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Effective ELL Instruction and the SIOP Model: A Comparative Analysis

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Abstract

Although English language learners (ELL) constitute the fastest growing segment of the
U.S. student population, the majority of teachers are not prepared to meet the instructional needs
of students learning English as a second language. The Sheltered Instruction Observation
Protocol (SIOP) model has been a popular way of delivering ELL content instruction. I will be
drawing comparisons and determining differences between the SIOP instructional model and
what current research identifies as effective ELL instruction. The goal of this research is to
identify possible benefits or drawbacks to using the SIOP model to teach academic language to
English Language Learners, as well as identify any biases which may exist in the model. I will
be conducting a content analysis of the literature by coding the text of selected studies in order to
identify underlying themes and biases. I will then compare my findings to the contents of the
SIOP manual. The potential benefit of conducting this research is to provide school districts
with critical analysis of the SIOP model using current research regarding ELL instruction.

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I conducted this content analysis with the intent to add something of value to the existing body of research on effective instruction for English language learners. While doing a review of the literature I chose the Sheltered Instructional Observational Protocol model (Echevarria, Vogt, & Short, 2017) as the focus of my approach. It provided me with a subject that has been as widely used as it has been researched. In the following paper I analyze current independent research studies which focus on effectiveness of content instruction for ELLs and compare their findings to the SIOP model.

Purpose

Although English language learners (ELLs) constitute the fastest growing segment of the U.S. student population, the majority of teachers are not prepared to meet the instructional needs of students learning English as a second language. According to the National Center for Education Statistics (2019), the number of ELLs in the United States public school system jumped from 3.8 million students in the year 2000 to 4.9 million students by the year 2016, and they account for 9.6% of total enrollment in K-12 schools. The rising trend poses a challenge to school systems charged with educating these students. I began my research with an interest in discovering how public-school teachers can provide high-quality literacy education for students learning English as a second language in general education elementary classrooms. I have since narrowed my focus to a specific method referred to as Sheltered Instruction Observation Protocol (SIOP), a research-based instructional model for ELLs that has been in use since 2003. The SIOP model is the product of studies conducted by Echevarria, Vogt, and Short who also authored the manual. The Center for Applied Linguistics (2016) currently offers teacher professional development workshops available to school districts located in all 50 states that focus on how to effectively implement the SIOP instructional model. Furthermore, the SIOP

publisher, Pearson (2019) offers monthly workshops which provide the option of on-line or in-person sessions. The importance of studying an instructional model which is so widely used, and invested in, is to interpret whether it is a successful model or merely a popular one.

The objective of sheltered instruction is two-fold: to make grade-level content accessible, and to develop English language proficiency (Echevarria, Vogt, & Short, 2017). To do so, SIOP employs an observation protocol for both lesson plan design and execution, as well as for rating the fidelity of lesson delivery against the model (Echevarria, Vogt, & Short, 2017). The goal of conducting a content analysis is to identify possible strengths and weaknesses to using the SIOP model for ELL academic language instruction, as well as identify any biases which may exist in the literature or the instructional model. I hope to be able to draw comparisons and determine differences between this model and what current research identifies as effective ELL academic language instruction.

Problem Statement

What are the potential benefits or drawbacks to using the SIOP Model to teach academic content to English Language Learners?

Rationale for the Study

The SIOP Model is one of many methods used by school districts across the United States in an effort to meet the needs of the growing ELL population among students. While studies conducted by the developers of the model (Short et al., 2011) suggest there is a positive relationship between implementation of the SIOP Model and academic language achievement for ELLs, more studies are necessary to explore what works best when teaching literacy to English Language Learners (August & Shanahan, 2010).

Definitions

Center for Research on the Educational Achievement and Teaching of English Language Learners (CREATE) A national research and development center with a program of research designed to address the critical challenge of improving educational outcomes of English learners in content area classrooms (Center for Applied Linguistics, 2016).

Content Vocabulary The key words and terms associated with a particular topic being taught (Echevarria et al., 2017).

English Language Learners (ELLs) Any student learning English as a second language.

IDEA Language Proficiency Test A family of standardized tests which measure English learners' proficiency in oral language, reading, and writing. The data are used to provide placement information for instructional programs, to monitor progress in English development, and to provide diagnostic information for program planning (Ballard & Tighe, 2020).

Illinois Measure of Annual Growth in English (IMAGE) A standardized reading and writing assessment used to assess English Language proficiency in students who have been identified as Limited English Proficient. There are three test forms which each span three grades: 3-5, 6-8, and 9-11. The reading portion of the test is administered in two 40-minute sessions during which students answer questions addressing literal reading comprehension, inference, and critical thinking skills. All questions include five possible multiple-choice answers of which up to three may be correct. The writing portion of the test is also administered in two 40-minute sessions, over the course of which students respond to four different kinds of prompts: descriptive, narrative, expository, and persuasive. Trained readers score essays against a rubric which covers the range of writing skills from beginning to skilled communication (Illinois State Board of Education, 2004, pp. 1-2).

Predictive Assessment Scales (PAS) Test A series of equivalent assessments designed to match, predict, and improve the knowledge and skills tested by state standards aligned to nationally normed and state criterion tests (McIntyre et at., 2010, p.341).

Sheltered Instruction A method for developing academic English and providing English learners access to core content coursework in grades k-12. In sheltered content instruction classes, the curricula are tied to the state subject area standards, such as the Common Core, and the students may be all English learners or mixed with native English speakers (Echevarria et al., 2017).

SIOP Sheltered Instruction Observational Protocol

Teaching English to Speakers of Other Languages (TESOL) Refers to the international professional association, the profession, and the field itself (Jacobson, R., 1970). Standards developed by the TESOL international association address the need for consistency in the way English is taught as a second or foreign language (TESOL International Association, 2020).

Literature Review

How can we begin to meet the needs of our growing ELL student population? Calderón et al. (2011) suggest that improved teacher preparation and professional development programs are a crucial part of bridging the achievement gap between native and non-native English speakers. I will begin a review of the literature by explaining what the SIOP model is, followed by the history and efficacy of the model. Then I will present what research tells us about effective ELL instruction in general. For example, Calderón et al. (2011) identify formative assessment, on-going teacher training for ELL instruction, classroom management, and leadership as the elements of effective practice for teachers of English learners. Finally, I will examine what research tells us about training teachers to use and sustain the SIOP model.

About the SIOP Model

Developed to align with state and national standards of learning, the Sheltered Instruction Observational Protocol (SIOP) is an approach used for making instruction understandable for English learners while at the same time developing their academic language and literacy skills (Echevarría et al., 2017). Sheltered instruction is a method that may be used in any content area class, like Science or fourth grade, which are composed of all English learners or mixed with native English speakers. The SIOP model includes an observational tool used to measure the implementation of the model, and a manual which explains the 30 features of SIOP alongside examples of how to incorporate them into a lesson. Each feature is organized under one of the following 8 components: lesson preparation, building background, comprehensible input, strategies, interaction, practice and application, and lesson delivery. For example, feature 7 (Concepts explicitly linked to students' background experiences) falls under the building background component (Echevarría et al., 2017). The manual, which was developed to serve as

a guide to the observational protocol, provides an explanation for each of the 30 features of the

SIOP model, examples of how to implement them in the classroom, lesson plan templates, and

practice exercises for using the observational protocol to rate lessons. Teacher training for using

the SIOP model is available and recommended for districts wanting to implement it (Pearson,

2010).

       Using the SIOP model requires at least two people who are trained on it. First, the

teacher who is delivering a lesson plan to be evaluated, and second, the person observing and

scoring the lesson against the SIOP score sheet. The score sheet lists the 30 features of SIOP

with possible scoring responses and room for comments. A 5-point scale is used for rating the

degree to which each feature is implemented during a lesson. A score of 4 indicates a feature

was implemented effectively, a 2 indicates a feature was somewhat present but was not effective,

and a score of 0 indicates a feature was not implemented at all (Echevarría et al., 2017). The

observational protocol facilitates constructive feedback for teachers so through practice they may

design their lesson plans in a way more consistent with the model (Short, 2013). This does not

require teachers to abandon all of the strategies they previously used and start over. Instead, this

model guides educators to bring together what to teach by providing a framework for how to

teach it (Echevarría et al., 2017, p. 23).

       The SIOP Model (Echevarría et al., 2017) prepares teachers to intentionally structure

their lesson plans in ways giving ELLs access to content material while at the same time

developing their English proficiency (Short, 2013). This process begins by educating teachers

about the strategies SIOP evaluates (the 30 features), which are grouped into eight components.

Lesson preparation is the first component featured in the SIOP Model and on the SIOP score

sheet. These strategies are meant to set students and their teacher up for success: having clearly

defined content and language objectives to be displayed and reviewed with the students; content

concepts which are suitable for the age and educational background of students; using supportive

teaching materials to make the lesson clear and more meaningful; adapting content to meet the

proficiency level of each student; and incorporating meaningful activities that integrate lesson

concepts with language practice opportunities for reading, writing, listening, and/or speaking

(Echevarría et al., 2017).

Components two through six on the SIOP score sheet focus on what happens during the

lesson. The second component is building background. ELL's come from widely varied

backgrounds and many experience disadvantages because of their previous schooling

(Echevarría et al., 2017, p. 71). Strategies used in the SIOP Model to help close the gap between

what students know and what they need to learn include: explicitly linking concepts to students'

background experiences; explicitly linking past learning to new concepts; and emphasizing key

vocabulary terms (Echevarría et al., 2017, pp. 303-304). Comprehensible input is the third

component, which refers to physical and linguistic practices that make instructional delivery

more understandable by students (McIntyre et al., 2010, p. 338). These strategies include

speaking in a way which is appropriate for student's proficiency levels when conducting a

lesson, clear explanations of academic tasks, and using multiple strategies to make concepts clear

(Echevarría et al., 2017, p. 304). The fourth component of SIOP is strategies, meaning learning

strategies for students. Teacher strategies for the fourth component are to provide many

opportunities for students to use learning strategies, use scaffolding consistently throughout the

lesson to assist and support student understanding, and use varied questions or activities to

promote higher-order thinking skills (Echevarría et al., 2017, p. 305). Interaction is the fifth

component of the model. This refers to student-to-teacher interaction as well as student-to-

student interaction. The strategies for facilitating this include providing frequent opportunities for interaction and discussion, which encourage elaborated responses about lesson concepts; grouping students in ways which support language and content objectives of the lesson (whole group, small group, or individual work depending on the goals); allowing students sufficient time to respond; and ample opportunities for students to clarify information in their first language (Echevarría et al., 2017, pp. 305-306). The sixth component of SIOP is practice & application, which includes the following strategies: providing hands-on materials and manipulatives for students to practice using new content knowledge (e.g. having third graders build a simple machine after they learn about the different types and how they work); providing activities for students to apply content and language knowledge in the classroom; and providing activities which require students to use reading, writing, listening, and speaking skills (Echevarría et al., 2017, pp. 306-307).

The final two components of the SIOP Model focus on how well the lesson went was presented by the teacher, and strategies for assessing student progress. Lesson delivery is the seventh component, which includes scoring on the following: content and language objectives were clearly supported by the lesson, there were high levels of student engagement, and the lesson was paced appropriately for the learners (Echevarría et al., 2017, p. 307). The eighth component, review and assessment, includes the following strategies: conducting a comprehensive review of key vocabulary and content concepts, providing students with regular feedback on their work and language use, and assessing student comprehension and learning of all lesson objectives (Echevarría et al., 2017, p. 308).

History and Efficacy of the SIOP Model

The development of the SIOP Model was sponsored by the Center for Research on Education, Diversity, and Excellence (CREDE), which was funded by the U.S. Department of Education from 1996 through 2003. This was part of a larger initiative to assist the nation's diverse student population in achieving academic excellence. Researchers Echevarria, Vogt, and Short (2017) collaborated to identify instructional features of high-quality sheltered lessons with the goal of developing an explicit model of sheltered instruction (Center for Applied Linguistics). The result was a means for an observer to measure the implementation of sheltered instruction, the Sheltered Instruction Observation Protocol. Variations of the model were field-tested by middle-school teachers over a four-year period, the effects of which were monitored by researchers and lead to the expansion of the SIOP tool to include a lesson planning and delivery approach, which is now called the SIOP Model (Short, D., Echevarria, J. & Richards-Tutor, C. 2011). The Center for Applied Linguistics is currently conducting research on the SIOP Model by facilitating professional development on the SIOP Model and examining the effects of SIOP-based instruction on student achievement in core content areas and in English language development (Center for Applied Linguistics, 2018).

Three subsequent studies grew out of the initial SIOP Model development study, which expanded the scope of research to eventually include measures of implementation fidelity of the SIOP Model as well as the effectiveness of the Model in regard to student achievement. The first of these studies, incorporated the use of a five-point scale by which to measure the implementation of each of the 30 instructional features of the SIOP Model (Short, Echevarria & Richards-Tutor, 2011, p. 365). This has remained the means for measuring the fidelity of SIOP Model implementation. The researchers, Echevarria, Short, and Powers (2006), wanted to know if there were significant differences in achievement data between students who received

instruction from teachers who had been trained to implement the SIOP model and students who received instruction from teachers who were not trained to implement the model. This quasi-experimental study included 19 teachers who had received training for the SIOP model and four comparison teachers. The Illinois Measurement of Annual Growth in English (IMAGE) reading and writing assessment was used to measure academic literacy for the 1998-1999 school year. The purpose of this test is to accurately assess English language proficiency in students who have been identified as Limited English Proficient (Illinois State Board of Education, 2004, p. 1). A pre-test and post-test were administered to participants who were ELLs in grades 6-8 sheltered classes. The findings revealed students who had received instruction from teachers who had trained in the SIOP model made gains over the comparison group in all five areas of the test, three of which showed statistical significance (Short et al. 2011, pp. 365-367).

To expand upon these findings another quasi-experimental study was conducted which measured the effects of the SIOP Model on middle-school and high-school students' academic achievement, as well as assessing the SIOP Model teacher training offered in the 2004-05 and 2005-06 school years (Short et al. 2011, p. 367). Short, Fidelman, and Louguit (2012) wanted to know if ELLs receiving instruction from teachers who received training for the SIOP model showed significant gains on standardized tests as compared to ELLs with teachers who did not receive training for the SIOP model. They also wanted to find out how well teachers implemented the SIOP model after receiving professional development in SIOP over the course of two years (Short et al., 2011, p. 367). Academic literacy achievement was measured using the IDEA Language Proficiency Tests (IPT), which are aligned to teaching English to speakers of other languages (TESOL) standards. Participants of the study were secondary school teachers and students located in two demographically similar New Jersey school districts (Short et al.,

2011, p. 368). The results of the research show teachers who received professional development in the SIOP Model implemented more features than comparison teachers, showing significantly higher levels of implementation after the second year of sustained training. For this reason, student data from the second year of the study were used to measure English language achievement. Students who received instruction from SIOP teachers in the second year had significant gains over the comparison group in oral proficiency level, writing proficiency level, and total proficiency level (Short et al., 2011, pp. 370-371). SIOP students displayed gains in reading proficiency as well, although not significantly more than the comparison group. This indicated that receiving instruction from SIOP-trained teachers had a positive impact on ELL students' English language achievement (Short et al., 2011).

The final study in this series built upon previous research by expanding the program to include an experimental design, a focus on middle-school science, investigation into the time necessary for teachers to become effective implementors of the SIOP Model, and the participation of native English speakers and former ELLs to be used in the analysis. It was conducted by researchers at California State University Long Beach, the Center for Applied Linguistics, and the University of Houston (Echevarría, Richards-Tutor, Chinn & Ratleff 2011). It was sponsored by the Center for Research on the Educational Achievement and Teaching of English Language Learners (CREATE) and funded by the US Department of Education. This time, researchers wanted to know what effects the SIOP model had on acquisition of academic language and science concepts among English language learners in middle-school science classrooms (Short et al. 2011). The project was developed in two phases. In the first phase a pilot study was conducted in order to modify science units to incorporate the SIOP model. The second phase was a randomized study of eight middle schools within the same district of

southern California, all with moderate to large percentages of ELLs. Teachers in five of the

schools received instruction for the SIOP model and were given the modified SIOP science units

to use. The other three schools served as the control group and teachers did not receive

instruction or units for the SIOP model. Students receiving instruction from both groups of

teachers completed a pre-test of the Center for Research on the Educational Achievement and

Teaching of English Language Learners (CREATE) science language assessments at the

beginning of each unit. These results were compared to post-test scores for both groups in order

to measure growth in language acquisition specific to science content being taught. The results

of the study show students who received instruction from teachers who had undergone training

for the SIOP model showed higher levels of achievement for the essay and non-essay portions of

the assessment than students in the control group but not to a significant degree (Short et al.

2011). The researchers also found that not all teachers who received training for the SIOP model

had implemented it with fidelity. Students who received instruction from high-level

implementors of the SIOP model scored significantly better on the post-assessments than

students who did not receive instruction from teachers trained with the model, which suggests a

positive correlation between implementation fidelity of the SIOP Model and student achievement

outcomes for standardized language assessments (Short et al. 2011).

Effective ELL Instruction

Recent studies have identified the integration of language, literacy, and content to be

helpful for developing English Language Learners (ELL) literacy skills. Calderón, Slavin, and

Sánchez (2011) state the ultimate goal for students who are learning English as a second

language is to become proficient both in English and in core content; meaning ELLs have to

learn English while at the same time mastering the grade level academic content required by

state standards. However, despite the rising population of students learning English as a second language, school districts are not prepared to meet the needs of ELLs. The resulting achievement gap between native and non-native English speakers persists, sometimes through multiple generations. In their review of prior research, Calderón et al. (2011) emphasize the importance of content vocabulary accompanied by explicit comprehension strategy instruction, discussion beyond the text to develop language comprehension skills, writing to strengthen knowledge of vocabulary, technology as a tool to support learning, and formative assessments to track progress and understand the needs of the learner. They suggest these strategies would accelerate the rate at which students learn English as a second language, therefore offering a more efficient way to teach English as a second language.

To gain a deeper understanding of language acquisition Dixon, et al. (2012) assessed research contributions on the subject of second language learners and teachers from the perspectives of foreign language educators, child language researchers, sociocultural researchers, and psycholinguists. Five questions frame their research to address: 1) what are the optimal conditions for second language acquisition; 2) characteristics of excellent or unsuccessful second language learners; 3) characteristics of excellent or unsuccessful second language teachers; 4) reasonable expectations for speed and accomplishment for second language learners of different ages; and, 5) if information generated by the four research perspectives has influenced the formulation of educational policies for second language learners (Dixon et al., 2012). Optimal conditions for second language acquisition include a strong literacy connection at home, frequent exposure to book reading, and the amount of time devoted to second language learning instruction, among others (Dixon et al., 2012). Characteristics of instructional models structured specifically for second language learners were found to influence outcomes of language

acquisition as well. As an example of this, Dixon et al. (2012) cited research on the SIOP model by McIntyre et al. (2010). Individual learners' aptitudes for learning a second language as well as motivation to learn the language were the characteristics found to have the most significant relationship to second language acquisition outcomes for students (Dixon et al., 2012). Attributes of successful teachers include proficiency in the second language being taught to students, a desire to teach well, organized classroom instruction, and a certain degree of proficiency in students' first language. Although there are some emergent themes in successful teacher characteristics, Dixon et al. (2012) suggest more research should be done from a sociocultural perspective to provide a balance of viewpoints.

Training and Sustaining the SIOP Model

Short (2013) provides a guide for districts to implement effective sheltered instruction training for in-service teachers. She proposes the rigor of teacher professional development should mirror increasingly rigorous academic achievement expectations for students. Seven elements are identified as being necessary for rigorous professional development: 1) Using empirically validated intervention focused on the knowledge and skills teachers need to work with English learners; 2) Give teachers time to get good at it; 3) Design the program to be job-embedded in both presentation and practice; 4) Provide plenty of support; 5) Explain the theories that undergird the intervention; 6) Engage the school administration; and 7) Employ a means to measure teacher implementation (Short, 2013, pp. 121-125). The SIOP model is used as the example for each of these elements.

McIntyre, Kyle, Chen, Munoz, and Beldon (2010) conducted a study to find out if training teachers to use the SIOP model was directly benefiting students. They examined reading achievement of elementary ELLs in classrooms in which teachers implemented to SIOP

model of instruction compared to students of teachers who had not received instruction in the model (McIntyre et al., 2010, p.342). Twenty-three teachers participated in this study, ranging from kindergarten to upper elementary grades; however, 18 of them taught in grades 3 through 5. Participants varied widely in teaching experience (McIntyre et al., 2010). The professional development, which took place over the course of 18 months, focused on one of the eight components of SIOP at a time. For example, one workshop would go in depth for building background, while the next would focus on comprehensible input. Lesson plan examples showcased how the different components of the model worked together. Teachers who participated in the training were observed and evaluated both before and after receiving the training.

Of the twenty-three teachers participating in the study only seven teachers were found to have implemented the SIOP program with fidelity in their classes. Student achievement was only measured in these seven classrooms, with a total of 50 students. The target sample of 50 students was matched against 59 students whose teachers who did not participate in the training. The reading portion of the Predictive Assessment Scales (PAS) test was used to measure student achievement. McIntyre et al. (2010) found student scores to represent a significant difference in ELL student achievement for classes receiving the fully implemented SIOP model, versus those students not served by the model at all. Using pre- and post-PAS tests of reading comprehension with a paired-sample t-test, McIntyre et al. (2010) found that the SIOP treatment group made a 5.28 simple linear gain in test scores while the control group had a loss of .80. Although, less than a third of teacher participants in this study fully implemented the SIOP model, McIntyre et al. (2010) noted all participants did grow in their ability to implement the SIOP model to some degree as a result of the trainings.

Once teachers have been trained to implement the SIOP model, the goal becomes sustaining the practice of using SIOP. Short (2013) suggests ongoing professional development is essential for the success of any program. In order for teachers to demonstrate implementation fidelity with SIOP, Short (2013) states teachers must be allowed the time they need to adapt to and learn about the SIOP model as part of their regular workday. In a separate study, Short et al. (2011, p. 379) found teachers with SIOP training need 1-2 years of support to become effective implementers. Teachers must receive the support they require from administration in order to effectively sustain the SIOP model. Support from administration can come in many forms, including instructional coaches, learning communities, and book study groups (Short, 2013).

Methodology

I wanted to know how the SIOP model holds up to current research. Doing a content analysis of existing studies on teaching subject matter to ELLs provided me an efficient method of selecting the most effective strategies that I could locate. I followed the recommendations made by Shanahan (2000) for conducting synthesis research. These included the identification and selection of valid and trustworthy studies, as well as the development of a rigorous system of data collection and analysis (Shanahan, 2000). The studies included in the content analysis were readily available through the University of Mary Washington library databases (Bowen, 2009). Utilizing existing independent studies also made it possible to cover a variety of locations, subjects, professional development programs, and teaching strategies (Bowen, 2009).

To address my research question, I followed procedures recommended by Drisko and Maschi (2015) to conduct a qualitative content analysis of selected scholarly articles as compared to the SIOP manual (Echevarria et al., 2008). I utilized critical case sampling in my selection of independent research studies. Critical cases are those which provide "particularly valuable perspectives and insights" (Drisko & Maschi, 2015, p.99). With this as my goal, I

selected studies representing a variety of teaching strategies which produced statistically significant gains in student output as compared to a control group. I selected scholarly journal articles reporting original research to use in my analysis by searching databases such as ERIC, Education Research Complete and Education Full Text, using the key terms: English language learners, sheltered instruction, English as a second language, academic language, and literacy outcomes. I selected 7 of the most recently published peer-reviewed education studies, looking specifically at ELL instructional methods for teaching academic language that the research demonstrates are most effective. The studies included are of K-12 ELLs in content area classrooms and measure progress by assessment while using a comparison group. The selection criteria provided me with relatively current studies that focus on assessing ELL student academic language learning outcomes. I focused on effectiveness of instruction methods in the research so that I could draw direct comparisons to the SIOP instructional model.

I immersed myself in the selected materials in order to gain understanding of the study as a whole, and identified emergent themes (Drisko & Maschi, 2015, p.102). For the analysis, I used a coding frame with thematic categories such as setting, subjects, methodology, treatment, and process. These are among the seven categories for classifying study features recommended by Shanahan (2000), which I used with the intention of limiting researcher bias in my own analysis. The qualitative themes for the coding frame include key concepts identified through a review of the literature, including but not limited to: Teacher training (Short, 2013), formative assessment (Calderon et al. 2011), and implementation fidelity (McIntyre et al. 2010). Subcategories were recorded within each theme in order to identify nuance among the data set (Drisko & Maschi, 2015). These are the data I used to compare my analysis of the literature to the SIOP instructional model (Echevarria et al. 2008).

Research Question

How does the SIOP teaching model compare to what independent research says are the most effective strategies for teaching academic language to ELL students?

Data Collection and Analysis

The following study characteristics (Shanahan, 2000) were coded as subdomains, and aided in selection of articles to be used in the content analysis: report identification, subjects, setting, methodology, treatment, process, and effect size. Each article was coded for study features in order to 1) ensure the studies included met the criteria for selection, and 2) identify themes across the literature to be coded. The subdomains of study features were not directly used in the analysis of the SIOP model, however, the themes and subdomains derived from the study features were. I began the process of data collection by identifying themes found in my literature review including, but not limited to, classification of study characteristics (Shanahan, 2000), implementation fidelity (Short, Echevarría & Richards-Tutor, 2011), professional development (Short et al., 2011), (Short, 2013), ESL strategies (Calderón et al., 2011), and optimal conditions for second language acquisition (Dixon et al., 2012). Subdomains within themes were established through review of the seven research studies included in the content analysis. These included subdomains such as comprehensible input (McIntyre et al., 2010), questioning strategies (Tong et at., 2014), and scaffolding (August et al., 2018). Once the 8 major themes and 42 subdomains were identified, I used them to code the methods and results of selected research studies. I analyzed the coded data by looking for patterns, such as identifying domains and subdomains which applied to all studies and identifying subdomains which were drawn from the literature review, but not coded for in the studies used. This is the information I used to guide my comparison of the research to the SIOP model.

Coding Framework

Theme	Subdomain
(1) Study Features	
	(10) Report Identification
	(11) Subjects
	(12) Setting
	(13) Methodology
	(14) Treatment
	(15) Process
	(16) Effect Size
(2) Professional Development	
	(17) Teacher Training
	(18) Empirically validated intervention focused on the knowledge and skills teacher need to work with ELLs
	(19) Time to get good at it
	(20) Program is job-embedded in presentation and practice
	(21) Support Provided
	(22) Underlying Theories Explained
	(23) Engage administration
	(24) Employ a means to measure teacher implementation
(3) Implementation Fidelity	
	(25) Fidelity measure
	(26) Interrater agreement
	(4) Formative Assessment
	(27) Review
	(28) Teacher feedback
	(29) Student feedback
(5) ESL Strategies	
	(30) Questioning strategies
	(31) Building background
	(32) Opportunities for collaborative group work
	(33) Use of manipulative and realia
	(34) Advanced organizers
	(35) Scaffolding
	(36) Content vocabulary
	(37) Explicit comprehension strategy instruction
	(38) Connecting academic language to content
	(39) Discussion beyond the text
	(40) Opportunities for speaking and writing
	(41) Technology as a support

(6) Optimal conditions for second language acquisition
                          (42) Strong literacy connection at home
                          (43) Frequent exposure to book reading
                          (44) Time devoted to second language learning

(7) Teacher attributes
                          (45) Proficiency in language being taught
                          (46) Desire to teach well
                          (47) Organized instruction
                          (48) Certain degree of proficiency in student L1

(8) Lesson Attributes
                          (49) Align with state and/or national standards
                          (50) Include activities that require higher-order thinking
                          (51) Preparation
                          (52) Comprehensible Input

When analyzing the coded data, I was able to see that five of the seven studies included some form of professional development for teachers in the treatment group. Of those five studies, all employed a means to measure teacher implementation of the intervention or model, and four included in-person teacher training as part of the professional development. The SIOP model employs a 0-4 scale to score each of the 30 features and offers professional development opportunities for training on the model, as well as a manual which provides detailed descriptions and examples of the 30 features.

Next, I analyzed the subdomains for the implementation fidelity theme and found all seven studies included some form of fidelity measure, however, only five of them established interrater agreement. The SIOP model explains that establishing inter-rater reliability is an important part of implementing the model effectively (Echevarría et al., 2017, p.278).

Four of the seven studies included teachers providing feedback to students. Correspondingly, **"**regular feedback provided to students on their output (e.g., language, content, work" is a feature of the SIOP model included as part of the Review and Assessment component.

ESL Strategies identified by the research studies, and coded for as subdomains, include questioning strategies, building background, opportunities for collaborative group work, use of manipulatives and realia, advanced organizers, and scaffolding. The SIOP model includes features which specifically address each of the following strategies: a variety of questions or tasks that promote higher-order thinking skills, building background, grouping configurations, interaction, hands-on materials and/or manipulatives provided for students to practice using new content knowledge, and scaffolding techniques. Only the subdomain for scaffolding was coded for in all 7 studies. While the subdomain, advanced organizers, is not explicitly addressed by any feature of the model it could be interpreted as an "opportunity for students to use a learning strategy", which is reflected in feature 13 of the SIOP (Echevarría et al., 2017).

Of the six subdomains identified for efficiency in teaching English as a second language (later renamed as ESL Strategies II), content vocabulary, explicit comprehension strategy instruction, connecting academic language to content, opportunities for speaking and writing, and technology as a support were coded for (Calderón et al., 2011). Content vocabulary and opportunities for speaking and writing were coded for in all seven studies. By contrast, discussion beyond the text was the only subdomain not coded for in any of the studies. The SIOP model includes the following features which reflect the above strategies: key vocabulary emphasized, activities provided for students to apply content and language knowledge in the classroom, activities integrate all language skills, and supplementary materials used to a high degree, making the lesson clear and meaningful (e.g., computer programs, graphs, models, visuals). Explicit comprehension strategies are not a feature included in the SIOP model.

Under the theme of optimal conditions for second language acquisition, time devoted to second language learning was the only subdomain to be coded for in all seven research studies.

The SIOP model includes language objectives as a feature, which is supported by other language learning specific features such as feature 22 in the practice and application component of the model: activities integrate all language skills. It should be noted that there is not time exclusively devoted to second language learning in this model.

All four subdomains of teacher attributes (proficiency in language being taught (45), desire to teach well (46), organized instruction (47), and certain degree of proficiency in L1 (48)) were coded for at least once. However, organized instruction was the only subdomain that was coded for each of the seven studies. The lesson preparation component of the SIOP model directly addresses organization of the lesson before instruction and the lesson delivery component addresses execution of the lesson.

Finally, I analyzed the coded data for lesson attributes. These were subdomains that emerged from the studies themselves and not the literature review. Two of the four subdomains, preparation and comprehensible input, were coded for in all 7 studies. The lesson preparation component of SIOP consists of 6 features which address preparation, and the comprehensible input component includes 3 features.

Findings and Conclusions

Five of the studies used some form of professional development, and all seven utilized a measurement of implementation fidelity for the intervention being administered. Professional development and fidelity measures are not included as features on the SIOP score sheet; however, they are both integral to the model as whole. These findings suggest that professional development and fidelity measures are important factors in successfully implementing the SIOP model. Components of the SIOP model in which all features are reflected in the coding used for this content analysis include Lesson Preparation,

Comprehensible Input, Strategies, and Practice & Application. This suggests that these components of the model are strongly supported by the selected studies as being effective. Components of the SIOP model in which at least one feature is reflected in the coding include Building Background, Interaction, Lesson Delivery, and Review & Assessment. All components of the model were found to be reflected in the coding to some degree.

I also looked for subdomains which were supported by the research, but not explicitly included in the SIOP model. In comparing the SIOP model to the coded content of the research studies I discovered two subdomains which are supported by the research, but not clearly supported by the SIOP model: advanced organizers and time exclusively devoted to second language learning. While advanced organizers (34) are not explicitly addressed by any feature of the model it could be considered an opportunity for students to use a learning strategy, which is reflected in feature 13 of the SIOP score sheet. Time exclusively devoted to second language learning (44) is not part of the SIOP model, however, strategies for teaching English as a second language are embedded in the teaching of content material.

Recommendations for Further Study

Further research into the length of time it takes to master implementing the SIOP model, as well as other models for teaching content material to ELLs, would be beneficial for schools looking to use such a model. Short, Fidelman, and Louguit (2012) found it took two years for participating teachers to become effective implementors of the SIOP model. Another study suggests that having enough time to get good at teaching content to ELLs is important for student achievement (Short, 2013, p.122).

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