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# Efficacy of the SIOP model in content teaching with Foreign Language Learners

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# Efficacy of the SIOP model in content teaching with Foreign Language Learners.

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# 1. INTRODUCTION

The Sheltered Instruction Observation Protocol (SIOP) model is a language program that is widely used in the United States and was implemented in the Charlotte Mecklenburg County (CMS) in 2007 when we used to work at Carmel middle school in North Carolina (NC), USA.

After reading the literature in the Funiber master´s program about Content and Language Learning Integrated Learning (CLIL), and how effective it is in Europe, it occurred to me that SIOP could be an effective tool for (English as a Foreign Language) EFL learning as well; consequently, this thesis is based on the applicability of SIOP to test its efficacy as a content-based method for foreign language learners.

The purpose of this research is to explore the abundant literature, evidence and research from multiple contexts to determine if the SIOP components are effective in teaching English at the Liceo Taller San Miguel (LTSM) School. It is my interest to understand how the SIOP method can help our students gain greater cognitive academic language proficiency in the target language and integrate it with subject-content at the same time.

One of the main grounds for conducting this research is getting to understand the theory and practice of the teaching of a content subject through another language in SIOP and understand how its practical applications contrast when comparing among four classes; from which, two will receive SIOP instruction whereas two more will receive regular classes (Non-SIOP instruction). This dissertation will provide valuable information so that administrators at school can come to a conclusion about the pertinence and applicability of a SIOP method to provide theoretical routes to improve the plan of study in content subjects, material development, and school methodology in the teaching and learning of English as a foreign language

## 2. JUSTIFYING ACADEMIC AND PERSONAL INTEREST OF THE TOPIC:

The Sheltered Instruction Observation Protocol model is a language program that we suppose can be used extensively in a variety of language learning contexts. The most important objective of SIOP in the US is to give rise to the impact and influence of Content-Based Instruction (CBI) in English as a Second Language (ESL) classes so that the students can develop their Cognitive Academic Language Proficiency (CALP), and become cognitively homogenous with their native English-speaking peers in mainstream classes.

After having lived and taught in the United States and in Colombia, I have had the opportunity to interact with English Language Leaners (ELLs) for over ten years and compare teaching practices for both English as a Second Language (ESL) students in the US and English as a Foreign Language (EFL) students in Colombia. When I worked in North Carolina (NC) in 2008, I had to receive SIOP training because even though that in a few schools, students were given the opportunity to observe ESL, sheltered, and mainstream content classes before entering the regular ESL program in the school, SIOP offered such positive results that it was mandated to replace all ESL and pull-out programs in the Mecklenburg county and several other states.

At present, while working at Liceo Taller San Miguel (LTSM) in the city of Pereira, I have come to realize that ELLs in either context (ESL vs. EFL) may, in fact, speak English very fluently, but still perform at low academic levels in their regular classes in bilingual immersion programs.

It is important to mention that SIOP has been a very successful approach in the US and it is presently being used in almost all states in the US. As it is supported by Boyson & Short (2003: 22) in the sense that “

> Schools and districts have established newcomer programs to offer the educational benefits of an intensive focus on language and content skills that help to accelerate the students' preparation for the regular U.S. school curriculum through a supportive environment that fosters close ties between families and the community.

The implementation of SIOP not only in ESL programs in North America but also in EFL programs in Iberoamerican schools, such as LTSM in Colombia, is quite relevant because the SIOP model is a research-based approach with a repertoire of teaching techniques called by the National Association for Education for Young Children (NAEYC), and therefore, it should reflect valid teaching practices in EFL classes as well as in ESL settings.

# 3. OBJECTIVES

## 3.1. Main Objective

To use the SIOP model to analyze efficacy in content teaching with Foreign Language Learners.

## 3.2. Specific objectives:

- Provide participant teachers with training on the SIOP model, its components and features to help them make content comprehensible for learners.

- To implement the SIOP model in content classes to realize the linguistic impact when used consistently for a given period of time.

- To analyze the outcomes of implementing the SIOP model in an EFL teaching context.

# 4. THEORETICAL BACKGROUND

## 4.1. Bilingual education

Being bilingual is traditionally considered having the ability to speak to languages fluently, even La Real Academia Española difines bilingualism as "Uso habitual de dos lenguas en una misma región o por una misma persona". Nonetheless, the main focus of bilingual education in the twenty first century has been directed towards the mastery of two languages through higher order thinking skills to achieve specific goals. Garcia (2009: 4) explains this concept further:

> Bilingual education is different from traditional language education programs that teach a second or a foreign language. For the most part, these traditional second or foreign language programs teach the language *as a subject,* whereas bilingual education programs use the language *as a medium of instruction;* that is, bilingual education programs teach content through an additional language other than the children's home language.

Modern bilingual education involves teaching content through a combination of two languages, in this case the English language can be taught as a second or as a foreign language. English as a Second Language (ESL) refers to English being learned in a country where English is also the native language of the majority of the community. On the other hand, English as a Foreign Language (EFL) refers to the learning of English in a country whose native language is other than English; in this case, this subtle contextual difference makes intelligible that EFL is learned as a foreign language and not as an immediate socio-cultural need (ESL). It is important to analyze the most important variety of program models in immersion and bilingual education in order to determine their strengths, advantages and limitations according to the students' particular contextual, academic and social needs.

## 4.2. Bilingualism in Colombia

When compared to Europe, one of the big disadvantages that public education has in Colombia is that most students graduate from high school mastering only one language: Spanish. Most of the times, high school students are able to read, translate and understand some words and expressions in English but they are not entirely capable of attaining the number one objective when learning a foreign

language: communication. In other words, most Latin American schools emphasize the EFL instruction on form (grammar) rather than meaning and communicative skills.

In Colombia, efforts have been done in increasing the amount of schools, which include English in their curriculums by turning it into an obligatory subject in primary and junior high. Moreover the Plan Nacional de Bilinguismo (PNB) states that the main objective for the Minister of Education in regards with TEFL is to have competent citizens able to communicate in English, with standards that can be internationally comparable, aimed at including the country in the process of universal communication, in the global economy and in the cultural opening. The Colombian Ministry of education is committed to make Colombian citizens bilingual in an additional language, not only English, in this sense, Min education (2013) emphasizes: “Aunque el inglés es el idioma universal, las dinámicas del mundo actual evidencian la importancia de conocer otros idiomas, gracias al incremento de nuestras relaciones económicas con la Unión Europea o al posicionamiento de China en la economía mundial”

Bilingual education in Colombian public schools –alike the European Union (EU) has prescribed goals and guidelines about the present-day priorities to teach English through an integrated curriculum with communicative aims and, therefore, improve the twentieth first century bilingual education according to the demands of global language teaching.

## 4.3. Content Based-instruction

For decades, foreign language teachers have been teaching English with a variety of methods, approaches and purposes. The experience of using academic content rather than the structure of the English language itself was originated the language immersion education in Canada in 1965 and it is defined as the development of use-oriented second and foreign language skills' and is 'distinguished by the concurrent learning of a specific content and related language use skills' (Wesche,1993).

To highlight the impact of Content-Based Instruction (CBI) in Second Language Acquisition (SLA) teaching practices, research supports that CBI promotes negotiation of meaning and enhances language acquisition and content learning. The

Council of Chief State School Officers (CCSSO) argues that for Culturally and Linguistically Diverse (CLD) students to be academically successful in school, they must continue to learn and expand their knowledge of new content so that they do not fall behind their monolingual peers (CCSSO, 1992).

Cummins' (1981) notion of Cognitive Academic Language Proficiency (CALP) as contrasted with Basic Interpersonal Communication Skills (BICS) shows that students need to be learning content while they are developing CALP; there is not enough time to separate language and content learning; postponing content instruction while students develop more advanced (academic) language is not only impractical, but it also ignores students' needs, interests, and cognitive levels.

## 4.4. Some Benefits of CBI.

- It can make learning a language more interesting and motivating. Students can use the language to fulfill a real purpose, which can make students both more independent and confident. (British Council 2003)

- Underlying CBI's success is isually understood by "the depth of learning--the notion that if students are actively engaged in meaningful, related theme-based tasks, they gain repeated exposure to language that helps them to process the language".
- ICB instruction motivates learners because language becomes the medium through which all students have Access to meaningful learning developmentally appropriate material (Genesee, 1998).
- ICB instruction promotes the negotiation of meaning in context among all students (Grabe & Stoller, 1997).
- Content-based instruction develops a wider range of discourse skills than does traditional language instruction (because of the incorporation of higher cognitive skills); Byrnes (2000) notes the increasing demands for high levels of literacy in languages other than English

## 4.5. Content- Based Instruction in Europe

Bilingual education is always on a quest for discovering effective theories, approaches and teaching practices that might converge in compelling tools for language learning. The vast amount of models and methods to help Culturally and Diverse (CLD) English Language Learners (ELLs) has gone through many changes over time in an attempt to accommodate the shift in social/cultural needs as the world changes.

Since the promotion of the linguistic diversity by the European Council Resolution in 1995, which came to conclusions on improving and diversifying language learning and teaching within the education systems of the European Union (EurLex, 1995), it is almost mandatory that all students should be able to speak two languages other than their mother tongue by the time they are finished with compulsory schooling. By making this policy an official statement, the European Union opened the door to practices in Content-Based Instruction (CBI) in diverse European educational settings. In the subject of content-oriented classes, Eurydice (2006: 8) links CBI to foreign language teaching as follows:

> Uno de los primeros textos ineludibles en la cooperación europea en materia de AICLE (Aprendizaje Integrado de Contenidos y Lenguas Extranjeras) es la resolución del consejo de 1995 que se refiere al fomento de métodos innovadores, y en particular, a la enseñanza de una lengua extranjera, en las clases en que se imparta una educación bilingüe, de asignatura distintas a las lenguas.

Content-centered learning is an answer to adapt the educational changes under the light of the communicative movement and the benefit of achieving high-quality academic competence.

## 4.6. Content-based instruction on Colombia

In many countries the linguistic policies for second and foreign language teaching and learning have been gaining greater importance. In South America, the need for plurilingual education and the fact that bilingual education can be defined as “a gradual introduction to CALP” (Bernstein, 1971) urges academic English to became an almost mandatory add-on to any dual-focus curricular program in the Teaching of English to Speakers of Other Languages TESOL. As regards with Colombia, the country has adopted some of the European guidelines to develop a solid national

bilingual program for both private and state schools. To understand this better, in 1999, it was evident for the Colombian government that the country needed to become a more multicultural society, open to the requirements of a globalized world. Hence, the Colombian Ministry of education drew up specific guidelines for the Teaching of English as a Foreign Language (Lineamentos generales para la enseñanza del inglés como lengua extranjera). Rodriguez (2011: 17) explains these guidelines further:

> The Colombian government restated the National Bilingualism Program, whose main goal now is to have bilingual citizens in the Colombian territory by the end of the year 2019. In order to guarantee that this goal is met, the MEN has decided to use European standards as a reference to evaluate the competence of Colombian citizens. The Common European Framework (CEF) was adopted and adapted as the document guiding the standards of language learning in the country.

It is clear that English Language Learners (ELLs) need the development of communicative English skills or Basic Interpersonal Communication Skills (BICS) in order to express their ideas and make themselves understood; however, due to the needs for plurilingual individuals in this globalized world, ELLs also need to develop a good command of academic English. In this sense, Cummins (2003) indicates a distinction between basic interpersonal communicative skills and cognitive academic language proficiency in an online book at The University of Toronto (2003), which explains:

> Conversational fluency is often acquired to a functional level within about two years of initial exposure to the second language whereas at least five years is usually required to catch up to native speakers in academic aspects of the second language. Failure to take account of the BICS/CALP (conversational/academic) distinction has resulted in discriminatory psychological assessment of bilingual students and premature exit from language support programs into mainstream classes.

Despite the fact that the tendency in English Language Teaching (ELT) in the 21st century highlights the importance of content-based instruction methods to incorporate BICS and CALP, most bilingual schools in Colombia in an attempt to implement CBI, they teach content in English (translation) as opposed to teaching through English (TTE). Content and language integration is quickly becoming the most important approach in Colombian bilingual schools. More evident every year, universities and schools have been making more curricular adjustments to finally develop equilibrium among the demands of the Colombian ministry of education, the challenges of the world and the professional demand of graduating proficient individuals in more than one language.

## 4.7. Content and Language Integrated Learning (CLIL)

The CLIL model has had its roots from 1070 and 1980 when immersion education started to play a very important role in European education. It is only since the 1980s that CLIL gained importance and it was recognized as an educative European innovation to foster the development of plurilingual curricula in European schools. The term CLIL was, however, adopted in 1994 to promote rich learning environments through the use of an additional language where good teaching practices in which content and language could be integrated. One of the fist countries to embrace this new approach was Finland. Ruiz de Zarobe & Jimenez state that since the 1990s European Union (EU) language policies need to adopt educational models to account for the diversity of European programs in languages; in other words; CLIL appears as an answer to comply with the EU policies for multilingualism and diversity. CLIL is known (Coyle, 2010) 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.

## 4.8. The 4Cs framework guidance

It is essential to analyze and plan how language skills in a foreign language and subject themes can be integrated by the use of cognition and meaningful activities: Lower-order thinking skills (LOTS) and higher-order thinking skills (HOTS).

The 4Cs framework is an active part of the CLIL model methodology that seeks to integrate and contextualize quality lessons in terms of progression in knowledge and skills (content), teacher to student and peer to peer interaction; language usage (communication), comprehensible input, use and application of (HOTS), cognitive levels in the bloom's taxonomy (Cognition), self awareness and awareness or the world, including the culture behind the language used as means of communication (culture).

The Coyle's four Cs is a framework that allows CLIL teachers to conceptualize teaching practices to focus on seeing the curriculum as a whole rather than a succession of separate topics or linguistic units of information in L2. Coyle (1999:60)

remarks:

> It is through progression in the knowledge, skills, and understanding of the content, by engagement in associated cognitive processing, interaction in the communicative context, and a deepening awareness and positioning of cultural self and otherness that learning takes place

Then, Coyle makes an interrelationship between the four Cs and his concepts of progression, engagement, interaction and awareness, as follows:

| | |
|---|---|
| Content | Progression |
| Cognition | Engagement |
| Communication | Interaction |
| Culture | Awareness |

The four guiding principles in this CLIL framework integrate content and language in contextualized and functional relationships; these relationships are explained by Coyle (2010) in more detail:

**Content:** At the heart of the learning process lie successful content or thematic learning and the acquisition of knowledge, skills and understanding. Content is the subject or the project theme.

**Communication:** Language is a conduit for communication and for learning. The formula *learning to use language and using language to learn* is applicable here. Communication goes beyond the grammar system. It involves learners in language using in a way that is different from language learning lessons.

**Cognition:** For CLIL to be effective, it must challenge learners to think and review and engage in higher order thinking skills. CLIL is not about a transfer of knowledge from an expert to a novice. CLIL is about allowing individuals to construct their own understanding and be challenged-whatever their age or ability. A useful taxonomy to use as a guide for thinking skills is that of Bloom. It serves as an excellent checklist in CLIL planning.

**Culture:** For our pluricultural and plurilingual world to be celebrated and its potential realized, this demands tolerance and understanding. Studying through a foreign language is fundamental to fostering international understanding. “Otherness” is a

vital concept and holds the key for discovering self.

## 4.9. The Sheltered Instruction Observation Protocol (SIOP).

Sheltered Instruction was originated in North America, more specifically, when traditional schools only used a standard curriculum for both native speakers and ELLs that emigrated from various countries mainly to the US. Sheltered instruction is launch more as a strong need and attempt to fill the gap that exists in terms of language, culture and transitional curricula from countries others than the American schools. Herrera & Murphy (2005) interpret sheltered instruction as a method that provides communicative solutions, philosophies, strategies, and techniques that recognize the multifaceted challenges that ELLs confront when they are trying to adapt to their new schools in the United States.

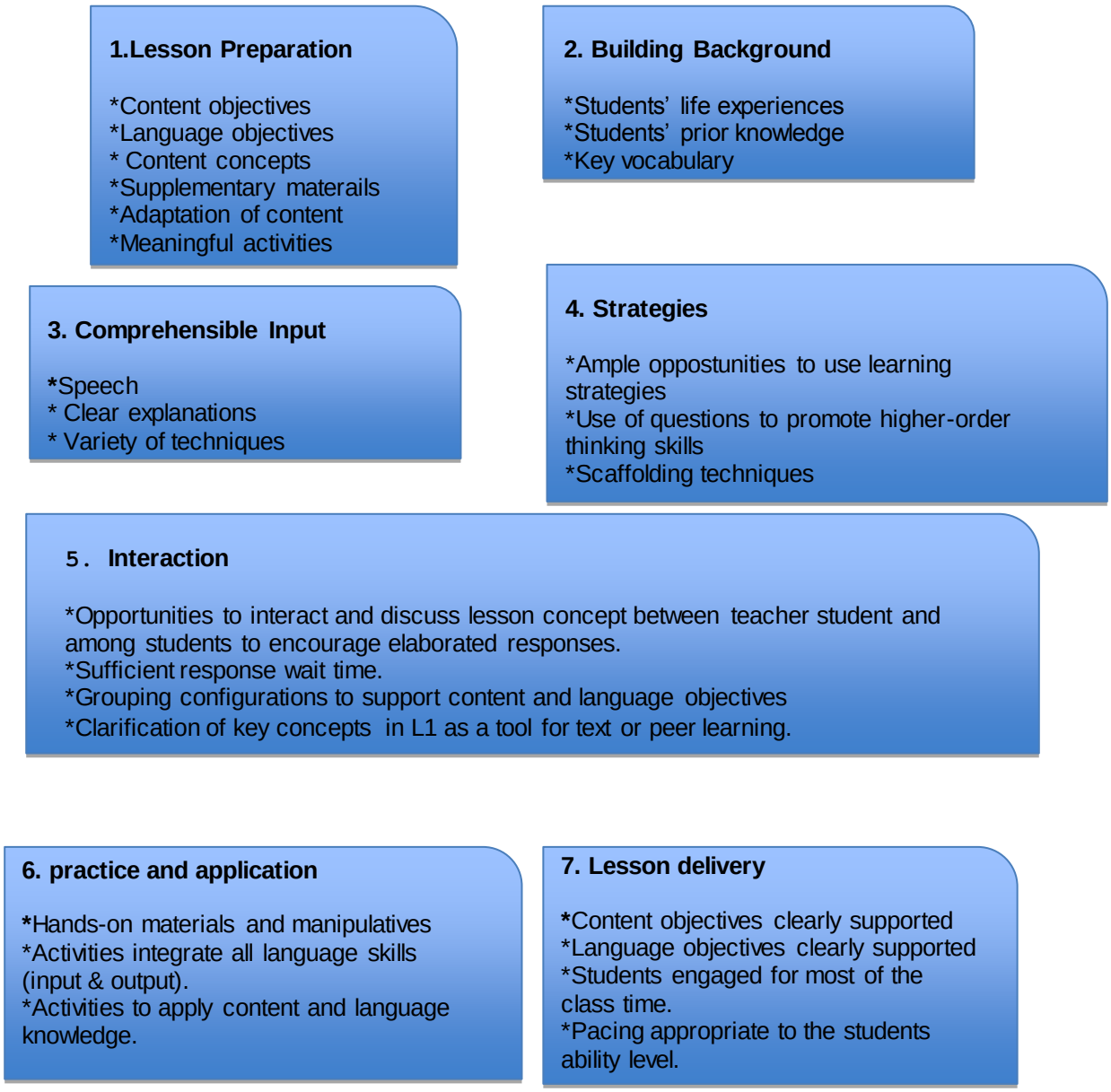
Originally, CBI was a popular method for Canadian bilingual schools with immersion programs during the '70s and '80s in Quebec. In the United States, CBI has been an umbrella term that has evolved into more structured frameworks of Sheltered Instruction (SI). First, SI evolved to be used with students who had attained an intermediate level of English proficiency and it transformed into SDAIE (Specially Designed Academic Instruction in English). Eventually, researchers Jana Echevarria, MaryEllen Vogt, and Deborah Short developed a procedural model that is now known as the Sheltered Instruction Observation Protocol (SIOP). This variation of sheltered instruction is the most popular filed-tested model in the United States nowadays. The Center for Applied Linguistics (2013) describes SIOP as a research-based and validated model of sheltered instruction that has been widely and successfully used across the U.S. for over 15 years.

The main objective of the SIOP model is to help Culturally Linguistic Diverse (CLD) students to adapt to regular classes in the US, and this is accepted in the American education since there is no doubt that the social and cultural milieu in which learners grow up determines their beliefs and behavior (Ellis, 1994). This unique approach is not aimed at isolating immigrant students from their regular peers; on the contrary, it seeks to optimize the cognitive, and cultural differences so that all that knowledge can be exploited and transferred to the target language they are acquiring and the new culture they are trying to adapt to. Echevarría, Vogt, & Short (2007) assure that "sheltered instruction is an approach that can extend the time students have for

getting language support services while giving them a jump-start on the content subjects they will need for graduation" (p.13). Sheltered Instruction (SI) is a method that helps ELLS adapt grade-level curricula and meaningful ESL content to prepare them for their transition to mainstream classes.

The SIOP model is a framework procedure that considers 8 components, as the critical aspects of the teaching process, and 30 features that serve as more specific indicators of teaching practices as illustrated in figure A.

**Figure 1. Components and features of the SIOP model**



**8. Review and Assessment**

*Comprehensive review of key vocabulary
*Comprehensive review of content concepts
*Ongoing feedback to students regarding language production and content output
*Formal and informal assessment of student progress, comprehension and learning

Adapted from http://www.nclack.k12.or.us/Page/1563

In the implementation of appropriate of CBI lessons, the SIOP model considers three critical aspects of the teaching process: preparation, instruction, and review and assessment (Herrera & Murry, 2005, p.262).

Lesson preparation is one of the most important parts of the SIOP model because it provides learners with access to content knowledge and language skills. Teachers must be very careful about connecting content and language objectives for the lesson, gather supplementary materials to give students comprehensible input and develop ways to adapt content to the language proficiency level of the learners. The lesson preparation category examines planning process, including the language and content objectives, the use of supplementary materials, and the meaningfulness of the activities (Estrada, Dalton & Yamauchi, 2000, p.5). A clear description of the essential academic and linguistic goals that students should glean from the lesson help learners acquire BICS, CALP, vocabulary and language structures to perform well in a bilingual school.

Once the preparation phase is completed with content objectives, language objectives, key vocabulary, supplementary materials, adaptations, and meaningful activities, it is time to mull over the way (strategies) the teacher will use to deliver the lesson in this second critical aspect of the SIOP model. During SIOP instruction, teachers need to engage students by fostering opportunities for students use their previous background knowledge and bring it into the classroom topic. Instruction that helps language learners connect new concepts to their prior life and learning experiences improves their language comprehension (Saunders et al., 1999). In other words, the students' background knowledge affects the understanding of topics as they make meaningful connections between the academic subject theme and their previous real-life experiences.

Also in this second aspect of the SIOP model, strategies and interactive accommodations needs to guarantee that students have plenty of opportunities to develop their social language and cognitive academic language proficiency.

SIOP teachers need to teach strategies explicitly to help students learn how to access and remember information, scaffolding strategy use, and promoting higher order thinking skills (Moughamian, Rivera, & Francis 2009: 14). Teachers can use these elements as necessary to engage students in language development and encourage ELLs in learning English. The SIOP strategies, during this second critical aspect, scaffold learning and help teachers focus on the language skills students need for success on academic tasks. After the guided practice in this linguistic protocol, with elements such as building background, comprehensible input, strategies, interaction, practice and application, and lesson delivery, SIOP lessons need to focus on opportunities to provide learners with feedback and ongoing assessment.

According to the third critical aspect of the SIOP model, the teacher needs to yield progressing occasions for ELLs to review the key vocabulary, the main concept topics in the lesson, and the assimilation of the lesson input; furthermore, SIOP lessons are filled with ample opportunities to look back upon the comprehension of content and language objectives and ongoing assessment through qualitative and formative techniques. As Howard, Sugarman & Coburn (2006: 17) point out:

> As the SIOP Model suggests, to use a variety of assessment techniques that are culturally appropriate for students from a variety of backgrounds, teachers should be aware that when students learn a particular assessment structure in one language, less time needs to be spent on teaching that test-taking skill/strategy in the other language.

The three critical aspects of the model, the eight components are all its features provide teachers with a framework structure that helps differentiate the learner´s needs according to their linguistic and cognitive individual demands.

# 5. METHODOLOGY

## 5.1. Research approaches

This project uses qualitative and quantitative tools for the analysis phase as it is very important to observe how the in-class processes evolve and the impact of the new methodology has to produce a final result. Arguing the condition that, “There is no need to oppose qualitative and quantitative research. Each is capable of critical thinking and each has its place in interlanguage studies” Ellis (Ellis 1984: 284). We believe that the survey has equilibrium in the use of qualitative and quantitative instruments; however, qualitative research has a special concern with process rather than simple outcomes (Bogdan & Biklen, 1982: p.2) whereas the quantitative instruments gain more relevance at the end of the project when conclusions need to be made.

This project seems to be based on an experimental approach because there is a hypothesis that needs to be validated through an experimental and a control group. In this sense, Hockly & Madrid (n.d) express that “if the researches are careful in setting up the study, these two groups can be presumed to be virtually identical in all respects, except that one gets the treatment (teaching method, materials, foe example) and the other does not”. Nevertheless, even though the project is guided through the perspective of an experimental research, it is impossible to control variables such as age, number of students, behavioral aspects, cognitive skills, and motivation so as to assure that both groups are identical; therefore, an action research suits the project objectives much better.

This eclectic, action-research project will adhere to the four developmental phases (Hockly & Madrid, n.d, p. 51) with the purpose of assuring the putting into action of this reflective model of research:

Phase 1: Develop a plan of action to improve what is already happening
Phase 2: Act to implement the plan
Phase 3: Observe the effects of action in the context in which it occurs
Phase 4: Reflect on these effects.

## 5.2. Research instruments

**5.2.1 Questionnaire:** Participating teachers will answer a survey at the end of the project in order to get to know their opinions about the implementation of the SIOP model with the two control groups; furthermore, the questionnaire will aim at collecting more accurate information on the comparative analysis between the classes exposed to the SIOP model.

**5.2.2 Lesson plans:** Teachers will be asked to turn in weekly lessons plans with the purpose of assuring that the protocol for incorporating the SIOP components in their classes. In the lesson plan, teachers will be asked to write a short reflective analysis on how the classes went according to what was initially planned. This refection exercise will help us not only observe but also do an ongoing reflection on the effects of the SIOP methodology in relation to the objectives that need to be met.

**5.2.3. Class observations:** Additionally, there will be bi-weekly class observations to ensure that the SIOP lessons are coherently delivered according to the lesson plans. The SIOP checklist will be used for this purpose, adapted from Short, D. J., Vogt, M., & Echevarria, J. (2008). *The SIOP model for administrators*. Allyn & Bacon.

**5.2.4 Assessment and scores:** The classes` academic performances will be compared by the end of the quarter through a formative and summative evaluation to keep track of their linguistic progress in their SIOP and non-SIOP classes

## 5.3. Research participants

For study purposes, the research participants will be primary and high school students at Liceo Taller San Miguel (LTSM), which is one internationally, accredited bilingual school in Colombia. This project will be carried out with one control group in elementary and one control group in high school. The research participants will be four groups that receive classes in English, two in primary and two in high school for a total of four groups. Two of these classes will be using the Sheltered Instruction Observation Protocol in content subjects (SIOP methodology) whereas the other two

groups will receive normal instruction with a non-SIOP methodology as to do a comparative analysis between the classes being taught using SIOP and the ones using the school regular methodology (non-SIOP).

## 5.4. Data Analysis

Finally, the data collected from the questionnaires, class observations and the learners' academic performance (formative and summative evaluation) will be compared to determine the efficacy of the SIOP model in those groups who were methodologically exposed to it during lesson preparation, lesson delivery and assessment.

Therefore, by the end of the project, we will be able to analyze through class observations, interviews and test scores to determine if SIOP can be considered an effective methodology for dual language programs in EFL bilingual schools.

# 6. STUDY

## *6.1. Context description*

The research project was designed at Liceo Taller San Miguel, which is a private school that emerges in the city of Pereira in Colombia as an answer for some specific needs in the areas of fine arts and bilingual education. This school has been aiming at developing a very solid curriculum, an effective language approach and methodology in order to rise and maintain an upright position in the field of English Language Learning (ELL) in the region.

The research participants were 40 students in both 6th grade groups, and 40 students in 3rd grade groups, even though only one class at each grade-level received SIOP instruction; namely, a total of 40 students were selected to be exposed to SIOP in this research. The reason we consider the sample to be random selection is because every year the school administrators mix the students and place them in different groups at each grade-level so as to foster socio-cultural interactions and academic skills.

This project was carried out with four different groups in their math classes. The 'A classes' used the Sheltered Instruction Observation Protocol (SIOP methodology), whereas the 'B classes' received normal instruction with a non-SIOP methodology. The arrangement for all groups being taught with a content-based methodology was as follows:

**Figure 2: Group arrangement**

| Class | Methodology | Teacher |
|---|---|---|
| 3A class | SIOP methodology | Teacher D |
| 3B class | Non-SIOP (regular methodology) | Teacher D |
| 6A class | SIOP methodology | Teacher C |
| 6B class | Non-SIOP (regular methodology) | Teacher C |

The students' ages in 3rd grade range from 8-9 whereas the students' ages in 6th grade fluctuate from 11 to 12 years.

## 6.2. Corpus and data collection

With the purpose of successfully collecting proper information about the SIOP strategies in Math classes, which are taught in English, we used several instruments to collect this valuable data during the execution of the study. These instruments will help us construct validity upon analyzing data sets and constructing validity to the outside observer as well. Thus when we talk about ´construct validity` in research, two things need to be taken into account: firstly, the construct needs to be verifiable, and secondly the constructs needs to be captured or measured through various measurement procedures (Hockly & Madrid, n.d: 76) as those used in this research work.

As an introduction to the research tools, the class observations done through the implementation of the SIOP methodology was gathered in written reports according the protocol checklist -explained above- so as to identify the most important categories of the features been observed. Quite often "categories emerge from data, without the researcher having to apply a fixed taxonomy for analysis" (Hockly & Madrid, n.d: 84), and those categories were taken into consideration to find coherence on the methodology used by the math teachers in their classes.

Regarding the questionnaire and the assessment instruments, the graphing tool was used to divide the data into meaningful analytical categories. Basically, the analysis of the datasets obtained during the research was conducted mainly through descriptive statistics as follows: frequencies were used to indicate how often a phenomenon occurred, the mean showed the average of the learners' scores in their evaluations, and the range to indicate how homogenous or heterogeneous the groups were when compared to one another.

### 6.2.1. Training.

First of all, since the Sheltered Instruction Observation Protocol (SIOP) is a North American model that is not very well known in South America, an initial training on SIOP was provided to both teachers participating in this action research. Inorder to give participants anonymity, we will refer to them as Teacher D (third grade math teacher) and Teacher C (sixth grade teacher). Both teachers gladly accepted utilizing the SIOP model for a period of three months (from May 26th to August the 22nd) and that way, analyze multiple methodologies that can be useful to improve the learning of math in their classes, which are taught completely in English.

Since I was trained in SIOP when I worked at Carmel middle school, in North Carolina US, in 2008, I decided to use the same booklet and materials I was exposed to when I first received training in content based-instruction and the SIOP model. The textbook used for the training was Echevarria, **J.,** Vogt, M.E., & Short, D. (2007). *Making content comprehensible to English language Learners: The SIOP model.* Boston: Allyn & Bacon (see appendix 1).

Teachers Teacher D and Teacher C had a four-hour training, divided into two sessions in two weeks, before the research took place. The didactics of the training was focused on assigning some reading prior our meetings, then discuss the topics in detail, go over the contents in the SIOP textbook and finally, do some mini-planning exercises to make sure the subject matter had been understood consistently and homogeneously. It is only possible to complete o good research work when all participants are fully aware of what they must do and how they should be doing it; and this is why the training sessions were crucial in connecting the teachers' previous background knowledge with the goals of the research they accepted to participate in.

### 6.2.2. Lesson planning

To ensure that classes had used the SIOP components during both the lesson planning and delivery, weekly lesson plans were requested to both math teachers. The SIOP model has a protocol that needs to be followed to perform proper implementation of all its components and features; therefore, teachers needed to take aside some time to plan their lessons over carefully.

For planning purposes, teachers were asked to review their notes, booklet and photocopies from the previous training they had on SIOP, then, teachers were to state the content and language objectives taking into account that premise that language leads learning and language development leads to a better understanding of the subject matter. The math teachers were to turn in weekly lessons plans and also used to write a short reflective analysis on how the classes went according to what was initially planned. Their refection exercise (appendix 2) helped us not only observe but also do an ongoing reflection on the effects of the SIOP methodology in relation to the objectives that need to be met during the research.

### 6.3.3. Questionnaire

At the end of the project, both participating teachers received a survey (appendix 7) in order to get to know their opinions about the implementation of the SIOP model with the two sample groups; in other words, the survey objective was to collect information from the teachers' perspectives about the impact of the SIOP methodology in their math classes. The questions in the survey have to do with the methodology, the quality of the workshop and the effects on their teaching styles and learning strategies.

### 6.4.4. Class observations

Teachers D and C needed to be observed during their lesson delivery. In the training, class observation was discussed with teachers as a requirement since it is an important instrument for data collection in this type of research. The two teachers agreed on being visited and have three unannounced class observation to guarantee the coherence between the lesson plan and the lesson delivery.

For academic purposes, the SIOP feature checklist proposed by Echevarria, **J.,** Vogt, M.E., & Short, D. (2000). *Making content comprehensible to English language Learners: The SIOP model.* Boston: Allyn & Bacon, was used to make sure that the most important components in the SIOP model were being implemented by both teachers in their focus classes. Some of the most important features to be observed were the content and language objectives, which needed to be clearly defined, displayed and reviewed with students. In addition to these, concepts were supposed

to be explicitly linked to students' background experiences and ample opportunities to use learning strategies in frequent moments of interaction and discussion. A total of three class observations were performed during the research; that is, three observations in third grade and three observations in sixth grade.

### 6.4.5. Assessment

As part of the assessment process, we needed teachers focus not only on gathering summative grades but also formative elements such as the comprehensive review of vocabulary, the review of learned key content concepts, and the use of higher-order thinking skills to make a good use of SIOP in their grade-level subject matter. Moreover, with the purpose of achieving objective-oriented results, we needed to combine strategies for formative and summative assessment in their final academic production at the end of the three months. More specifically, we used evaluative strategies to assess both the students' final product but also the students´ progress in the process; therefore, with the idea to assess reading and writing skills though content, all students took a written test (appendix 3)

Furthermore, with the aim to assess the learners' ability to socially interact while using math operations in listening and speaking competencies, we designed the grocery store project in groups of three and four students (see appendix 4). This is why "the super grocery store project" arouse from the idea that during and interactive/ social project, teachers were going to have the opportunity to provide timely oral feedback, give opportunities for all students to be challenged through open tasks in math, and allow multiple ways for learners to demonstrate communicative skills through the use of the target language.

The grocery store activity was created in order to provide grade leaners with a real life context, full of activities where they were able to consolidate and practice math skills and concepts related to the numerical thinking. The students were asked to bring objects, toys and foods from their houses to sell at the store. They were also asked to assign the prices (with the teacher´s help) and to buy and sell the products among themselves. Students calculated the change that they were suppose to return to the costumers (students) and were finally asked to record their sales and find their total incomes. During the grocery store activity many content concepts like quantity, data collection, estimation, addition, subtraction, multiplication, division and fractions

were practiced and further consolidated.

Pictures and description on appendix 4, shows how students had to prepare their own products, use math to perform operations, negotiate meaning of expressions in English and interact in a meaningful evaluative context.

## 7. RESULTS AND DISCUSSION

In this chapter, the data gathered from the research instruments is analyzed in relation to the specific objectives and the main objective in the thesis. The results are presented in a sequential order according to the way the instruments were utilized.

The conduct of this study entails a detailed account of questions, as it is our interest to keep into consideration the teachers´ opinions and feelings about the quality of the training as well as the accurate information about the study among the classes exposed to SIOP. The questionnaire teachers were to respond (appendix 7) was designed on Google forms as it allows immediate analysis of the responses received and allows storage in a spreadsheet where individual responses can be seen.

The Questionnaire contained questions regarding the quality of the training offered to teachers, the level of understanding the participating teachers acquired to plan their lessons and teach their classes using the SIOP method. In addition to this, the questionnaire also contains some questions regarding the quality of the materials used for the research study and the feedback provided to teachers after their turning in their weekly lesson plans. The questions and answers provided during the questionnaire are presented in this document to be examined. It is necessary to keep in mind that teachers were requested to answer the questionnaire using a scale from 1 to 5, with 5 being the highest. The analysis is developed in groups of two question at a time; exempt the last question, which was an open request to provide any recommendations for future studies.

### 7.1. Questionnaire questions and answers:

**Figure 3: Questionnare answers**

| **Questions** | 1. Were the explanations about SIOP clear during the training? | 2. Did you understand how SIOP works in lesson planning? |
|---|---|---|
| **Teacher 1** | 5 | 5 |
| **Teacher 2** | 5 | 5 |

It is clear that teachers were satisfied with the quality of the workshop that was

offered as a preliminary stage in order to get them prepared for the research study. Having provided the highest score confirms what we had already discovered through multiple informal conversations with them while on campus.

| **Questions** | 3. Did you understand how SIOP works during lesson delivery? | 4. Was the training both informative and practical so as to learn how to appropriately use it in class? |
|---|---|---|
| **Teacher 1** | 4 | 4 |
| **Teacher 2** | 5 | 4 |

In terms of question number 3, even though both marks are high, it is understandable that it is normal that one of the teachers feels she is not completely mindful of how the SIOP method works. We believe that in a 4 hour workshop, the fact that they feel capable of getting the gist of how to apply a SIOP class affirms the importance of having provided good the training beforehand.

On a different note, in reference to the combination of theoretical framework and exemplars of practical issues on how to implement SIOP, both teachers feel very well about both concepts; therefore, their answers reflect the consistency during the implementation process, that is, when they turned in their lesson plans, when their classes were observed, and upon proper application of the assessment tools.

| **Questions** | 5. Were the materials used during the training appropriate for mastering the most important concepts about the SIOP components and features? | 6. Did you receive timely and specific feedback after turning in the weekly lesson plans? |
|---|---|---|
| **Teacher 1** | 5 | 4 |
| **Teacher 2** | 5 | 3 |

Question 5 aimed at knowing the teachers' perceptions about the materials used for the training as an initial stage, and the feedback provided through the entire research time. During the training, we used the SIOP materials: Making Content Comprehensible for Language Learners, Compiled by the Bilingual and

Compensatory Education Resource Team, Dearborn Public Schools, 2002 (see appendix 5) , and then we continued working with the textbook Echevarria, **J.,** Vogt, M.E., & Short, D. (2007). *Making content comprehensible to English language Learners: The SIOP model.* Boston: Allyn & Bacon (see appendix 1). I made the request so that the school could get a copy of these books so Teacher D and Teacher C could get them checked out from the library, and the request was approved by the school director. The school even got the SIOP workbook which was quite useful to refer teachers to some of those exercises as part of the timely feedback they were provided with. All these aspects been taken into account, the high responses match the efforts made to assist teachers with qualified materials and to endorse this research project.

In regards with question 6, teachers are satisfied with the feedback but have suggestions to improve how to do in in the future. Their recommendations are highly appreciated and will be taken into consideration for further studies.

| Questions | 7. Did you receive constant suggestions about how to assess language and content learning in class? | 8. How would you rate the quality of the workshop and the help you received during the study? |
|---|---|---|
| Teacher 1 | 4 | 4 |
| Teacher 2 | 3 | 4 |

In question 7, teachers expressed that the suggestion done through the feedback was good but could have been better. This feeling is probably based on the fact that they were to design the assessment instruments by themselves and, once finished, further suggestions were given to them so that they could adhere the objectives of content-based teaching and learning framework.

Overall, the quality of the initial training, the assistance given to teachers during the research and the feedback provided about how they were implementing SIOP in their classes was very good and the two participating teachers were well-satisfied with the assistance provided all along.

| | |
|---|---|
| Open Question | Do you have any suggestions or comments to help us implement improvement plans in future research practices? |
| Teacher 1 | I would like the school to buy the materials we used in in the training. |
| Teacher 2 | My suggestion for the future is that feedback was given everyday if possible but my students and myself learned a lot. |

Respecting the open question at the end of the survey, I understand that teachers suggested a couple of improvements that could be considered in future similar studies. They suggest that the school could buy the materials for the teachers; in other words, buy the materials for the teachers to own and not for library (I talked to the teachers for a more detailed explanation since the answer was somehow ambiguous). Furthermore, they also suggested that feedback must be given if possible on a daily basis during the duration of the implementation stage, as opposed to daily feedback after the submission of their lesson plans.

## 7.2. Lesson plans:

Teachers turned in weekly lessons plans with the purpose of assuring that the protocol for incorporating the SIOP components in their classes was properly implemented during lesson delivery. The lesson plan format included the learning outcomes for each unit and the assessment strategies teachers wanted their students to develop. The combination and adaptation of the relationship between the language and cognitive level is an issue that has been explored following the guidelines for content-based instruction and SIOP with the purpose of combining language development and content level learning.

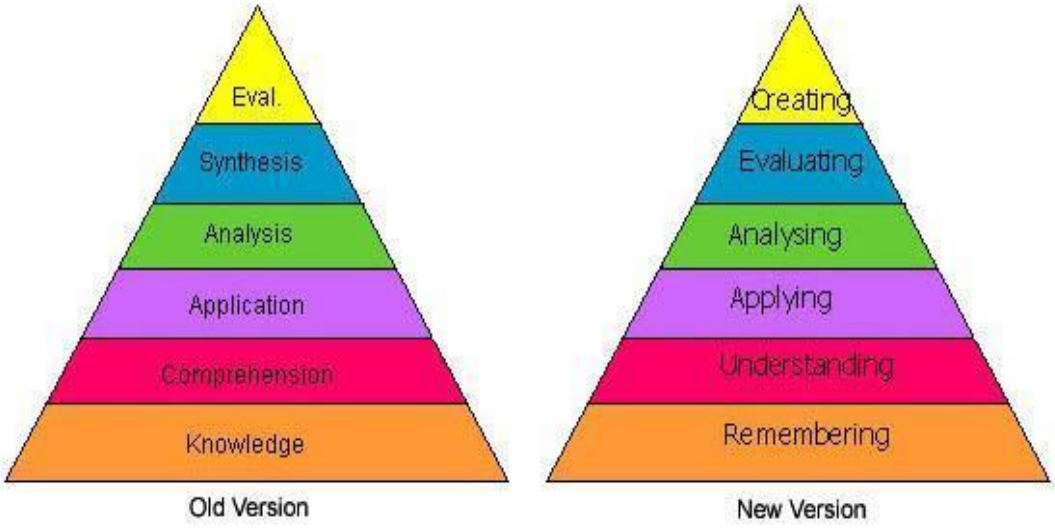
The lesson plan format also contained the components of language and communication, cognition and citizenship (see appendix 2). In terms of the communication component, teachers needed to identify the language objectives, the pre-teaching and the post-teaching stage in order to reflect upon how students learn to build language development in L2 (English as an additional language) while learning content too, in this case mathematics.

Since a SIOP classroom definitely needs to be centered on cognitive engagement

and constant development of academic language, lesson preparation and lesson delivery needed to be included in the format so as to show a wide variety of thinking and problem solving skills for learners to be capable of conceptualizing, comprehending and assimilating content themes through the use of Higher-Order Thinking Skills (HOTS). The Bloom´´ taxonomy was used for planning purposes to help teachers think about the levels of cognition to engage their students in.

The figure A. shows the different levels of the taxonomy used during the lessons. Notice that the old taxonomy on the left was designed using nouns as opposed to the new taxonomy on the right, which were re-adapted using verbs.

**Figure 4: Bloom taxonomy.**




**Taken from** ***http://www.odu.edu/educ/llschult/blooms_taxonomy.htm***

Concerning the citizenship component, its goal was to teach the students the usefulness of their new acquired knowledge. In other words, the lesson should include an activity that showed learners how to use their new knowledge in a dynamic, true-to- life environment. The citizenship or community component is supposed to teach the learners the usefulness of what they have learned in an expanded situation; beyond the traditional classroom experience.

At the end of the lesson plan, teachers were asked to write a short reflective analysis on how the classes went according to it what was initially planned. This reflection

exercise helped us not only observe but also do an ongoing reflection on the effects of the SIOP methodology in relation to the objectives that needed to be met. Furthermore, the ongoing feedback provided to teachers was usually compared to those reflections in order to help improve the lessons week after week.

A total of 10 lessons were submitted and they all had the requested components explained above. The planning was structured and demonstrated that the lessons were prepared following the standardized guidelines for the research project as well as students having been exposed to SIOP effectively. The quality of the work was excellent and the teachers' reflections showed that the concept ideas on how to teach SIOP had been successfully assimilated too.

## 7.3. Class observations:

Each teacher was observed three times to ensure that the SIOP lessons were coherently delivered according to the lesson plans. The SIOP checklist used for this purpose, adapted from Short, D. J., Vogt, M., & Echevarria, J. (2008). *The SIOP model for administrators*. Allyn & Bacon. The checklist observation format (appendix 6) was used in unannounced observations where the following components were examined in their execution during lesson delivery: preparation, building background, comprehensible input, strategies, interaction, practice & application, lesson delivery, review & assessment.

Each teacher was observed three times in their SIOP classes, one at the beginning of the study, another one in the middle, and a last observation towards the end of the project, for a total of six observations altogether.

In the checklist, each component is divided into several features. Those features were marked using a scale from 1 to 5, with 5 being the highest, to evaluate the coherence and accordance with which the classes had been planed to teach using the SIOP model. After this, all the features were added to get a sum for each SIOP component (See appendix 6). For data analysis purposes, based on all the class observations, the different components were taken into account, their values summed up and the dataset is presented in the table below.

**Figure 5: Sum of all components**

| Component | Sum of all components in all observations altogether | Maximum possible score. |
|---|---|---|
| Preparation | 88 | 90 |
| Building background | 40 | 45 |
| Comprehensible input | 44 | 45 |
| Strategies/Interaction | 40 | 45 |
| Interaction | 35 | 45 |
| Practice/application | 37 | 45 |
| Lesson delivery | 54 | 60 |
| Review/Assessment | 45 | 60 |
| Mean | 48 | 53 |

This final chart which gathers all the collected data in the class observation formats shows that the total sum average of the components is 48, in comparison with the mean of 53 in the maximum score category. According to these numbers, teachers who implemented SIOP instruction complied with the majority of the requested procedures according to the protocol suggested by the SIOP authors.

### 7.4.1. Assessment and scores:

All classes took a final examination to test their reading and writing skills in english while doing math operations. Likewise, Students in all classes did an interactive project called “the grocery store activity” so as to assess the learners´ abilities in listening, speaking and negotiation of meaning with math concepts. The scale breakdown used to score the students’ results corresponds to the school grading policy in such a degree:

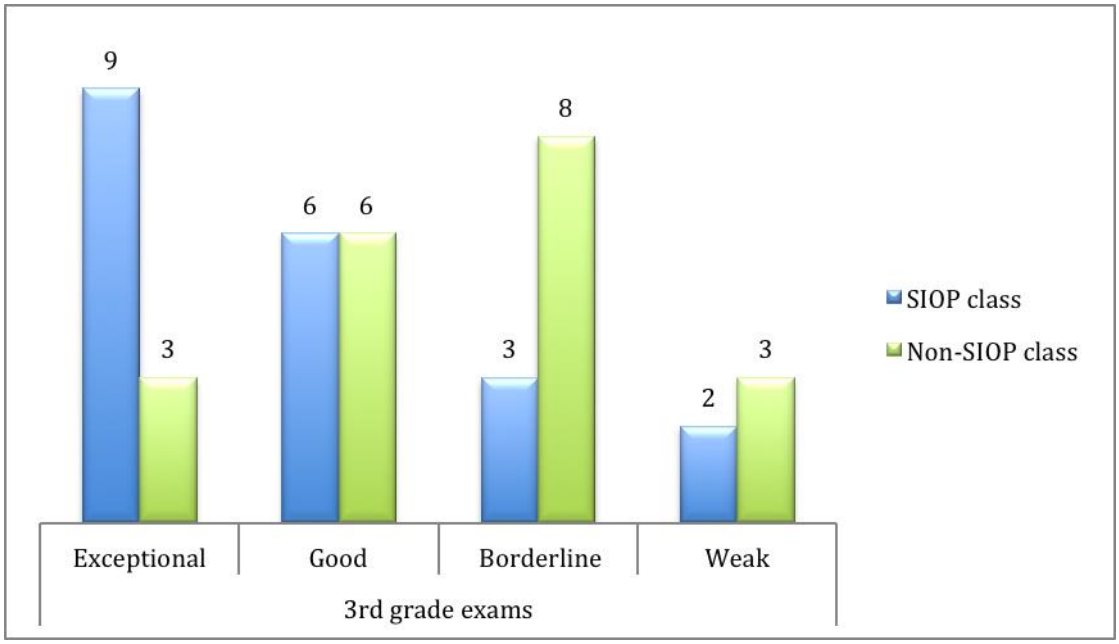
**Exceptional:** from 90 to 100
**Good:** from 80 to 89
**Borderline:** from 70 to 79
**Weak:** From 1 to 69

## 7.4.2. Results in the written final test

The results in the exams to do a comparative analysis between the sample group and the regular group were as follows:

**Figure 6: Third grade exam results**

| | 3rd grade exams | | | |
|---|---|---|---|---|
| | Exceptional | Good | Borderline | Weak |
| SIOP class | 9 | 6 | 3 | 2 |
| Non-SIOP class | 3 | 6 | 8 | 3 |

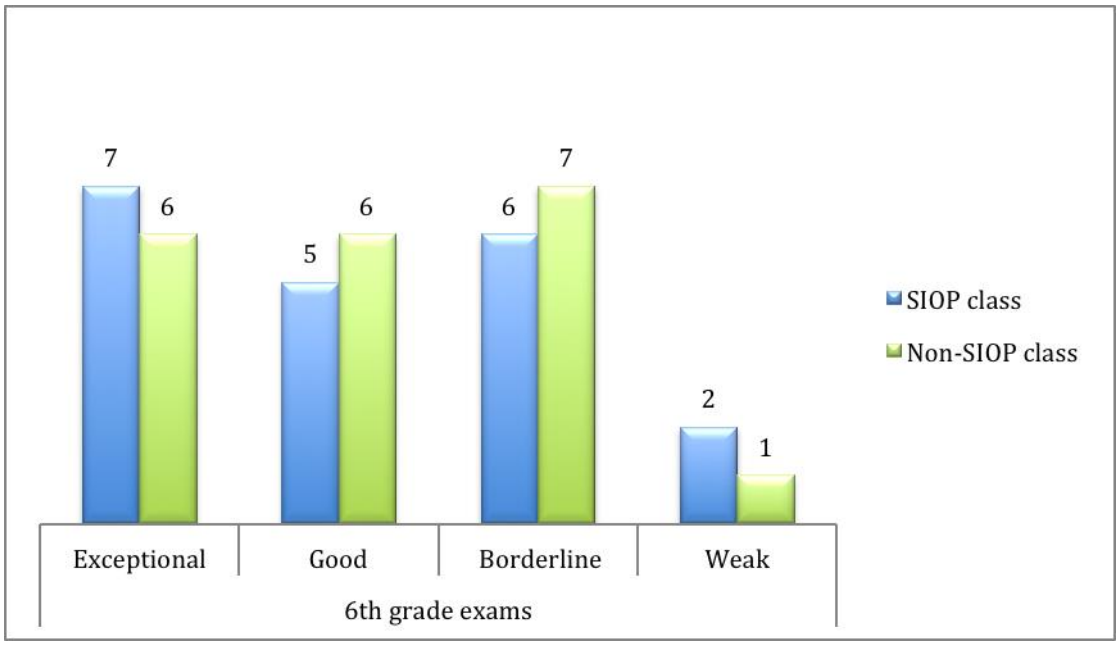



This exam shows an exceptional performance of the students exposed to the SIOP methodology compared to those who received math class with a regular non-SIOP methodology. There are six more students who performed at the highest score, equal number of learners who got a good grade , five less students who performed at borderline and one less student who failed the examination.

In conclusion of this first data set, there is a better performance in reading, writing and grade-level math skills in those students who were exposed to SIOP during the research study in third grade.

**Figure 7: Sixth grade exam results**

| | 6th grade exams | | | |
|---|---|---|---|---|
| | Exceptional | Good | Borderline | Weak |
| SIOP class | 7 | 5 | 6 | 2 |
| Non-SIOP class | 6 | 6 | 7 | 1 |



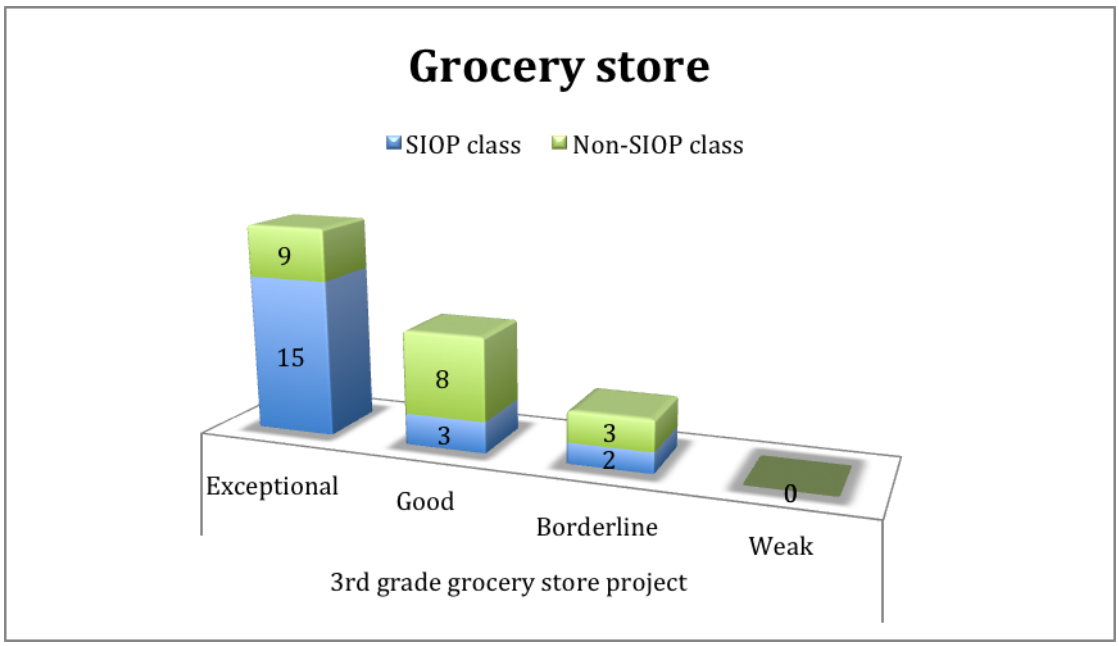

In the sixth grade math exam the scores are more standard between both classes as there are differences marked by only one student range, at each competence level. At the exceptional level, there is one more students in the SIOP class compared to the other Non-SIOP class. However, there are six students scoring good at Non-SIOP, with the difference of one more student as well as for those scoring at borderline. Regarding those who failed the test, there is, again, just one difference, in range, between both classes.

In this case, it is hard to affirm that there is a better performance in reading, writing and grade-level math skills in those students who were exposed to SIOP because all the results were very similar. One of the hypotheses about why the results resemble each other so much in this type of examination is because of the age factor. Children learn foreign languages faster than teenagers and, perhaps, SIOP being a content-based instruction model for language learning, could be better assimilated by kids than by teenagers. In conclusion of this first data set, no remarkable differences were evident in grade-level math skills in sixth grade.

### 7.4.3. The Grocery store project

**Figure 8: Third-grade grocery store project**

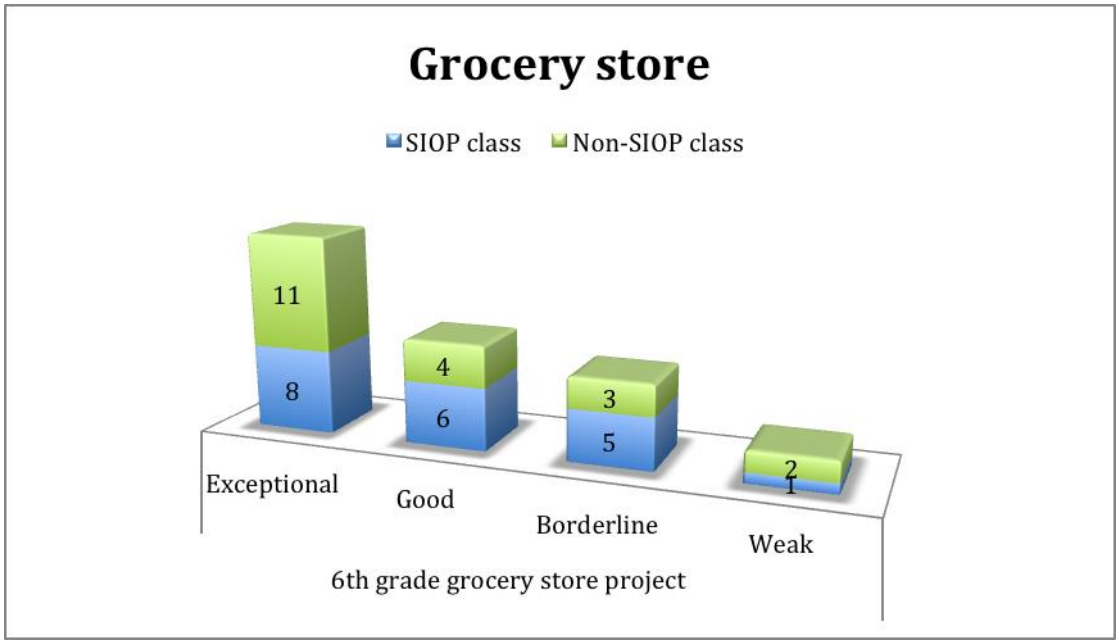
| | 3rd grade grocery store project | | | |
|---|---|---|---|---|
| | Exceptional | Good | Borderline | Weak |
| SIOP class | 15 | 3 | 2 | 0 |
| Non-SIOP class | 9 | 8 | 3 | 0 |




The grocery store activity shows that the socio-academic competences worked in class are better at the exceptional level in the 3rd grade SIOP class. Once more, the learners´ speaking abilities got better grades and this is why nobody failed the activity in third grade. In terms of good performance, there is a higher number of high achiever in the non-SIOP class due to many others migrated to the exceptional levels, as seen in the bar graph.

**Figure 9: Sixth-grade grocery store project**

| | 6th grade grocery store project | | | |
|---|---|---|---|---|
| | Exceptional | Good | Borderline | Weak |
| SIOP class | 8 | 6 | 5 | 1 |
| Non-SIOP class | 11 | 4 | 2 | 2 |




The 6th grade grocery store activity shows interesting data when compared to the previous information in the comparative analysis. In this case, the non-SIOP class got more students being placed at the exceptional level compared to those in the SIOP class.

This data probably means that using a content-based instruction methodology for a short period of time does not have a significant impact on the students` speaking skill as this is a competence that is developed over time. However, if we compare the exceptional and good categories altogether the results shows that the SIOP class has 14 students achieving high scores whereas the non-SIOP one has 15 students getting high grades. Again, it will be a one-student difference that proves that the SIOP method did not influence quite significantly in those sixth grade classes with pre-adolescents.

From a more general perspective, adding all the students´ scores in both assessment activities, we can observe the following results:

**Figure 10: Overall scores**

| Criteria | Exceptional | Good | Borderline | Weak |
|---|---|---|---|---|
| SIOP students | 39 | 20 | 16 | 5 |
| Non-SIOP students | 29 | 24 | 21 | 6 |

In almost all cases, the students exposed to SIOP outperformed their Non-SIOP peers, except for the scores in the sixth grade grocery store project. There is a tendency that indicates that SIOP could be an effective method to use in content-based instruction classes in bilingual schools. However, it seems that SIOP might me more effective when used in early education but that theory would need further studies to replicate this research and deepen into the effectiveness of this method when compared to other similar counterparts such as Content and Language Integrated Learning (CLIL), Language across the curriculum (LAC), and the Cognitive and Academic Language Learning Approach (CALLA).

## 8. CONCLUSIONS

Content-based instruction is not a new approach to language teaching but it is in constant development, mainly with CLIL in Europe and SIOP in the United States. The most important aspect when implementing content-based instruction, is to give attention to both the language and the content being taught and not put more emphasis on one or the other; even though SIOP was designed for native speakers of English as opposed to CLIL. If properly applied, CLIL & SIOP may have a solid future in content- based instruction in Latin America; where in fact, it is a topic that is just arriving at the competitive bilingual schools.

Based on the results of the study, it was found that the Sheltered Instruction Observation protocol (SIOP) that is normally used in North America works effectively to teach content and language in schools where English is not the mother tongue. Just like the Content and Language Integrated learning (CLIL), the Language Across the Curriculum (LAC) approach and other content instruction methods, SIOP incorporates some important components that accompanied by other features helps integrates language and content learning.

There is a need for further research, going deeper; perhaps with a quasi-experimental investigation in the near future. The participating teachers agree that it is important to explore the advantages of using this CB method to setting clear objectives, scaffolding language learning, and making the learning of math more procedural.

Action research was also validated as an appropriate choice during the study because it was used as a way to learn about our teaching, its effectiveness, and as a way of monitoring and evaluating innovation. At the end, the results concur with Parrott`s assertion:

“the aim of action research is not to arrive at universal truths but only to learn more about ourselves at the moment, our teaching at the moment, our learners at the moment and their learning at the moment” (Parrott, 1996, 6)

SIOP instruction offers a compendium of components and recourses that guides teachers on how to teach their content classes beyond the traditional foreign

language curriculum; therefore, students become better academically proficient and develop language skills in the process. Even though the sample classes were exposed to SIOP in their math classes, students acquired abilities to express accuracy in their math skills and better fluency to communicate their ideas during instruction and the evaluative process.

The best results were noticeable with the third-graders in contrast to the sixth grade classes. Our assumption is that it is natural that a three-month study shows better results in children than adults because the Content Instruction (CI) conceptualization is based on acquisition through inductive instruction rather than enforcing learning through deductive methods.

Although the study proved some good results, mainly in the third grade sample, this research needs some revisions to make better use of the existing opportunities of this expanding methodology that is not wildly known to teach English as a Foreign Language (EFL). It would be interesting to conduct this research with other content classes taught in English, such as social studies, Science, chemistry and Language Arts to replicate the framework of this work and discover whether or not the SIOP model has a more powerful impact on elementary school children rather than the middle school students.

In terms of the opinion about the instruments, qualitative and quantitative methodologies were combined. The data in the questionnaire evidences good characteristics in the quality of work done altogether with both math teachers at LTSM. The opportunity Teacher D (second grade math teacher) and Teacher C (Sixth grade math teacher) had to access this kind of training before hand, and receive timely feedback during the study was decisive on doing a reflective work that allowed us to gather constant data sets from all the different instruments. Lesson planning helped to:

- Plan how to allow learners to use language in a range of different and more complex ways in math classes.
- Enable learners to deal with complex information given to them in the target language.
- Guide the teachers on how to systematically teach, and assess their classes' progress according to the SIOP procedures.

Taking into consideration the datasets and the conclusions in this research study, we would like to propose some recommendations that could be regarded as a short-term/long –term plan of action that could offer more valuable information about the use of SIOP in bilingual school.

The following recommendations may also contribute to the improvements and revision of possible challenges in the improvement the obtained results in this study:

## 8.1. Recommendation 1:

It was hard to get the school director´s permission to conduct the research and promote the importance of this study among the math department; hence, it is crucial to have a timetable not only for the academic work but also for the time needed to make the logistics arrangements before the work begins.

## 8.2. Recommendation 2:

Further studies in SIOP are needed in order to know how effective it is in the teaching and integration of content instruction with preschool, primary, middle and high school students. The results in this research make us ponder about the impact of SIOP depending on the students` age and grade-level cognitive skills. Further studies with a special focus in the cognitive and age factors would immensely expand this initial price of work.

## 8.3. Recommendation 3:

SIOP should be implemented as a teacher development program and, possibly, as a module for teacher training every time new staff members are hired to work as specialized content teachers. Likewise, teacher training in SIOP should be updated every school year with conferences, specials guests and state- of the art material in the field.

## 8.4. Recommendation 4:

For SIOP to be effective, the teachers' suggestions in terms of more accurate, ongoing, timely feedback must be taken into serious consideration. Resources are to be made readily available for teachers to use and meetings are to be scheduled on a regular basis. Study groups could also be considered so as to provide teachers with progressing teaching tools in the field of content-based instruction in bilingual environments.

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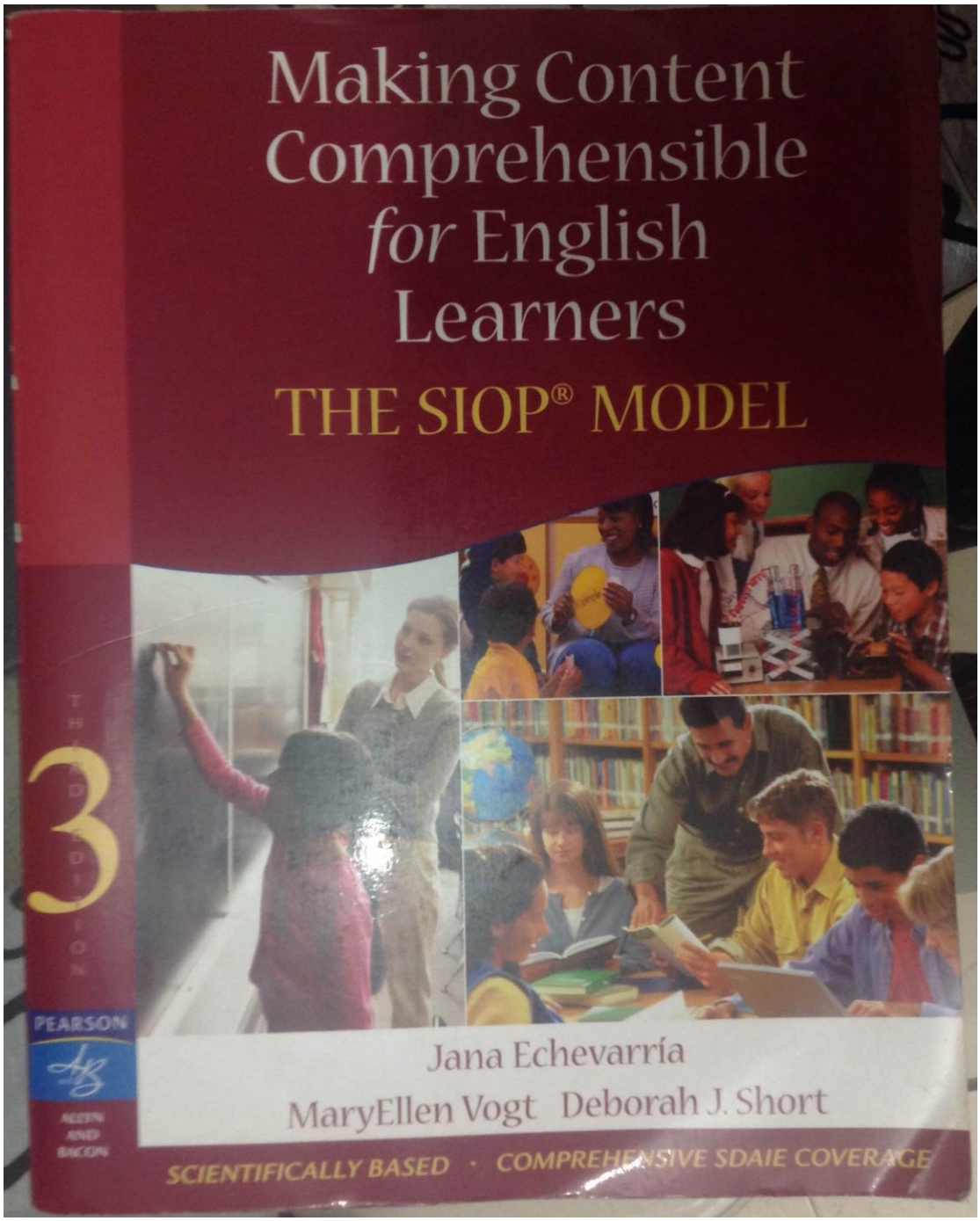
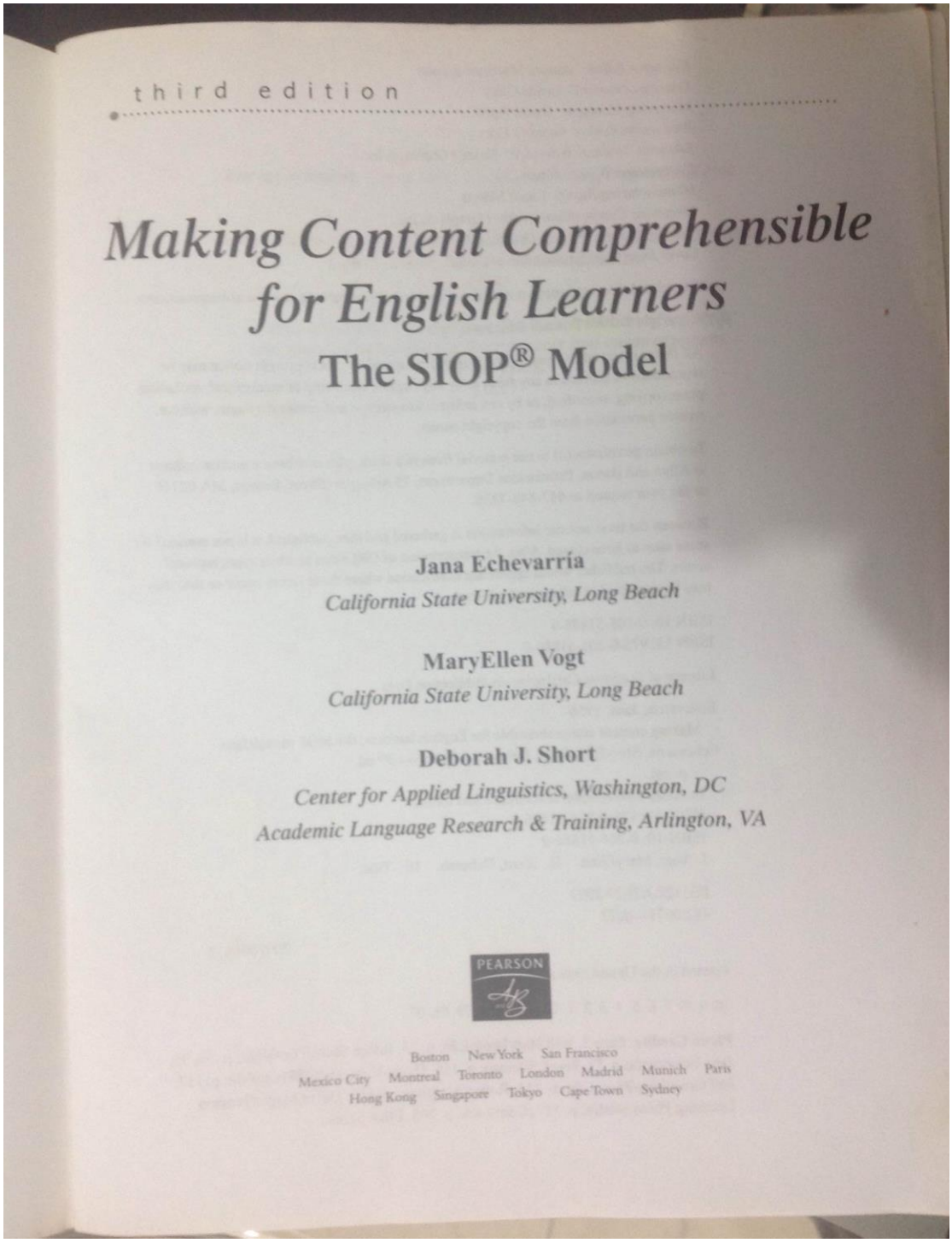
# 10. APPENDIX

**10.1. Appendix 1:** Echevarria, J., Vogt, M.E., & Short, D. (2000). *Making content comprehensible to English language Learners: The SIOP model.* Boston: Allyn & Bacon.





third edition

# *Making Content Comprehensible for English Learners*

## The SIOP® Model

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PEARSON

Boston New York San Francisco
Mexico City Montreal Toronto London Madrid Munich Paris
Hong Kong Singapore Tokyo Cape Town Sydney

## 10.2. **Appendix 2:** Lesson plan samples

**SIOP LESSON PLAN TEMPLATE**
**Teacher D:**
**Third grade students**

**STANDARTS:**
**Describes patterns with numbers and identifies missing elements**

**THEME: SEQUENCES AND PATTERNS**

**LESSON TOPIC: SEQUENCES AND PATTERNS**

**OBJECTIVES: Describe patterns and sequences and complete the missing elements.**

**LANGUAGE: use the right words, math key vocabulary and communicative language.**

**CONTENT: The student is going to be able to complete patterns, to write numbers, identify them and count.**

**LEARNING STRATEGIES: games, exercises, worksheets**

**COGNITION (LOTS- HOTS): Understand, practice and apply.**

**COMMUNICATION: Pair work in the competition activity and group work to complete the number chart cooperatively.**

**MATERIALS: worksheets, visuals, notebooks, elements from their pencil case**

**CITEZENSHIP: Students are going to learn how important numbers are when counting sums and doing estimations.**

**MOTIVATION:**
**We are going to start with a counting game. Every student is going to say a number in the right order, for example, student 1 says number 1; student 2 says the number 2 and so on. The students that don´t say the correct number, don´t participate anymore. They have 2 chances.**

**PRESENTATION: after that exercise we are going to discuss what we are working, what that is, the objectives.**

**PRACTICE AND APPLICATION:**

**We are going to talk about what counting is; if they use**

it in real life, in what occasions and so on. I´m going to gove them a paper and they have to draw those occasions where they use counting.

After that, they have to complete a 100 chart with the missing numbers.

We are going to do a competition, about writing numbers. (Individually and in groups)

They are going to complete worksheets about sequences.

REVIEW AND ASSESSMENT:

They are going to complete a worksheet about sequences and writing numbers and after that, they will change papers

and compare their answers.

Citizenship:

Students are given paper money. Then they will follow directions in terms of given amounts of money. They will have to find the place value, round up, round down and share the money. The goal is that they realize how important it is the place value and the big difference a digit can make.

Reflection:

Students moved well from LOTS to HOTS. I am very happy with the result of higher-order thinking skills because my third grade students were able to create challenging situations and negotiate with the value of the paper money used in the activity. At the end of the class, the students did not want to stop and wanted to continue with the class even when the bell rang. A very meaningful activity, and we will have to do it again.

# SIOP Lesson Plan

**Teacher:** Teacher C
**Subject/Class:** 6th grade Math
**Date:** April 1st to April 7th
**Content:** Units of length

**Teaching aims**

| Learning outcomes | Assessment |
|---|---|
| Know:<br>Units of length (cm, dm, m, hm, dam, km)<br>Be able to:<br>Identify the different units of length.<br>Do the conversion of the different units. | Can the learners……<br>Solve the quiz individually converting units of length and finding the area and the perimeter of different geometrical shapes.<br>Finish the worksheet<br>Actively participate in the class<br>Do and solve the homework properly. |

**Communication**
**Language and content objectives**

| Language of learning | Language for learning | Language through learning |
|---|---|---|
| Units of length<br>Conversion<br><br>Unit of measurement<br>Width<br>length | Written practice.<br>Pair work/group work<br>Conversion<br>Solving problems: steps | Discussion:<br>In what specific situations we use km, m, com in order to measure the distance or the length of the objects?<br>Working with others, discussing after watching a video. |

**Cognition**

| Lower-order thinking skills | Higher-order thinking skills |
|---|---|
| Understand<br>Apply<br>Interpret | convert<br>Compare<br>Reason<br>Evaluate<br>Solve problems |

**Citizenship**

**Discussion: When we might need in our context to add and subtract fractions?**

| |
|---|
| **In what specific situations do we use km, m, cm in order to measure the distance or the length of the objects?** |

| Stages | Activities |
|---|---|
| Warm up | Teacher will project a game in order to introduce the topic. Students will have to identify what units of measurement they will need to use in order to measure different objects. http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures/index.htm |
| Vocabulary input | Teacher will do a revue in the vocabulary needed for the lesson.<br>Length units<br>Conversion<br>Width<br>Length<br>Height |
| Content input | Teacher will project a video http://www.youtube.com/watch?v=rrthDhAadjI, then she will elicit on the board the different units of measurement, and how to do the conversions when needed. |
| Discussion | Students will discuss in what specific situations they have to use km, dm, cm, m, and mm in their everyday life. |
| Practice | Students will complete a workshop in which they will have to answer several questions. Starting in the process of identification moving to the conversion of units of length and finally solving problems. |

| | |
|---|---|
| **Evaluation** | **Teacher will evaluate the students by using a written test.**<br><br>**Reflection:**<br><br>**I did not have too much time to get my students to do extra conversion exercises. However, the game at the end of the activity was an excellent way to recycle knowledge and use a formative assessment tool with SIOP. Next week, I will probably try using a game as a warm-up activity and another one to wrap it up to keep my sixth graders more engaged.** |

**10.3. Appendix 3.** Written evaluation

**SIOP EXAM**
**6 GRADE**
**NAME:**

**LOTS**

1. **Interpreting information**

**Three classrooms from Liceo Taller San Miguel collected papers and newspapers for a recycling campaign.**
**4B collected 120.75 kilograms**
**5A collected 210.5 Kilograms**
**5B collected 194.86 Kilograms**

a. **How many kilograms of newspaper did 4B and 5A collect all together?**
b. **How many pounds (lb) there are between what classroom 5A and classroom 5B collected?**
c. **How many pounds of newspaper did all the classrooms collect in total?**

2. **Understand the information.**

**The fastest animals in the world are the cheetah which reaches 31.67 meters per second**

**; the pronghorn with 27.22 meters per second and the black wildebeest with**

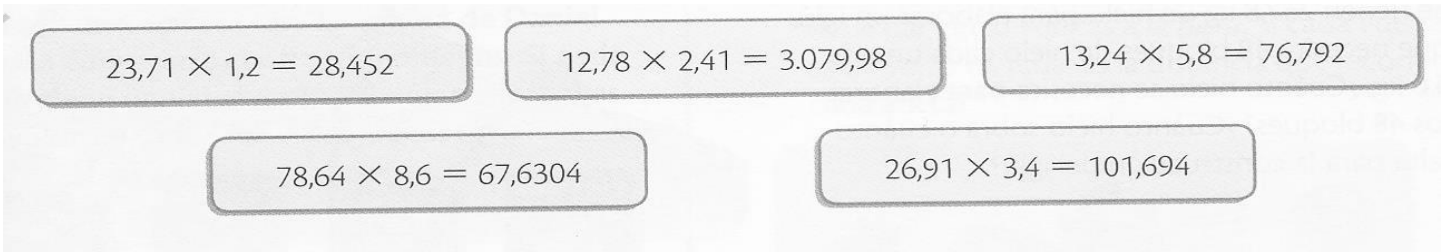
**22.22 meters per second.**

a. **How much more does the cheetah runs than the pronghorn? Please justify your answer.**
b. **What is the difference between the speeds of the first and the third fastest animal in the world?**

**HOTS**

3. **Evaluate and correct.**

**Without doing the multiplications determine which ones**



**are not correct.**

a. **Why can you determine which multiplications are not correct? Please justify.**
b. **Write the correct answers when the multiplications are not correct.**

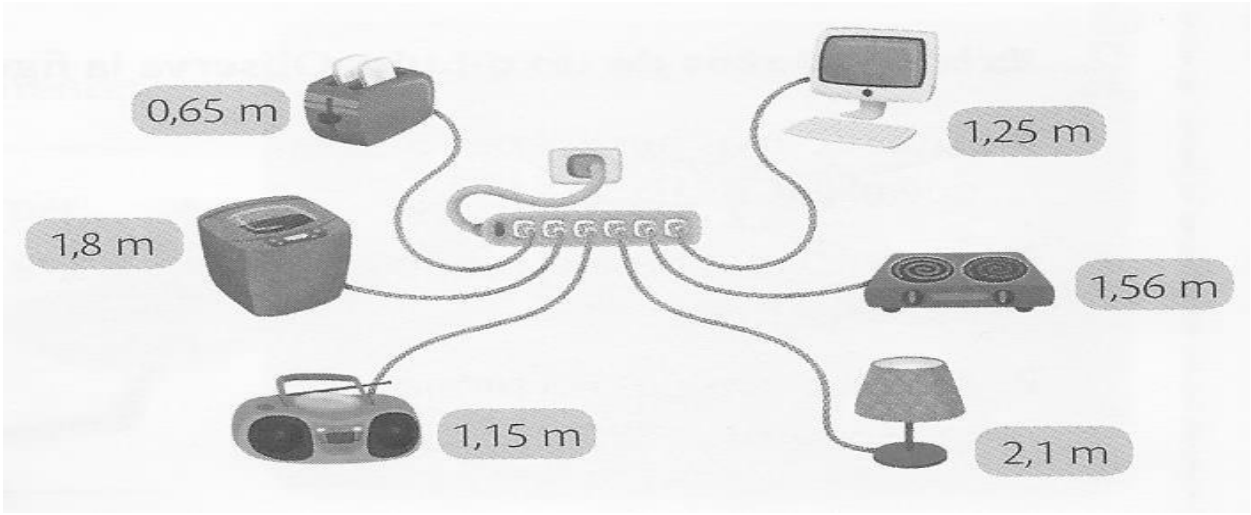
4. **Solving a problem.**

**Each one of Juan´s horses eats in a week one and a half bags of food. Each bag has 47.75 kg.**

a. **How many kilograms of food does each horse eat in a week?**
b. **In order to feed all the horses in one week, how many kilograms of food does Juan need?**
c. **How many kilograms of food does Juan have to buy in order to feed all the horses in one month?**

5. **Creating a problem.**

**Using the lengths of the different cables please create and solve an addition problem. Remember to use the steps. (Understand, plan, solve and check).**


0,65 m
1,25 m
1,8 m
1,56 m
1,15 m
2,1 m

**10.4. Appendix 4:** The grocery store project.

## 10.5. Appendix 5: Training material sample

### Making Content Comprehensible—
### 2. Building Background

- ✓ There is a strong correlation between vocabulary knowledge and student achievement
- ✓ Select fewer key terms to focus on
- ✓ **Explicitly teach "school language"**—*ex. Identify, compare, summarize, define…*

**1. Contextualizing Key Vocabulary:**
Review the content and select key terms that are critical to understanding the lesson's most important concepts. The teacher

- Introduces and defines terms simply and concretely
- Demonstrates how terms are used in context
- Explains use of synonyms, or cognates to convey meaning

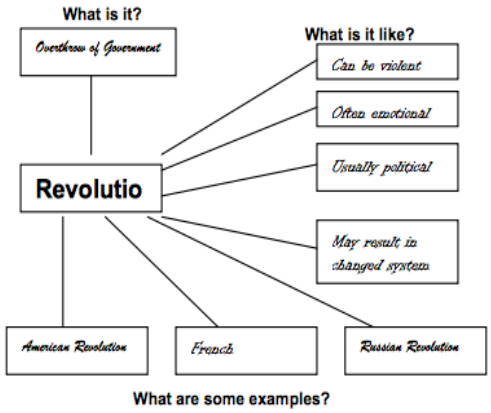
**2. Vocabulary Self-Selection:**
After reading a content text, students self select vocabulary they think is essential to the understanding the content concepts.

- Words are selected by individuals, partners, or teams
- Shared, discussed, and agreed upon by whole class
- Empowers students in choosing the most appropriate key vocabulary

**3. Personal Dictionaries:**
Personal dictionaries are created as an individual vocabulary and spelling resource for students.

- Students read text in partners or teams and select unknown words
- Teacher works with teams to review each student's personal dictionary and providing clarifications where needed

**5. Concept Definition Map**
A simple graphic system used to discuss complex concepts and clarify the meaning of a concept.
Ex: Concept Definition Map—*Revolution*




**6. Cloze Sentences:**
Used to teach and review content vocabulary **in context.**

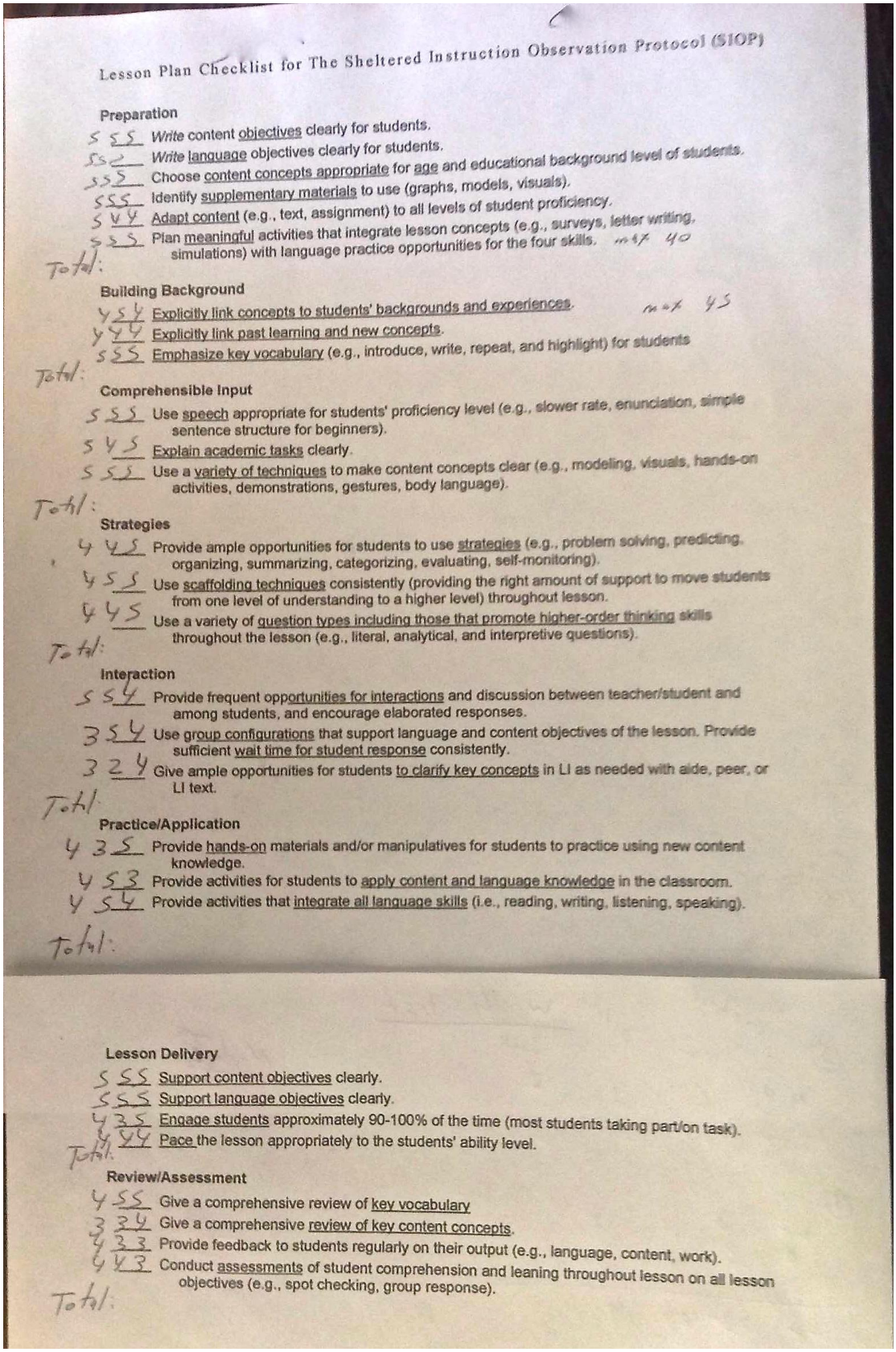
- Teacher chooses a sentence that has a strong contextual support for the vocabulary focus word.
- Possible replacement words are brainstormed
- Teacher assists students in choosing correct word

Ex: During a _____ a group of people tries to overthrow an existing government or social system. *(revolution)*

**7. Word Sorts:**
Students categorize words or phrases (previously introduced) and sorts them according to meaning, structure, word endings, or sounds. This reinforces word relationships, spelling, and word structure.
Ex: Word Sort by endings—***American Revolution***

| -tion | -sion | -tation |
|---|---|---|

## **10.6. Appendix 6:** Lesson plan checklist



Lesson Plan Checklist for The Sheltered Instruction Observation Protocol (SIOP)

**Preparation**

5 5 5 *Write* content objectives clearly for students.
5 5 4 *Write* language objectives clearly for students.
5 5 5 Choose content concepts appropriate for age and educational background level of students.
5 5 5 Identify supplementary materials to use (graphs, models, visuals).
5 4 4 Adapt content (e.g., text, assignment) to all levels of student proficiency.
5 5 5 Plan meaningful activities that integrate lesson concepts (e.g., surveys, letter writing, simulations) with language practice opportunities for the four skills.

Total: max 40

**Building Background**

4 5 4 Explicitly link concepts to students' backgrounds and experiences.
4 4 4 Explicitly link past learning and new concepts.
5 5 5 Emphasize key vocabulary (e.g., introduce, write, repeat, and highlight) for students

Total: max 45

**Comprehensible Input**

5 5 5 Use speech appropriate for students' proficiency level (e.g., slower rate, enunciation, simple sentence structure for beginners).
5 4 5 Explain academic tasks clearly.
5 5 5 Use a variety of techniques to make content concepts clear (e.g., modeling, visuals, hands-on activities, demonstrations, gestures, body language).

Total:

**Strategies**

4 4 5 Provide ample opportunities for students to use strategies (e.g., problem solving, predicting, organizing, summarizing, categorizing, evaluating, self-monitoring).
4 5 5 Use scaffolding techniques consistently (providing the right amount of support to move students from one level of understanding to a higher level) throughout lesson.
4 4 5 Use a variety of question types including those that promote higher-order thinking skills throughout the lesson (e.g., literal, analytical, and interpretive questions).

Total:

**Interaction**

5 5 4 Provide frequent opportunities for interactions and discussion between teacher/student and among students, and encourage elaborated responses.
3 5 4 Use group configurations that support language and content objectives of the lesson. Provide sufficient wait time for student response consistently.
3 2 4 Give ample opportunities for students to clarify key concepts in LI as needed with aide, peer, or LI text.

Total:

**Practice/Application**

4 3 5 Provide hands-on materials and/or manipulatives for students to practice using new content knowledge.
4 5 3 Provide activities for students to apply content and language knowledge in the classroom.
4 5 4 Provide activities that integrate all language skills (i.e., reading, writing, listening, speaking).

Total:

**Lesson Delivery**

5 5 5 Support content objectives clearly.
5 5 5 Support language objectives clearly.
4 3 5 Engage students approximately 90-100% of the time (most students taking part/on task).
4 4 4 Pace the lesson appropriately to the students' ability level.

Total:

**Review/Assessment**

4 5 5 Give a comprehensive review of key vocabulary
3 3 4 Give a comprehensive review of key content concepts.
4 3 3 Provide feedback to students regularly on their output (e.g., language, content, work).
4 4 3 Conduct assessments of student comprehension and leaning throughout lesson on all lesson objectives (e.g., spot checking, group response).

Total:

**SIOP LESSON PLANNING SHEET**

**Name:** _____ **Date:** _____
**Assignment:** _____

**Lesson Preparation**

☐ *1. Write* content objectives clearly for students.
☐ *2. Write* language objectives clearly for students.
☐ 3. Choose content concepts appropriate for age and educational background level of students.
☐ 4. Identify supplementary materials to use (graphs, models, visuals).
☐ 5. Adapt content (e.g., text, assignment) to all levels of student proficiency.
☐ 6. Plan meaningful activities that integrate lesson concepts (e.g., surveys, letter writing, simulations, constructing models) with language practice opportunities for reading, writing, listening, and/or speaking.

**Building Background**

☐ 7. Explicitly link concepts to students' backgrounds and experiences.
☐ 8. Explicitly link past learning and new concepts.
☐ 9. Emphasize key vocabulary (e.g., introduce, write, repeat, and highlight) for students.

**Comprehensible Input**

☐ 10. Use speech appropriate for students' proficiency level (e.g., slower rate, enunciation, and simple sentence structure for beginners).
☐ 11. Explain academic tasks clearly.
☐ 12. Use a variety of techniques to make content concepts clear (e.g., modeling, visuals, hands-on activities, demonstrations, gestures, body language).

**Strategies**

☐ 13. Provide ample opportunities for students to use strategies, (e.g., problem solving, predicting, organizing, summarizing, categorizing, evaluating, self-monitoring).
☐ 14. Use scaffolding techniques consistently (providing the right amount of support to move students from one level of understanding to a higher level) throughout lesson.
☐ 15. Use a variety of question types including those that promote higher-order thinking skills throughout the lesson (literal, analytical, and interpretive questions).

**Interaction**

☐ 16. Provide frequent opportunities for interactions and discussion between teacher/student and among students, and encourage elaborated responses.
☐ 17. Use group configurations that support language and content objectives of the lesson.
☐ 18. Provide sufficient wait time for student responses consistently.
☐ 19. Give ample opportunities for students to clarify key concepts in L1 as needed with aide, peer, or L1 text.

**Practice/Application**

☐ 20. Provide hands-on materials and/or manipulatives for students to practice using new content knowledge.
☐ 21. Provide activities for students to apply content and language knowledge in the classroom.
☐ 22. Provide activities that integrate all language skills (i.e., reading, writing, listening, and speaking).

**Lesson Delivery**

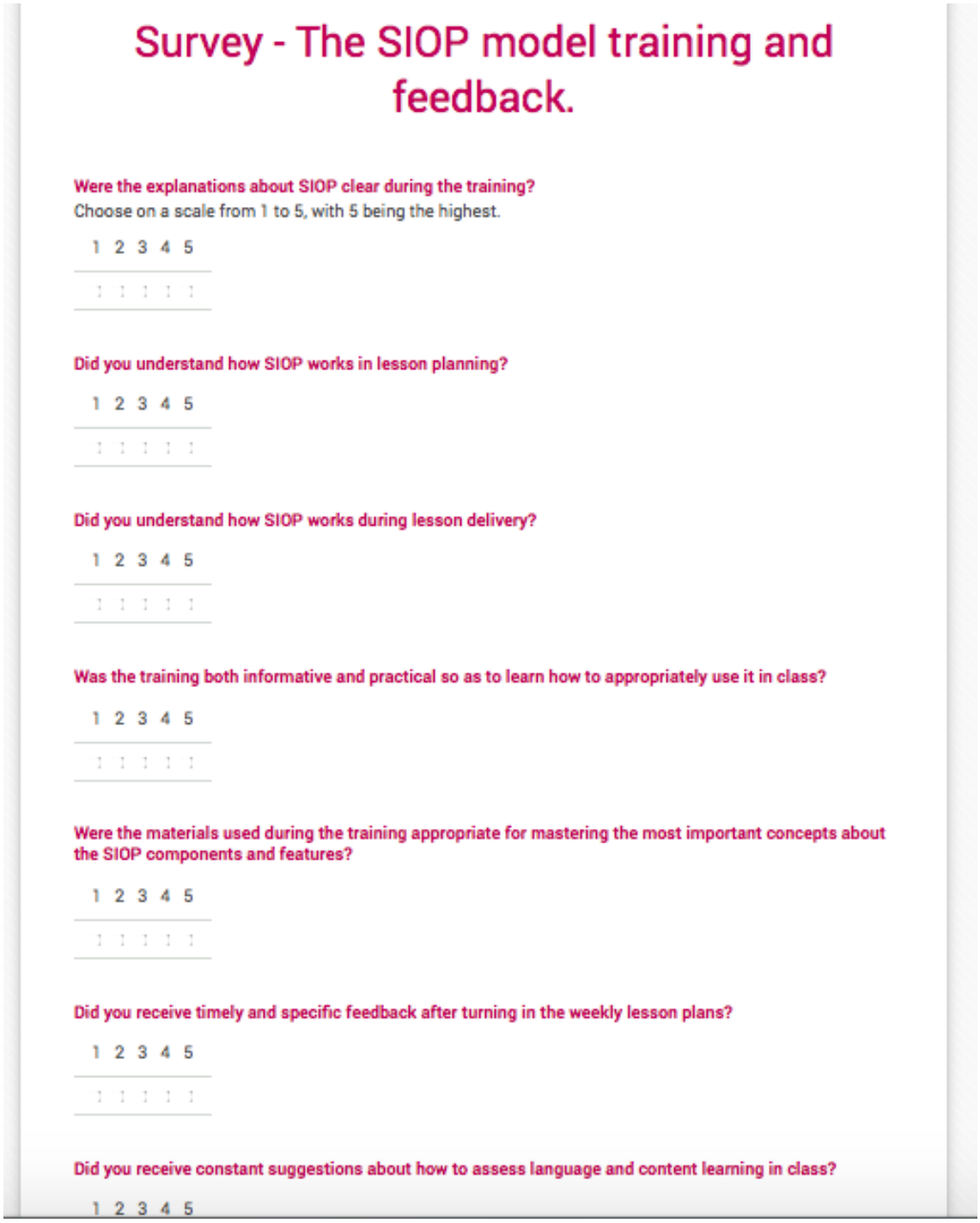
☐ 23. Support content objectives clearly.

☐ **24. Support language objectives clearly.**
☐ **25. Engage students approximately 90-100% of the period (most students taking part and on task throughout the lesson).**
☐ **26. Pace the lesson appropriately to the students' ability level.**

### Review/Assessment

☐ **27. Give a comprehensive review of key vocabulary.**
☐ **28. Give a comprehensive review of key content concepts.**
☐ **29. Provide feedback to students regularly on their output (e.g., language, content, work).**
☐ **30. Conduct assessments of student comprehension and learning throughout lesson on all lesson objectives (e.g., spot checking, group response.)**

## **10.7. Appendix 7:** Questionnaire on google forms.



# Survey - The SIOP model training and feedback.

**Were the explanations about SIOP clear during the training?**
Choose on a scale from 1 to 5, with 5 being the highest.

1 2 3 4 5

**Did you understand how SIOP works in lesson planning?**

1 2 3 4 5

**Did you understand how SIOP works during lesson delivery?**

1 2 3 4 5

**Was the training both informative and practical so as to learn how to appropriately use it in class?**

1 2 3 4 5

**Were the materials used during the training appropriate for mastering the most important concepts about the SIOP components and features?**

1 2 3 4 5

**Did you receive timely and specific feedback after turning in the weekly lesson plans?**

1 2 3 4 5

**Did you receive constant suggestions about how to assess language and content learning in class?**

1 2 3 4 5