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Integration of Sheltering Strategies in Science Curriculum for English Language Learners

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INTEGRATION OF SHELTERING STRATEGIES IN SCIENCE CURRICULUM FOR ENGLISH LANGUAGE LEARNERS

by

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ABSTRACT

Integration of Sheltering Strategies in Science Curriculum for English Language Learners

A curriculum was created that incorporates elements of inquiry based science teaching and sheltered instruction. The curricular unit provides a model for biology teachers to instruct in ways that allow English language learners to access the curriculum and develop their native language. The unit was developed for use in a mainstream classroom to allow for the integration of English language learners with native English speakers.

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Chapter 1

INTRODUCTION

The use of sheltered curriculum has been described as the best way to integrate the development of the English language and the teaching of content for students who are English language learners (Echevarria, Vogt, & Short, 2004; Gibbons, 2002; Hill & Flynn, 2006). The inclusion of English language learners (ELLs) in the mainstream classroom has been described as ideal in order for students to achieve cultural and linguistic proficiency and narrow the achievement gap between ELLs and nonELLS. The goal of teaching ELLs is to develop their English proficiency while they progress through high school content toward the completion of a successful school experience. The integration of ELLs in the mainstream has educational and cultural benefits to both the ELLs and nonELLs (Gibbons).

How to successfully integrate English language learners in the mainstream classroom has been the topic of much discussion in the literature. However, much of the research is focused on the integration of ELLs and sheltering strategies in elementary school. Many authors (Echevarria et al., 2004; Gibbons, 2002; Stoddart, Pinal, Latzke, & Canaday, 2002) have emphasized that it is important to maintain a rigorous curriculum for ELLs, but there is a lack of concrete examples in the literature.

Background of the Problem

The academic progress of ELLs is notably behind that of their English speaking peers (Stoddart et al., 2002). In high school, the problem becomes magnified as Hispanic students have a dropout rate 3.5 times higher than that of Anglo American students (Hampton & Rodriguez, 2001). In most high schools, ELLs are placed in low track academic classes. As a result, the scores in mathematics, science and reading are 20 points lower for Hispanic students than Anglo American, English speaking students (Stoddart et al.).

The goal of sheltered instruction is to achieve full and equitable education for ELLs. To do this, the curriculum must be adapted to allow content to be accessible while the English proficiency of ELLs is increased. If this is to occur in a mainstream classroom, the rigor must not be compromised for the nonELL students in the process. Stoddart et al. (2002) proposed the integration of academic subjects with the acquisition of English. They believe that inquiry based science is a natural and effective tool for the integration of the usually separate fields of language and science, and a *synergistic* union of language development and content instruction is possible.

Statement of the Problem

Many ELLs enter high school at a beginner or intermediate level of English (Gibbons, 2002). These students are challenged by the complexity of learning a new language while they try to succeed in academic classes. The use of sheltered instruction is one way that educators can move ELLs toward proficiency in English and provide them with grade level academic content (Echevarria et al., 2004). The use of inquiry based science has been shown to be effective in the engagement of ELLs (Stoddart et al, 2002). Although it is common to offer sheltered classes for ELLs, a fully inclusive model of sheltered instruction, designed for the mainstream high school science classroom, is lacking in the literature.

Purpose of the Project

The purpose of this project was to develop a curricular unit in which sheltered instruction and inquiry based science are integrated to provide an accessible and meaningful learning experience for ELLs and native speakers alike. The author of this project demonstrates that it is possible and desirable to design curricula that are inclusive of all learners, regardless of language ability.

Chapter Summary

The use of sheltered instruction allows teachers to integrate ELLs into the mainstream classroom without compromising the learning experience for nonELLs. Carefully designed, sheltered curriculum can provide students with grade level content while their English proficiency is increased. This author provides an example of a sheltered curriculum designed for the mainstream secondary science class. The curriculum is presented in such a way that teachers can use it to assist them in the development of their own sheltered curricula.

In Chapter 2, the literature on sheltered content instruction and inquiry science is reviewed in order to identify the elements of successful models of instruction for ELLs. The methods used to design a sheltered curriculum are explained in Chapter 3.

Chapter 2

REVIEW OF LITERATURE

Teachers can use sheltered instruction and inquiry science to increase the performance of English language learners (Echevarria, Vogt, & Short, 2004; Gibbons, 2002; Hill & Flynn, 2006; Stoddart, Pinal, Latzke, & Canaday, 2002). This author will demonstrate that it is possible and desirable to design rigorous, challenging curricula that are inclusive for all learners, regardless of language ability. The academic progress of ELLs is notably behind that of their English speaking peers (Stoddart et al., 2002). In high school, the problem becomes magnified as Hispanic students have a dropout rate that is 3.5 times higher than that of Anglo American students (Hampton & Rodriguez, 2001). In most high schools, ELLs are placed in low track academic classes; as a result, the scores in mathematics, science, and reading for Hispanic students are 20 points lower than Anglo American, English speaking students (Stoddart et al.).

Reeves (2006) described a recent emphasis on the inclusion of ELLs in rigorous academic classes to level the playing field after a history of exclusionary schooling. In order to narrow the achievement gap, she noted that is necessary to do more than just include ELLs in mainstream classes. In order to achieve full and equitable integration, curricula must be adapted to allow content to be accessible while the English proficiency of ELLs is increased. If this is to occur in a mainstream classroom, the rigor must not be compromised for the nonELL students in the process. Stoddart et al. (2002) proposed the integration of academic subjects with the acquisition of English. They maintained that inquiry based science is a natural and effective tool for the integration of the usually separate fields of language and science and a *synergistic* union of language development and content instruction is possible. This author presents findings from the literature about how to successfully integrate ELLs into a mainstream, inquiry based, secondary science classroom. Examples of effective classroom models are considered to provide a general, theoretical framework for the development of high school inquiry science classrooms of mixed ability students, including ELLs.

Inclusive Inquiry Based Science Instruction for ELLs

Inquiry science has been explored as an effective way to engage ELLs in scientific content (Stoddart et al., 2002). In inquiry science, lectures are replaced with investigations, discussions, and problem solving.

Inquiry Based Science Defined

According to Stoddart et al. (2002), inquiry is not just hands-on learning, but it involves thought and discussion centered on classroom activities. Inquiry science is the exploration of scientific phenomena with hands-on, process oriented experiments.

Benefits to ELLs

Hampton and Rodriguez (2001) described students as natural scientists with a curiosity about the world. Inquiry science is a student centered approach to the teaching of science that allows students to use their natural curiosity to learn about the world. In the context of inquiry, according to Hampton and Rodriguez, students are allowed to be actively engaged in the process of science. Students solve problems with the use of hands-on activities and discussion of their thinking with other students. New experiences with the English language and new understandings of content are made possible by this type of classroom interaction.

Sheltering Instruction Defined

Short and Echevarria (2004) defined sheltered instruction as content teaching to "English language learners in strategic ways that make the concepts comprehensible while promoting the students' academic language development" (p. 10). Also, Short and Echevarria described sheltering in terms of strategies used to help students understand content. Examples of sheltering strategies include: (a) a slow pace of speech, (b) the use of careful enunciation, and (c) the use of visuals and demonstrations. Also, explicit vocabulary development and the connection of new information to student experiences are strategies that fall under the umbrella of sheltering. However, the authors noted that the use of these strategies is not enough to advance ELLs to proficiency in English. Explicit teaching of language must be included in any sheltered program if students are to gain academic literacy skills and succeed in classes.

Benefits to ELLs

According to Echevarria et al. (2004), sheltered instruction is an approach that allows ELLs access to support in order to learn content and English in the same setting. Also, sheltered instruction should be delivered by teachers who are culturally sensitive to diverse populations of students. In effective sheltered instruction, all students are engaged in the learning of content and English. All sheltered instruction has the same aim, to improve the academic performance of ELLs.

Inclusion of ELLs in Mainstream Classes

According to Gibbons (2002), the integration of ELLs into mainstream classes allows these students to learn the curriculum while they develop language. In the content area curriculum, a meaningful context can be provided through which language can be learned. Also, the language learning is beneficial to all students, regardless of their language ability. In addition, the inclusion of ELLs in mainstream classes has a cultural benefit as inclusion provides for the exposure of ELLs and nonELLs to students who have experiences different from their own. According to Gibbons, when integrated in the mainstream classroom, ELLs can experience mainstream culture in authentic ways. In addition, students of the mainstream culture are benefited by a classroom in which a culturally diverse society is reflected.

Benefits to ELLs

According to Stoddart et al. (2002), the inclusion of ELLs in the mainstream classroom allows them to develop academic language in complex subject areas. Science is particularly rich in an academic language that students may not be exposed to elsewhere and may not understand implicitly. Therefore, the integration of language and science is important to the success of these students in science. Stoddart et al. pointed out that, often, ELLs are placed in classes where the level of academics matches the level of their language. Science and mathematics are subjects that require habits of mind and ways of thinking that can be distinct and separate from a mastery of English. Therefore, teaching language, which is integrated with the subject matter, would allow students to succeed in classes in which they typically are not even *allowed* to take part.

However, in most secondary programs, ELLs are left out of mainstream classes and are taught English in classes where the emphasis is on social communication skills. With this practice, monoculturalism is reinforced, and ELLs are segregated in low track classes (Gibbons, 2002; Stoddart et al., 2002).

Teacher Preparation

Much of the research on the development of science classrooms inclusive of ELLs is focused on the preparation of teachers and teacher conceptions of ELLs. It is a common belief in the literature that, in teacher preparation programs, new teachers are not adequately prepared to teach in an ELL inclusive classroom. According to Azzam (2004), fewer than 13 % of teachers in the U.S. have received professional development based on the teaching of ELLs. Short and Echevarria (2004) reported that, in most states, there is no requirement that teachers have background or training in methods to teach ELLs or cross-cultural communication. Also, Reeves (2006) reported that there is a lack of information related to secondary, mainstream teachers' attitudes toward the inclusion of ELLs in their classrooms. She conducted a study to assess teachers' perceptions of the inclusion of ELLs in mainstream classrooms, including views on the modification of coursework and their feelings of preparedness or lack thereof to teach ELLs. She found that many misconceptions about the time it takes to learn a second language exist. She also found that most teachers did not feel adequately prepared to teach ELLs.

Stoddart et al. (2002) emphasized that the progressive view of content instruction for ELLs is that mastery of English is not a prerequisite; instead, language and science content can be learned in an integrated way. This is in contrast to what Stoddart et al. reported is the predominant belief among teachers. Stoddart et al. developed a rubric to assess teachers' understanding of the connection between science and language that ranged from the belief that the two are distinct and separate, to teachers who can envision a synergistic relationship between inquiry science and language development.

Buck, Mast, Ehlers and Franklin (2005) reported that teachers have one of three outlooks on their role in the classroom, that is, the view that teachers are: (a) knowledge transmitters, (b) facilitators of learning, or (c) researchers. With respect to effective science teachers, specifically, Buck et al. noted a shift from technical expert to active reflection on classroom practices and experiences. They concluded that it is equally, if not more important, that teachers be able to reflect on their daily practice rather than simply become an expert at the delivery of science curriculum.

Teacher Misconceptions

Reeves (2006) found that teachers held misconceptions about the acquisition of the English language. In her study, nearly half of the teachers believed that English can be acquired in 2 years, and that the use of a native language should be avoided when English is learned. These beliefs are counter to Cummins (1981, as cited in Stoddart et al., 2004) who found that it takes 7 years to become fully proficient in academic language, and that the use of the native language supports and encourages the development of a second language.

Buck et al. (2005) encouraged teachers to be aware and ask questions of themselves in terms of their own values and beliefs. According to these researchers, many teachers send subtle messages to ELLs that they do not believe they can succeed in science. An honest reflection on preconceived notions of intelligence and language, as well as racial prejudice, should accompany any teaching of ELLs.

The Sheltered Classroom

In the sheltered classroom, teachers use strategies which enable students to learn content and language simultaneously. A key element of a classroom, where sheltering strategies are used, is group work.

The Benefits of Group Work

According to Gibbons (2002), when language development is an objective, the use of alternatives to the standard classroom dialog between teacher and student, known as initiation, response, feedback (IRF), must be carefully planned. As reported by Gibbons, group work has three key benefits for ELLs: (a) group work allows learners to have a wide variety and greater quantity of language input, (b) group work forces learners to interact and explain their meanings, and (c) group work allows for contextualized language. Also, the opportunity for students to hear information multiple times in different ways, what Gibbons termed *message redundancy*, is more likely to occur in groups. In groups, students tend to ask questions to solve problems whereas IRF is based, mainly, on teacher questioning. Finally, the use of group work may provide a safe environment for ELLs where they are able to take risks with language.

Grouping Strategies

In order to make group work effective, teachers must carefully consider the configurations of groups and strategize for the maximum success of all learners (Echevarria et al., 2004). The use of a wide variety of grouping strategies is a signature of effective sheltered classrooms. Echevarria et al. considered the use of grouping strategies to be a fundamental part of success for ELLs. Teachers must consider the composition of groups, specifically, whether or not groups should be heterogeneous or if

ELLs should work together to solve problems. These researchers proposed that grouping configurations should be based on the content and language objectives of the lesson. Variety in groups increases opportunities for ELLs to learn from each other and nonELLs in various settings. Also, there is diversity in learning styles among students; some may prefer to work with partners, and others may prefer to work in large groups. The authors recommended that at least two different grouping configurations should be used in each lesson.

Buck et al. (2005) found that the use of grouping strategies was the most complex and important aspect of the inquiry based science classroom. They were surprised by this discovery. The researchers experimented with the pairing of ELLs with nonELLs as well as motivated students with nonmotivated students. They found an important connection between the activities chosen and the grouping strategies. Cooperative groups worked best, regardless of their composition, when active hands-on problem solving was the focus of the activity. However, the classroom devolved into a management problem when students were asked to complete worksheets, and ELLs copied work from each other and nonELLs. The authors did not provide definitive suggestions for classroom teachers. Since, generally, inquiry science is group oriented, this seems an important area for further study.

Setting and Communicating Objectives

English language learners benefit from clearly communicated objectives. The objectives should be focused on content and language (Echevarria et al., 2004).

Content Objectives

Echevarria et al. (2004) suggested that teachers use district guidelines and content standards to guide the choice of content objectives. This will insure that any class, in which there are ELLs, will be accountable for the same level of academic content as the nonELL classes. According to Hill and Flynn (2006), setting content goals at the beginning of a class allows students to focus on the information that is relevant to the goals of the lesson. The goals should be broad enough for a wide range of learning. The objectives should be focused on a key complex idea rather than a simplified form of the curricular goals. In secondary science, the key complex idea could come from the content standards for the subject. Identification of the key ideas that are fundamental to learning the content and a strong focus on lessons to achieve the standards allow students with wide ranges of abilities to be successful. Hill and Flynn encouraged teachers to find ways to personalize the goals for a lesson by framing the goals in "I wonder if . . ." type questions.

Hover and Patton (2005) explored ways to differentiate curriculum for ELLs with special needs. They proposed the use of basic curricular principles in regard to the integration of ELLs with special needs. The content should be relevant to students and should include skills that can be reinforced in many classes. The content decisions should include cognitive as well as academic goals, and the two should be integrated. High expectations for all students should be maintained, while the differences in students are valued. The use of active learning and inquiry based tasks will support the learning of ELLs with special needs.

Language Objectives

According to Carrier (2005) and Echevarria et al. (2004), the purpose of language, or literacy objectives, is to give students the skills needed to read, write, and communicate orally about science. Incorporation of language objectives should be closely tied to the content objectives and should support the objectives of the lesson or unit. The language objectives will allow students to achieve the content objectives more readily. Also, the language objectives should include skills that allow students to fully participate in the activities of the science classroom.

Whereas many teachers of science tend to focus on vocabulary as the main language objective, Carrier (2005) reported that, in a typical science class, students are expected to use language in many ways. For instance, students are expected to: (a) seek out, (b) report, (c) describe, (d) compare, and (e) classify information. Also, literacy objectives can be built around the analysis of information and identification of patterns. The common language functions of an inquiry based classroom are: (a) the generation of hypotheses, (b) prediction, (c) knowing cause and effect, and (d) description of solutions to scientific problems.

According to Hill and Flynn (2006), it is important to carefully select literacy objectives; also, it is necessary to share them clearly with the students at the beginning and end of each lesson or unit. Students should be asked to assess themselves about whether they met the language objectives, and teachers should provide regular feedback to the students on the objectives.

According to Carrier (2005), ELLs are farther behind their peers as they progress into high school science classes. Many are relegated to low level science classes, based more on their language abilities than their scientific reasoning or analytical skills. Because ELLs are unable to access the language of science, their ability to participate in advanced science classes is minimized every year in comparison with their English speaking counterparts. Carrier cited Au and Raphael (2000) who referred to this disparity as the "literacy gap" (p. 5). A common theme in the literature is that, if students are given the literacy and language tools to meet the content objectives, this gap can be greatly reduced.

Science Specific Language Objectives

Fang (2006) described the challenges of literacy in middle school science classrooms. He described the "fourth grade slump" (p. 492) as a phenomenon whereby student literacy drops after fourth grade and continues to drop as students advance into secondary education. According to Christie (1998) and Hammond (1990, both cited in Fang), this slump may be a result of the expository texts that replace the storybooks of elementary school. Fang described the language of school science (LSS) as a specific challenge for both ELL and nonELL students in terms of reading comprehension. To address this issue, Fang provided suggestions on how teachers can improve the science literacy of their students. According to Fang, LSS is characterized by technical vocabulary which consists of: (a) ordinary words with nonvernacular meanings, (b) abstract nouns, (c) complex sentences, and (d) the use of passive voice. All of these qualities make science texts difficult for young readers and may result in middle school students, especially ELLs, being alienated from the context within the text and characterized as apathetic readers. Fang described two approaches currently used to address the science literacy problem: (a) minimize the use of texts and move toward an inquiry based curriculum, and (b) replace textbooks with scientific novels. However, Fang maintained that the text should not be replaced nor eliminated, because the ability to decode a scientific text is vital to the achievement of scientific literacy. Therefore, Fang suggested a third approach: teach LSS and the elements of scientific writing in order to help students overcome the challenges of science texts.

Lesson Delivery

In the sheltered classroom, teachers emphasize comprehension as they deliver lessons. Many strategies can be used to increase students' comprehension of language and content (Echevarria et al., 2004).

Comprehensible Input and Output

In the sheltered classroom, teachers need to use strategies that make the content comprehensible for ELLs. Echevarria et al. (2004) devoted a chapter on "comprehensible input" (p. 66), that is, the strategies which teachers employ to ensure students can understand the material.

Carrier (2006) described a teaching technique called multiple modes of input and output (MMIO). In addition to teacher input, this method includes student output, such as assignments and assessments. Carrier defined comprehensible input as "the use of techniques that are less reliant on written English to make information comprehensible" (p. 131). She emphasized the importance of the use of input strategies in high school classrooms where content can be language laden and difficult to comprehend. Carrier defined three steps in the use of the MMIO method: (a) clearly define high level content objectives, (b) present key concepts with the use of multiple modes of instruction, and (d) create assessment opportunities that allow multiple modes of output. With use of the

MMIO strategy, teachers can deliver content in multiple ways and provide multiple opportunities for students to express what they have learned.

Classroom Strategies

Scaffolding, nonlinguistic representations, and the development of higher order thinking skills are key areas of the sheltered curriculum. Teachers need to pay special attention to these areas while they design sheltered lessons (Echevarria et al., 2004; Gibbons, 2002; Hill & Flynn, 2006).

Scaffolding

Scaffolding is when teachers guide students from their current level of understanding to the next level as they provide support as students progress (Hill & Flynn, 2006). Echevarria et al. (2004) described scaffolding support as the instruction, modeling, questioning, and feedback that enables students to eventually demonstrate independence in learning. Scaffolding can refer to guiding students from the preproduction of language through intermediate and advanced fluency, or it can refer to guiding students through a single lesson to fulfill the content objectives. Hill and Flynn suggested that students should be provided feedback that: (a) is corrective, (b) is timely, (c) is criterion based, and (d) allows for some peer feedback.

Nonlinguistic Representations

Nonlinguistic representations are ways to express content without the use of language (Hill & Flynn, 2006). Echevarria et al. (2004) recommended the use of: (a) hands-on manipulatives, (b) realia, (c) pictures, (d) visual models and graphs, (e) multimedia materials, and (f) demonstrations. Also, they suggested that students should be asked to construct their own concrete, nonlinguistic representation of content. They concluded that the use of a variety of activities, based on nonlinguistic representation of content, can help students formulate their own, nonlinguistic understanding of content.

Higher Order Thinking Skills

With the attainment of metacognitive, cognitive, and social/affective thinking skills, students can comprehend and retain new information. Echevarria et al. (2004) described various techniques that teachers can use to promote the higher order thinking skills of ELLs. They provided suggestions as to how teachers can question students and teach strategies to develop students' higher order thinking skills. Examples of such strategies are the use of: (a) graphic organizers, (b) paraphrasing, and (c) mnemonics.

Hill and Flynn (2006) reported that the generation and testing of hypotheses can be a powerful language tool. They encouraged teachers to use hypotheses in classes other than science to allow students to practice explaining their reasoning. With the use of hypotheses, many levels of students can be challenged intellectually and linguistically. Students can develop either a simple explanation of a phenomenon or a detailed description that is based on various scientific theories. Hill and Flynn recommended that teachers use a variety of tasks that require the generation and testing of hypotheses. Students should be asked to verbalize their hypothesis and their conclusions.

Assessment and Evaluation

The integration of ELLs in the native English speaking classroom poses distinct challenges to assessment (Rice, Pappamihiel, & Lake, 2004). Assignments must be designed that allow for the successful assessment of content knowledge in a way that accounts for differences in English speaking ability. Rice et al. provided suggestions related to assessment in the science classroom. The authors referred to the cultural and linguistic bias inherent in most classroom assessments, which are usually designed for the native English speaker. Rice et al. differentiated between assessment of the content and assessment of the language. Many tests and quizzes do not effectively test content because the language of the document is a barrier to the student. The authors proposed the use of non-language dependent assessment whenever possible in science classes.

Also, Hill and Flynn (2006) referred to the purpose of assessment as "reinforcing effort and providing recognition" (p. 31). They noted that it is important for ELLs and mainstream students, alike, to track their progress in terms of effort as well as understanding. Rubrics can be designed to help students assess themselves on how much effort they put into an assignment as well as whether they understood the content and completed the assignment. Hill and Flynn reported that teachers should explicitly teach the importance of effort to ELLs. This can be applied in science because, often, the content requires great effort to understand or solve a problem.

The Sheltered Instruction Observational Protocol (SIOP) designed by Echevarria et al. (2004) is a popular model for the classroom teaching and assessment of ELLs. The model is based on research about the best practices for ELLs and encompasses many strategies for sheltered instruction. Echevarria et al. emphasized the importance of assessment in order to determine how well students understand vocabulary and content as well as to identify students who need additional help. They recommended the use of review as a strategy that is equally important to assessment in the classroom. The teacher can use consistent review to make clear to the student which concepts are essential, and what content will be assessed. They suggested that teachers begin and end a lesson with review of key concepts and vocabulary.

Also, for assessment, Echevarria et al. (2004) suggested regular assessment rather than a one time quiz or test at the end of the chapter or unit. They distinguished between assessment and evaluation. Assessment is an ongoing collection of information used to inform discussion, and it is not always graded. However, evaluation is a type of assessment used to assign scores in a class. Echevarria et al. provided examples of informal assessment such as responses from the whole group or observations during activities. Formal assessment can take the form of portfolios, journals, or projects; however, Echevarria et al. emphasized that these formal assessments should be multifaceted and allow the teacher to gain as much diverse information as possible about a student. They maintained that successful assessments are authentic and multidimensional, and that multiple indicators must be used for teachers to obtain accurate and complete information on how well students learn the material. Assessments must be used to inform the direction and pace of instruction as well as to determine whether the information should be retaught. "This teach, assess, review and reteach process is cyclical and recursive" (p. 144).

In addition, Rice et al. (2004) reiterated the importance of the regular, predictable review and assessment that Echevarria et al. (2004) emphasized in the SIOP strategies and concluded that it is important that the assessments follow the established procedure that was used to teach the content. The assessments should mimic and mirror the activities of the classroom.

Chapter Summary

A comprehensive model of a secondary, inquiry-based science classroom where ELLs, nonELLs, and special education students are integrated is elusive in the literature. Perhaps the segregation of language minority students is so pervasive that there is nothing to study. Or, perhaps, the models that exist are not effective for all students. A few authors, such as Buck et al. (2005) and Stoddart et al. (2002), conceptualized how it is possible to successfully mainstream ELLs in a rigorous science classroom; however, they did not provide data to substantiate useful best practices. In other worthy sources of information on ELLs, such as Echevarria et al. (2004) and Hill and Flynn (2006), the authors provided useful general strategies, but few were specific to the inquiry science classroom. The literature is in need of a longitudinal study that tracks the progress of ELLs in science programs that fit the mainstream, inquiry model. Also, the issues of making a change across a school or school district would be an interesting addition to the literature. Reeves (2006) reported that, if schools are to mainstream ELLs, the staff must create a structure which allows for comprehensive and complete procedures to place ELLs in classes. Staff development should be initiated by the staff, and it should be a long term commitment to professional development. Solutions to the integration of ELLs should be site based and specific to the individual cases at a school. It would be interesting to see this in a specific case study.

In conclusion, it appears that there is a need in the literature for specific examples or case studies of inquiry based, sheltered science curriculum at the secondary level. In Chapter 3, this researcher describes the method, target audience, goals, and procedures for the development of this project.

Chapter 3

METHOD

The purpose of this project was to develop a curricular unit that shelters a high school biology unit on protein synthesis. The model represents an integration of sheltered instruction and inquiry based science instruction. The classroom setting is a mainstream biology classroom where ELLs are present and fully integrated. The lack of information about how to shelter a high school class and the lack of concrete examples in the literature may be a stumbling block for teachers who wish to shelter their classes. Ideally, this project will assist the development of curricula by teachers who wish to help students, regardless of language ability, to succeed in the mainstream science class.

Target Audience

This project was designed to provide an example of a rigorous, sheltered, biology curriculum for high school teachers and administrators. The curriculum is designed for use with a mixed age, mixed ability, mixed language ability high school classroom to demonstrate its effectiveness and feasibility.

Organization of Unit

The goal of this project is to provide teachers with an example of sheltered, mainstream high school science curriculum. The unit provides examples of content and language objectives as well as strategies to access and build student background. Information on grouping configurations, activity choice, and strategies for teaching content are provided.

The unit consists of four 110 minute lesson plans intended for a block scheduled high school. Each lesson plan provides a detailed description of activities and estimated time for each activity. Resources and materials are listed for each activity in a separate list. Each lesson addresses content standards and benchmarks, and these are explicitly provided in each lesson plan. Language objectives are divided into reading, writing, speaking and listening to mimic the district goals for ELLs. Vocabulary for each lesson is separated into review and new vocabulary. Assessments, both formal and informal, are described. Differentiation strategies are listed for homework, assessments, and the in class activities. Data collection strategies are summarized at the end of each lesson.

Peer Assessment

Assessment of the curriculum was obtained from an administrator, a classroom teacher, the ELL coordinator, and the literacy coordinator of the school where the author is employed. Each reviewer was given a copy of the document and asked to review it for timeliness, ease of use, and relevancy. Each reviewer provided comments, editing marks, and suggestions on a separate hard copy which the author discusses in Chapter 5.

Chapter Summary

Through this research project, the researcher used knowledge gained from a review of literature on best practices for English language learners to develop a viable high school curriculum. The curriculum is written and presented in the form of a curricular unit. The unit provides a model for teachers to examine and use as they create their own curricula.

Chapter 4

RESULTS

Introduction

A curricular unit was designed to provide a model of how rigorous content can be integrated with sheltering strategies in a secondary biology class. Sheltering strategies compiled from many sources were used to create lessons for a mainstream high school classroom. The lessons are in 110 minute blocks, but could be adapted for the standard 55 minute period if necessary. The lesson plans incorporate key complex ideas, content and language objectives, and inquiry based activities. Reading, writing, listening and speaking are integrated into every lesson, and hands-on activities and discussion are the focus of the lessons. A formal written assessment culminates the unit. Suggestions for grouping configurations and ways to differentiate the lessons are provided.

Curriculum

<table>
<tr><td colspan="3">Lesson One: "Mistakes in DNA Replication"</td></tr>
<tr><td>Content Area: Biology (Protein Synthesis)</td><td>Grade: 9-12</td><td>Duration: 110 min</td></tr>
<tr><td>Essential Questions:
How does DNA replicate?
What mistakes can happen in DNA replication?</td><td colspan="2">Standards: 3. Students know and understand the characteristics, structures, processes, and relationships of organisms and how these may be affected by environmental changes and the passages of time.</td></tr>
<tr><td>Objectives/Learning Outcomes:
Students will predict a daughter strand of DNA correctly with complementary base pairing.
Students will describe the process of DNA replication in writing.
Students will be able to draw and explain DNA mutations (insertion, deletion and substitution)</td><td colspan="2">Benchmarks: 3.4 Students know and understand how organisms change over time in terms of evolution and genetics.
-describing how DNA serves as the vehicle for genetic continuity and the source of genetic diversity upon which natural selection can act;
-knowing the chemical and structural properties of DNA and its role in specifying the characteristics of an organism.</td></tr>
<tr><td>Language Objectives:
Reading- Students will read and interpret a description of DNA replication.
Writing-Students will write a paragraph explaining the process of DNA replication and the mutations that can occur. Students will write notes from the overhead on DNA mutations.
Speaking- Students will speak to each other as they problem solve and demonstrate the process of DNA replication.
Listening- Student will follow verbal instructions from the teacher and listen to the teacher explain DNA mutations</td><td colspan="2">Grouping Configurations:
Students are in small groups for the review questions.
Students are paired for the manipulative activity and pairs find another pair to share with.

Groups will be formed by the teacher based on the language and science proficiencies of the students. Groups will be formed for maximum achievement of all students in mind.</td></tr>
<tr><td>Review Vocabulary:
DNA
replication
nitrogenous bases
adenine
guanine
cytosine
thymine
weak hydrogen bonds</td><td colspan="2">New Vocabulary:
DNA replication
base pairs
parent strand
daughter strand
complementary</td></tr>
</table>

Assessment (formative/summative):	Differentiation:
Pre assessment/Warm-up on the review questions to activate background knowledge. Student writing will be collected at the end of the unit in the form of an essay on protein synthesis.	If students don’t answer all questions individually, there is a group debrief to give everyone the same information. Students can take home final writing assignment if more time is needed.

The Lesson	Time	Differentiation
Activating Background Knowledge:		
1. Daily vocabulary and objectives posted and explained by teacher. Students individually define review vocabulary.	10min	
2. Post review questions on overhead- students work independently, attempting to answer questions and define review and new vocabulary -Review the structure of DNA and the base pairing rules. -Review the structure and function of the nucleus. -Review why DNA replication occurs	5 min	Teacher chooses students who can answer correctly and in different ways.
3. Students discuss review questions and vocab. in small groups.	5 min	Teacher can read aloud if the class needs this
4. Teacher assigns students to answer questions for class.		
5. Teacher explains review questions with notes/visuals asking for input from assigned students.	10min	
Instructional Strategies:		Notes can be provided in advance
6. Teacher posts a written description of DNA replication- students read silently.	3 min	
7. Students gather materials and model the process of DNA replication using manipulatives.	15min	
8. Groups are paired and each group demonstrates DNA replication to the other group.	5 min	
9. Teacher shows overhead visuals and explains the process to the class, students draw the process in their notes.	10min	Photocopy from book provided for additional reading.
10. Students complete worksheet on DNA replication.	5 min	Advanced organizer provides structure for answering questions
11. Teacher explains DNA mutations using “the fat cat ate the rat” analogy. Students take notes, drawing the different DNA mutations in their notes.	15min	
12. Students write their own description of DNA replication and the various mutations that occur	20min	

following an "advanced organizer" which gives them specific questions to answer. When the questions are removed, the students' answers are in an essay format to be used for the final assessment of the unit. 13. Close and summarize- new vocabulary definitions clarified.	8 min 10min	

Resources and Materials: Objectives and vocabulary sheet for students with review questions Overhead visuals of DNA for review Overhead written description of DNA replication DNA manipulatives Overhead visuals of DNA replication Worksheet on DNA replication Overhead visuals of DNA mutations Reading on the DNA mutations Advanced organizer on DNA replication and mutations	Closing/Summarizing: Repost and revisit the daily objectives and clearly define the new vocabulary.
Homework and Practice: Students may need to finish the advanced organizer or reread the DNA mutations reading.	Differentiation: Notes and readings for the next day available to ELL students.

Data Collection Strategies: Informal assessment as teacher walks around, appointing students to answer review questions. Students self-assess as they attempt to write definitions of old and new vocabulary. Informal assessment as teacher observes students building models and demonstrating to the other students. Final assessment at the end of unit (will be explained in Lesson Four).

<table>
<tr><td colspan="3">Lesson Two: “The Transcription of DNA to mRNA”</td></tr>
<tr><td>Content Area: Biology (Protein Synthesis)</td><td>Grade: 9-12</td><td>Duration: 110 min</td></tr>
<tr><td>Essential Questions:
Why must transcription occur?
What is different between DNA replication and transcription? What is similar?
How do mistakes in DNA replication transfer into mRNA?</td><td colspan="2">Standards: 3. Students know and understand the characteristics, structures, processes, and relationships of organisms and how these may be affected by environmental changes and the passages of time.</td></tr>
<tr><td>Objectives/Learning Outcomes:
Students will transcribe a molecule of DNA into a molecule of mRNA.
Students will transcribe a mutated molecule of DNA into mRNA.
Students will identify all of the major molecules involved in transcription.
Students will describe the process of transcription in writing.
Students will create a concept map of the processes of DNA replication and translation, visually representing their similarities and differences using the daily vocabulary.</td><td colspan="2">Benchmarks: 3.4 Students know and understand how organisms change over time in terms of evolution and genetics.
-describing how DNA serves as the vehicle for genetic continuity and the source of genetic diversity upon which natural selection can act;
-knowing the chemical and structural properties of DNA and its role in specifying the characteristics of an organism.</td></tr>
<tr><td>Language Objectives:
Reading- Read short description of transcription from a computer simulation.
Writing- Write a descriptive paragraph from watching a computer simulation of the process of transcription.
Speaking- Share ideas about the concept map and explain thinking to each other. Explain concept map to the teacher.
Listening- Listen to other students’ ideas and incorporate those ideas into concept map.</td><td colspan="2">Grouping Configurations:
Students are in small groups for the review questions and the concept map. ELL students should be grouped together and allowed/encouraged to discuss the concept map in their native language.</td></tr>
<tr><td>Review Vocabulary:
RNA
nucleotides
uracil</td><td colspan="2">New Vocabulary:
transcription
RNA processing
RNA polymerase
messenger RNA</td></tr>
<tr><td>Assessment (formative/summative):
Students will create a concept map of the processes of DNA replication and translation, visually representing their</td><td colspan="2">Differentiation:
The teacher spends time with each group to externalize and address misconceptions. Each student should be asked to explain a</td></tr>
</table>

similarities and differences using the daily vocabulary. There is no “right” way to build a concept map. The map allows the teacher to ask questions about the connections between words and informally assess/clarify misconceptions.	different part of the map to test their knowledge and practice speaking, specifically using the vocabulary in complete sentences.

The Lesson	Time	Differentiation
Activating Background Knowledge:		
1. Daily vocabulary and objectives are posted and explained by teacher.	5 min	
2. Post review questions on overhead- students work independently, attempting to answer questions and define review and new vocabulary. -Discuss lesson one’s essential questions: How does DNA replicate? What mistakes can happen in DNA replication? -Why might information need to get out of the nucleus? How does DNA “communicate” with the rest of the cell? What does DNA need to “tell” the cell to do?	10min	
3. Students discuss review questions and vocab. in small groups.	10min	
4. Teacher assigns students to answer questions for class.		
5. Teacher explains review questions with notes/visuals asking for input from assigned students.	10min	Teacher chooses students who can answer correctly and in different ways
Instructional Strategies:		
6. Students watch a silent simulation of the process of transcription. Nothing is written or discussed.	2 min	Helpful for visual learners
7. Students watch the simulation again and try to describe what they are seeing in writing, without necessarily using the vocabulary.	5 min	
8. Pairs are formed and students share what they have written and try to attach the vocabulary to the images. Vocabulary lists with definitions are handed out.	8 min	
9. Teacher shows overhead visuals and explains the process to the class; students label a picture of the process in their notes.	10 min	Notes can be provided in advance
10. Students complete worksheet on translating a segment of DNA to a molecule of messenger RNA and translating a mutated DNA molecule into a mRNA molecule.	10 min Break	Photocopy from book provided for additional reading

11. Teacher models the creation of a "concept map" for students with a simple topic. 12. Students in pairs create their own concept map including all new and old vocabulary. The purpose of the map is for students to visualize similarities and differences between transcription and DNA replication. 13. Teacher circulates and questions students on their maps.	5 min 15 min	
14. Students write their own description of transcription following an "advanced organizer" which gives them specific questions to answer. When the questions are removed, answers are in an essay format to be used for the final assessment of the unit.	10min	Advanced organizer provides structure for answering questions
15. Close and review the objectives, clarify answers to essential questions.	10min	

Resources and Materials: Objectives and vocabulary sheet for students with review questions Overhead visuals of DNA replication and transcription Computer and projector to show simulation of DNA replication. No sound needed, but Flash may be required Handouts with vocabulary defined for writing about the simulation Worksheet on transcription Large paper and markers for concept map Advanced organizer on transcription	Closing/Summarizing: Repost and revisits the daily objectives and clarify the answers to the essential daily questions.
Homework and Practice: Students will be asked to find a simulation of translation on the internet (if available) or a description of the process. Students will be given a reading on translation to read before the next class session.	Differentiation: Notes and readings for the next day are available to ELL or special education students. Computers are available during lunch and study hall periods for those that don't have home computers
Data Collection Strategies: Informal assessment as teacher walks around, appointing students to answer review questions. Informal assessment as teacher interacts with each student as they build their concept map.	

Lesson Three: "The Translation of mRNA to Protein"		
Content Area: Biology (Protein Synthesis)	Grade: 9-12	Duration: 110 min
Essential Questions: How does a codon code for an amino acid? How do mistakes in DNA replication affect the final amino acid sequence? What is a silent substitution?	Standards: 3. Students know and understand the characteristics, structures, processes, and relationships of organisms and how these may be affected by environmental changes and the passages of time.	
Objectives/Learning Outcomes: Students will decode individual codons into amino acids. Students will translate a segment of DNA into a final polypeptide.	Benchmarks: 3.4 Students know and understand how organisms change over time in terms of evolution and genetics. -describing how DNA serves as the vehicle for genetic continuity and the source of genetic diversity upon which natural selection can act; -knowing the chemical and structural properties of DNA and its role in specifying the characteristics of an organism.	
Language Objectives: Reading- Students read instructions for worksheets, game and kinesthetic demonstration Writing- Students write a summary of the process of translation Speaking- Students discuss review questions and the demonstration. Listening- Volunteers follow verbal instructions from teacher during demo, audience listens to the volunteers' "script" of demo. Listeners use this auditory information to determine which student represents which molecule. Students listen to verbal instructions for Codon Bingo.	Grouping Configurations: Students are in small groups for the review questions. English language learners might benefit from discussing the demo in their native language. Students can work individually or in pairs for the worksheet activity. Groups will be formed by the teacher based on the language and science proficiencies of the students. Groups will be formed for maximum achievement of all students in mind.	
Review Vocabulary: DNA gene mRNA ribosome amino acid protein polypeptide polypeptide bond	New Vocabulary: codon anticodon transfer RNA (tRNA)	

Assessment (formative/summative):	Differentiation:
Pre assessment/Warm-up on the review questions to activate background knowledge. Informal assessment- filling out diagram of translation, labeling all molecules and organelles involved. Student writing will be collected at the end of the unit in the form of an essay on protein synthesis.	If students don't answer all questions individually, there is a group debrief to give everyone the same information. Students can take home final writing assignment if more time is needed.

The Lesson	Time	Differentiation
Activating Background Knowledge:	5 min	
1. Daily vocabulary and objectives are posted and explained by teacher.		
2. Post review questions on overhead- students work independently, attempting to answer questions and define review and new vocabulary		
-Review why transcription occurs.		
-Review how mistakes in DNA replication affect transcription and predict how this might affect the final protein.		
-Review the role of DNA and how genes are "recipes" for proteins.		
-Discuss homework, what students learned about translation from the web.		
3. Students discuss review questions in small groups.	10min	
4. Teacher assigns students to answer questions for class.		
5. Teacher explains review questions with notes/visuals asking for input from assigned students.	10min	
Instructional Strategies:		
6. Kinesthetic activity (Green Eggs and Ham) modeling transcription and translation with volunteers.	10min	Students who self-identify as kinesthetic learners will be chosen as volunteers.
7. Students are given a visual image of the full process of protein synthesis. Students are asked to discuss which volunteer represented which molecule.	5 min	
8. Teacher verbally explains the process using visuals.	10min	
9. Teacher explains how the genetic code works.		Students can get help
10. Students complete worksheet- a segment of	5 min	at their break if they

DNA is translated into a sequence of amino acids. Teacher posts answers.	5 min	are not done labeling the picture.
11. Teacher explains the rules to "Codon Bingo" Students play "Codon Bingo"	15min	
12. New worksheet representing the mutation that causes sickle cell anemia. Students translate DNA to protein.	5 min	Notes can be provided in advance
13. Review of mutations- students are asked to write examples of substitution, insertion and deletion.	10min	
14. Teacher introduces silent substitutions using "the fat cat..." analogy and students are asked to write an example of a silent substitution.	5 min	
15. Students write their own description of translation and the molecules involved following an "advanced organizer" which gives them specific questions to answer. When the questions are removed, the students' answers are in an essay format to be used for the final assessment of the unit.	10min	
16. Close and summarize- new vocabulary definitions clarified.	5min	Advanced organizer provides structure for answering questions

Resources and Materials:	Closing/Summarizing:
Objectives and vocabulary sheet with review questions for students. Visuals (overheads) to support answers to review questions. "Green Eggs and Ham" script for volunteers. Visual image of protein synthesis (overhead) and enough copies for each student. Codon Bingo cards for each student. Sickle cell anemia worksheet. Visuals to support explanation of silent substitution (can also be done on white board) Advanced organizer for translation section of the final assessment. Vocabulary definitions.	Repost and revisit the daily objectives and clearly define the new vocabulary.

<table>
<tr><td>Homework and Practice:
Advanced organizer most likely will not be finished in class and will need to be completed for homework.
Reading on translation assigned to help students answer advanced organizer questions.</td><td>Differentiation:
Notes and readings for the next day available to ELL students.
Supplementary readings with pictures provided for additional support.</td></tr>
<tr><td colspan="2">Data Collection Strategies:
Informal assessment as teacher walks around, appointing students to answer review questions.
Students self-assess as they attempt to answer warm-up questions.
Informal assessment as teacher observes students labeling pictures and completing worksheets.
Final assessment at the end of unit (will be explained in Lesson Four).</td></tr>
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<table>
<tr><td colspan="3">Lesson Four: “Writing the Essay”</td></tr>
<tr><td>Content Area: Biology (Protein Synthesis)</td><td>Grade: 9-12</td><td>Duration: 110 min</td></tr>
<tr><td>Essential Questions:
How do we combine the information we have learned so far into an essay?</td><td colspan="2">Standards: 3. Students know and understand the characteristics, structures, processes, and relationships of organisms and how these may be affected by environmental changes and the passages of time.</td></tr>
<tr><td>Objectives/Learning Outcomes:
Students will review DNA replication, transcription and translation to develop a comprehensive view of the process of protein synthesis and the role of mutation in protein synthesis.

Students will create a master word map which integrates the vocabulary from Lessons 1-3.

Students will write introductions, conclusions and transitions in teams.

Students will complete an essay describing the process of protein synthesis.</td><td colspan="2">Benchmarks:
3.4 Students know and understand how organisms change over time in terms of evolution and genetics.
-describing how DNA serves as the vehicle for genetic continuity and the source of genetic diversity upon which natural selection can act;
-knowing the chemical and structural properties of DNA and its role in specifying the characteristics of an organism.</td></tr>
<tr><td>Language Objectives:
Reading- Students will read aloud and potentially read each others work silently.
Writing- students will practice writing in one tense (the present tense) for the essay.
Speaking- students read their own writing aloud.
Listening- Students will listen to each other explain their word maps and to each others writing as it is read aloud.</td><td colspan="2">Grouping Configurations:
In this lesson, each student will work with every other student in the class through jigsaws. In this way, each will benefit from others’ writing styles and ideas and from diverse feedback.</td></tr>
<tr><td>Review Vocabulary:
DNA
nitrogenous bases
adenine
guanine
cytosine
thymine</td><td colspan="2">Review Vocabulary continued…
uracil
transcription
RNA processing
RNA polymerase
messenger RNA
gene</td></tr>
</table>

weak hydrogen bonds DNA replication base pairs parent strand daughter strand complementary RNA nucleotides	ribosome amino acid protein polypeptide polypeptide bond codon anticodon transfer RNA (tRNA)
Assessment (formative/summative): Word map is informally assessed. The essay in its final form is assigned today and formally assessed to determine if students met the standards.	Differentiation: Individual help is given on the word map. Students use the weekend to write the first draft of the final essay.

The Lesson	Time	Differentiation
Activating Background Knowledge:		
1. Daily vocabulary and objectives are posted and explained by teacher.	5 min	
2. Individual students are given a subset of vocabulary to create a word map on their own.	5 min	
3. Students combine in groups of three to create a master word map.	10min	
4. Students ask questions on vocabulary and/or any gaps in their three advanced organizers in a question-answer session with the teacher. Students write down their questions, discuss them with their group, and then turn the questions into the teacher. The teacher arranges the questions and answers them in an organized way.	15min	If major misconceptions (or confusion) are identified, more time can be spent reviewing.
5. Instructional Strategies:		
6. Students work together to write an introductory paragraph.	10min	
7. Teacher shows examples of good and bad introductory paragraphs to students.	5min	
8. Students given more time to polish their introductory paragraphs.	5min	
9. Students jigsaw and read out loud their paragraphs and get comments from their new groups.	10min	
10. In the new groups, students write a transition sentence to begin the section of the essay on DNA replication.	5min	

<table>
<tr>
<td colspan="2">11. Students jigsaw and share their transition sentence.
12. In the new groups, students write a transition sentence from the DNA replication section of the essay to the translation section of the essay.
13. Students jigsaw and share their second transition sentence.
14. In new groups students write a transition sentence from the transcription part of the essay to the translation part of the essay.
15. Jigsaw is repeated.
16. Conclusion is written and jigsaw is repeated.
17. Teacher posts examples of good and bad transitions sentences and conclusions. Students work individually at refining their writing until the end of class.</td>
<td>5min
5 min
5 min
5 min
5 min
5 min
10min</td>
<td></td>
</tr>
<tr>
<td>Resources and Materials:
Large paper and markers for the word map.
A full version of the advanced organizer questions to guide the writing of the final essay.
Examples of good and bad intros, conclusions and transitions on overhead.</td>
<td colspan="3">Closing/Summarizing:
Clarify the deadline for the essay and provide email address for any questions.</td>
</tr>
<tr>
<td>Homework and Practice:
Completing the first draft of the essay is weekend homework.</td>
<td colspan="3">Differentiation:
Written feedback will be given in the essay and individual meetings can be arranged.
If necessary, a modified version of the assignment can be provided. In the new version, students who have extreme writing difficulties can use drawings and bullets to summarize information and can verbally present to the teacher.
Because it is a first draft, some will need to revise.</td>
</tr>
<tr>
<td colspan="4">Data Collection Strategies:

The final essay on protein synthesis incorporates all of the advanced organizers from lessons 1-3. Students are expected to write an introduction and conclusion and transition between topics to demonstrate their understanding of the connections between DNA replication, mutations, transcription and translation.</td>
</tr>
</table>

Chapter Summary

This curricular unit provides an example of how the use of sheltering strategies can allow an abstract, microscopic, and complex topic in biology to be accessible to ELLs in a way that does not sacrifice the rigor of the curriculum. A discussion of the contributions and limitations of the project follows in Chapter 5. Peer Assessment will be summarized and recommendations for further development of the project will also be discussed in Chapter 5.

Chapter 5

DISCUSSION

Contribution of this Project

There is limited information on sheltering high school science in the literature. Most of the available literature is focused on elementary or middle school. Science content becomes more language intensive and abstract in high school, and this presents challenges to English language learners (Fang, 2006). This unit was an attempt to model how the sheltering strategies used in elementary and middle school can be adapted to shelter advanced content for a high school classroom. A concrete example of this integration has many advantages. One, if regular classroom teachers can shelter their curriculum, it allows for ELLs to become mainstreamed. This allows the same educational opportunities to be provided to all students regardless of language ability. Second, the use of sheltering strategies increases the literacy of non ELL students as well (Gibbons, 2002). Finally, providing educational opportunities where diverse groups of students are working together provides a valuable, real-world cultural experience for both ELLs and non ELLs.

Limitations

This project was tested at a high school that is in its initial stages of ELL recruitment and integration. The project was clearly limited in that there was not a sufficient number of ELLs to demonstrate the effectiveness of the curriculum. However, the process of writing the curriculum was the focus of this project, and the author found that the use of sheltering strategies was appropriate and useful.

Peer Assessment

This project was reviewed by an administrator, a classroom teacher, the ELL coordinator, and the literacy coordinator of the school. Each gave a unique perspective on the curriculum. Their substantive feedback is discussed below.

A suggestion was made that the language objectives should be as specific and descriptive as possible. If appropriate, the language objectives should be similar to or the same as the literacy objectives given to the ELL coordinator from the school district. It is expected that every school report on ELLs' progress towards literacy goals. Therefore, the language objectives of individual teachers should be synchronized with those of the school district.

In the "activating background knowledge" section of the curriculum, there is an expectation that students speak to each other and often to the class as a whole. It was suggested that creating a culture in the classroom where all students are prepared to share at all times is a good idea. However, as important as it is to find ways to hold kids accountable for speaking in English, it is equally important to find ways to lower the risk for ELLs. It was suggested that, in public speaking situations, the affective filter of the ELLs may prevent them from learning. It was suggested that perhaps ELLs could identify someone to speak to the class for them. That way, they are still expected to speak and explain themselves, but the risk is lowered.

It was suggested that many alternatives to writing be provided for the advanced organizer. In this way, while ELLs are struggling to grasp the content, they are not also