente información para **crear** y **resolver** un problema matemático usando suma y resta de números enteros. Al construir el problema **debes** usar el tiempo verbal sugerido por el adverbio de tiempo.

Ayer
Temperatura en la estación climática Vostok en Antártica -86 Fº.
Temperatura en Laredo, Texas 91Fº

_____

_____

_____

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2. Un estudiante escribió este problema y cometió algunos errores gramaticales. Lee el problema, subraya los errores, reescribe el problema correctamente y luego resuélvelo.

Yo me gusta Virginia, yo tienes un tío que vive en Richmond. El me dijiste que en el verano pasado el día más caliente la temperatura estabas 105 Fº. Cuando yo

visitaron a mi tío en el invierno pasado la temperatura es -3Fº. ¿Cuál es las diferencia entre las dos temperaturas?

_____

_____

_____

_____

_____

_____

_____

3. María es una estudiante nueva. Ya que ella no sabe cómo escribir números en notación científica, tú debes explicarle. Para hacerlo, debes seguir los siguientes pasos:

Reescribe el número en notación científica
Completa las oraciones usando el verbo que está en paréntesis de forma apropiada.
Ordena las instrucciones paso a paso y reescríbelas

916,300,000= _____

1._____

2._____

3._____

4._____

5._____

4. Para resolver los dos siguientes problemas debes completar las oraciones escribiendo las palabras o frases que faltan. Escoge las palabras o frases de la lista dada (solo puedes usarlas una vez). Finalmente, encierra en un círculo la expresión , ecuación o desigualdad que mejor describe el problema y resuélvela.

1. _____ la escuela tenía 508 estudiantes. _____ hay 603 estudiantes. ¿Cuántos estudiantes nuevos hay en la escuela?

a) 508 -x=603 **b) 603=508x**

c) 603+x=508 **d) 603=x+508**

2. La campaña de reciclaje empezará el _____ lunes en la escuela. Cada clase deberá traer mínimo 141 productos reciclables. ¿Cuántos productos se habrán recogido al _____ de la semana si hay 24 clases en la escuela?

a) 141=24y **b) y+24=141**

c)24•141≥ y **d) 24y≥ 141**

5. Francisco necesita encontrar el mínimo común múltiplo entre 24, 48 y 60. Cuéntale a Francisco la manera en la que tú hallas el mínimo común múltiplo de 24, 48 y 60. La primera frase está dada para ti. Al final escribe la respuesta para el M.C.M. entre esos tres números.
Lo primero que yo hago es escribir los números _____

_____

_____

2. "*¿Qué tipo de comida te gusta más?* "(What type of food do you like the most?)

3. Problems involving addition, subtraction, multiplication or division with decimal numbers.

Brianna conduce 3.35 millas al trabajo todos los días. Es decir, 1.75 millas menos que lo que Darius maneja para ir a su trabajo. ¿Cuánto más lejos tiene que manejar Darius para llegar al trabajo?

El peso de un objeto en Marte es 0.38 veces su peso en la Tierra. ¿Cuánto pesará una persona de 125 libras en Marte?

El diámetro del Segundo espejo del telescopio espacial Hubble de la NASA es de 0.3 metros. El espejo primario es 8 veces más grande. ¿Cuál es el diámetro del espejo primario?

Un centímetro cúbico de titanio pesa 4.507 gramos. El mismo volumen de oro pesa 19.3 gramos. ¿Cuánto más pesa un centímetro cúbico de oro?

4. Conjugation charts for *"decir"(*to say), *"añadir"* (to add), *"preguntar"* (to ask), and *"explicar"* (to explain) in preterite.

5. List of nouns

6. Post-Assessment

NOMBRE:_____
FECHA:_____

1. Usa la siguiente información para **crear** y **resolver** un problema matemático usando suma y resta de números enteros. Al construir el problema **debes** usar el tiempo verbal sugerido por el adverbio de tiempo.

El diciembre pasado
Temperatura en la estación climática Vostok en Antártica -97 Fº.
Temperatura en Laredo, Texas 54 Fº

_____

_____

_____

_____

_____

_____

_____

_____

2. Un estudiante escribió este problema y cometió algunos errores gramaticales. Lee el problema, subraya los errores, reescribe el problema correctamente y luego resuélvelo.

A mi gustar Virginia, yo tienes un tío que vive en Richmond. El me dijiste que en el verano pasado el día más caliente la temperatura estabas 102 Fº. Cuando yo visitaron a mi tío en el invierno pasado la temperatura es -5Fº. ¿Cuál es las diferencia entre las dos temperaturas?

_____

_____

_____

_____

_____

_____

_____

3. María es una estudiante nueva. Ya que ella no sabe cómo escribir números en notación científica, tú debes explicarle. Para hacerlo, debes seguir los siguientes pasos:

Reescribe el número en notación científica
Completa las oraciones usando el verbo que está en paréntesis de forma apropiada.
Ordena las instrucciones paso a paso y reescríbelas

814,200,000= _____

1._____

2._____

3._____

4._____

5._____

4. Para resolver los dos siguientes problemas debes completar las oraciones escribiendo las palabras o frases que faltan. Escoge las palabras o frases de la lista dada (solo puedes usarlas una vez). Finalmente, encierra en un círculo la expresión , ecuación o desigualdad que mejor describe el problema y resuélvela.

1. _____ la escuela tuvo 612 estudiantes. _____ hay 703 estudiantes. ¿Cuántos estudiantes más hay en la escuela?

a) 612-x=703 **b) 703=612x**

c) 703+x=612 **d) 703=x+612**

2. La campaña de reciclaje empezará el _____ lunes en la escuela. Cada clase deberá traer mínimo 254 productos reciclables. ¿Cuántos productos se habrán recogido el _____ día de la semana si hay 29 clases en la escuela?

a) 254=29y **b) y+29=254**

c) 29•254≥ y **d) 29y≥ 254**

5. Francisco necesita encontrar el mínimo común múltiplo entre 36, 42 y 60. Cuéntale a Francisco la manera en la que tú hallas el mínimo común múltiplo de 36, 42 y 60. La primera frase está dada para ti. Al final escribe la respuesta para el M.C.M. entre esos tres números.
Lo primero que yo hago es escribir los números _____

_____

_____

Annotated Resources

For teachers:

" Mathematics Standard Course of Study ." North Carolina Public Schools.

HYPERLINK

"http://www.ncpublicschools.org/curriculum/mathematics/scos/"http://www.ncpublicschools.org/curriculum/mathematics/scos/ (accessed October 4,2010).

Charlotte Mecklenburg Schools. "Charlotte Mecklenburg Schools 2009-2010 Preliminary Assessment Results." HYPERLINK "http://onecharlottecommunity.org/Archive/10Q3/2010EOGAssessment.pdf"http://onecharlottecommunity.org/Archive/10Q3/2010EOGAssessment.pdf. (accessed September 20, 2010).

Collier, Virginia, and Thomas Wayne. "The Astounding Effectiveness of Dual Language Education for All." HYPERLINK "http://njrp.tamu.edu/2004/PDFs/Collier.pdf"http://njrp.tamu.edu/2004/PDFs/Collier.pdf. njrp.tamu.edu/2004/PDFs/Collier.pdf (accessed June 14, 2010).

Europe, Council Of. *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*. New York: Cambridge University Press, 2001.

Genesee, Fred. *Integrating language and content: Lessons from immersion (Educational practice*

report). University of California, Santa Cruz: National Center For Research On Cultural Diversity And Second Language Learning, 1994.

Groucutt, Martyn . "Quality Review Report." Charlotte Mecklenburg School Quality Review Report. pages.cms.k12.nc.us/gems/collinswood/CollinswoodFINAL.pdf (accessed June 14, 2010).

Krashen, Stephen D.. *Principles and Practice in Second Language Acquisition (Language Teaching Methodology S.).* Pergamon: Oxford University Press, 1982.

Larsen-Freeman, Diane. "Teaching Grammar." *Teaching English as a Second or Foreign Language*. Heine and Heinle (2001): 279-283. HYPERLINK "http://mail.udgvirtual.udg.mx/biblioteca/bitstream/123456789/1372/1/Teaching_Grammar.pdf" http://mail.udgvirtual.udg.mx/biblioteca/bitstream/123456789/1372/1/Teaching_Grammar.pdf (accessed October 3, 2010).

Lightbown, Patsy, and Nina Spada. *How Languages Are Learned (Oxford Handbooks for Language Teachers S.).* 3 ed. New York: Oxford University Press, USA, 2006.

Mohamed, Naashia. "Consciousness-raising tasks: a learner prospective." *ELT* 58, no. 3 (2004): 228.

Nunemaker, J. H. 1929. The teaching of Spanish grammar. *Hispania* 12 (1): 79-82.

Omaggio, A. C., and A. O. Hadley. 1986. Teaching language in context: Proficiency-oriented instruction. Heinle & Heinle Publishers.

Setati, Mamokgethi . "Teaching Mathematics in a Primary Multilingual Classroom." *Journal for Research in Mathematics Education* 35, no. 5 (2005): 447-466.

Valette, R. M. 1991. Proficiency and the prevention of fossilization - an editorial. *Modern Language Journal* 75 (3): 325-8.

Materials for classroom use:

1.Video for activity 3 can be found at http: //www.youtube.com/watch?v=meiCvQe3ybM

2. Problems used in activity 4 can be found in the sixth grade math teaching resources book, Math 2, Holt p.217.

3. HYPERLINK "http://www.discoveryeducation.com" www.discoveryeducation.com has a variety of resources including tutorials of mathematical concepts used in the math sixth grade curriculum.

Internet resources for Students:

1. HYPERLINK "http://www.studyspanish.com" http://www.studyspanish.com is an excellent website for students who need grammatical Spanish tutorials. The explanations are clear and concise. It is also a useful tool for parents since the explanations are given in English.

2. HYPERLINK "http://www.usaelcoco.com" http://www.usaelcoco.com has mathematical problems in Spanish. It also includes a series of cryptograms and mental math activities.

3. HYPERLINK "http://www.supersaber.com" http://www.supersaber.com contains games to reinforce vocabulary and basic mathematical concepts.

4. HYPERLINK "http://www.edu.xunta.es/contidos/premios/p2003/b/karaoke/karaoke.html" http://www.edu.xunta.es/contidos/premios/p2003/b/karaoke/karaoke.html contains karaoke activities for students to narrate stories at different speeds. This website is special in that it allows students to practice their oral fluency in Spanish at their own speed.

5. HYPERLINK "http://eljuego.free.fr/Fichas_gramatica/gramatica_index.htm" http://eljuego.free.fr/Fichas_gramatica/gramatica_index.htm contains flashcards with explanations about grammatical features in Spanish.

Solución:

Solución:

Los números después del decimal se_____(deber) contar

El decimal _____ (tener) que ser más grande que 1 pero más pequeño que 10

El número se reescribe en notación científica usando el decimal y el exponente. La base del exponente siempre _____ (ser) 10.

María tú _____(deber) escribir el número como un decimal

El número de cifras que _____(estar)después del decimal será el exponente

mañana	próximo	final
este año	ayer	ahora mismo
el año que viene	el año pasado	anterior

AÑADIR

"yo añadí"(I added)
"tú añadiste"(you added)
"el añadió"(he added)
"nosotros añadimos"(we added)
"ellos añadieron"(they added).

DECIR

"yo les dije a ellas"(I told them)
"tú me dijiste"(you told me)
"ella te dijo"(she told you)
"nosotros le dijimos a el"(we told him)
"ellas les dijeron a ellos"(they told them).

PREGUNTAR

"yo pregunté"(I asked)
"tú preguntasté"(you asked)
"ella preguntó"(she asked)
"nosotros preguntamos"(we asked)
"ellas preguntaron"(they asked).

EXPLICAR

"yo expliqué"(I explained)
"tú explicaste"(you explained)
"ella explicó"(she explained)
"nosotros explicamos"(we explained)
"ellas explicaron"(they explained).

botella, arroz, mesas, carreras, cepillo, ciudad, mapa, mano, compás, hermanos, compañeras, libros, plato, cuchara, temperatura, país, calle, autovía, carro, bicicleta, peatón, amigo, estudiante, camisetas, héroes, dibujos, mentiras, lápices, regla, biblioteca, salón, bandera, persona, países, policía, profesora, razón, cabeza, saco, clima, brújula, historia, personajes, problema, moneda.

Solución:

Solución:

Los números después del decimal _____(deber) contar

La cifra decimal _____ (tener) que ser más grande que 1 pero más pequeño que 10

El número se reescribe en notación científica usando el decimal y el exponente. La base del exponente siempre _____ (ser) 10.

María tú _____(tener) escribir el número como un decimal

Las cifras que _____(estar)después del decimal serán el exponente

mañana siguiente último

este año	ayer	ahora mismo
hace dos años	en dos años	anterior