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DESIGNING CURRICULUM FOR EMERGING ENGLISH LEARNERS: USING
SCIENCE THEMES TO TEACH PRODUCTIVE ACADEMIC LANGUAGE IN A
HIGH SCHOOL EL CLASSROOM

by

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A capstone thesis submitted in partial fulfillment of the requirements for the degree of
Master of Arts in ESL.

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CHAPTER ONE

Introduction

Introduction

One common complaint that English Language (EL) teachers often make is that they do not have a curriculum for their Entering or Emerging students. Or if they do have a curriculum, EL teachers often feel that the curriculum does not do what they need it to do, especially when it comes to meeting the needs of high school Entering and Emerging ELs. Entering ELs are students who score between 1.0 - 1.9 on a language screener test or on ACCESS 2.0, while Emerging ELs score between 2.0 - 2.9. The adoption of World-Class Instructional Design and Assessment (WIDA) and the Assessing Comprehension and Communication in English State-to-State 2.0 test (ACCESS 2.0) increasingly highlights the need for ELs to receive rigorous instruction across language domains. Likewise, high school ELs have only a short time in which they need to gain a high enough language proficiency so they can meet high school graduation requirements and to be ready to pursue post-secondary education opportunities or begin their careers.

To address this need for appropriate curriculum, I explored the following research question: *How can a science-themed curriculum be designed for Emerging-level high school English learners that focuses on teaching productive academic language?* This question involved research on best practices for teaching productive academic language, which includes both speaking and writing. I researched what WIDA guidelines I should include in my curriculum design. I also looked at the type of speaking and writing

activities to include in order to help students broaden their academic speaking and writing proficiency within an EL Science course.

In this first chapter, I discuss my teaching background and experience. I include information about my teaching background and experience as an EL teacher and explain the importance of curriculum for ELs. I also justify why EL teachers need to explicitly teach academic speaking and writing.

My Professional Background

I began my teaching career in the fall of 2007. I would come to spend my first five years as an elementary EL teacher in two different rural school districts. In both elementary positions, I was the only EL teacher in my building. Later in my career, I was able to finally work in a team environment. I taught adult ESL two nights a week as a second job, and then I started working as a high school EL teacher in my current district. As I grew as a teacher and gained experience, I started to see more and more that there were major gaps in the type of professional curriculum that was available for teaching ELs.

First Teaching Position

I was born and raised in the suburbs of Minnesota. Growing up in suburbia in the 80s and 90s as a white female from a middle class family that only spoke English, I was not aware that English language teaching was a field of study and a career path. However, I was always interested in learning more about other cultures. After finishing my undergraduate degree with majors in history and anthropology, I decided to go back

to school to get my teaching license in ESL education. After earning my teaching license, I moved to a small town for my first teaching position.

In my first school, many of my students were Spanish speakers, though there were a handful of students who spoke other languages as well. While the majority of my students were second-generation immigrants, I did have a few upper elementary students who had just moved to the United States. I enjoyed working with my older beginning level students, but I struggled with finding appropriate materials to use with them. The other EL teachers in the district used our kindergarten materials with their older newcomers. I felt dissatisfied with using kindergarten materials with fifth and sixth graders, and I scoured my bookshelves, looking for instructional materials that I felt were more age appropriate.

As a beginning teacher, I had not yet amassed a large number of resources. However, I found a conversation and grammar book that was written for adults. I figured that it covered a lot of the social language that I needed to teach my students, so I gave it a try for a couple of days. Not surprisingly, my students thought the book was boring. I asked them if they wanted to continue with the book or if they wanted to work with the previous (kindergarten) materials. Since they wanted something more interactive, they chose the kindergarten materials. While the students still learned a lot and made great strides in their English language growth on their standardized language tests, even over a decade later, I still regret that I was not able to provide more age-appropriate materials for them that also met their linguistic needs. I was not able to provide them with higher-level content with language instruction and support. Instead of working on

kindergarten materials, they should have been reading linguistically simple texts about grade-level topics. I should have given them vocabulary and grammar instruction connected to those texts, and I should have provided ways for those students to talk and write about grade-level concepts.

Second Teaching Position

The second school I taught in was also an elementary school. In this school, almost all of my students were second-generation immigrants, and they mainly spoke Hmong, Spanish, or Russian. In this district, I did not have any older newcomers, but I still felt frustrated with a lack of quality curriculum for my students.

While both of my first two school districts had materials for me to use, both districts were also similar in that I had no clear scope and sequence that I was to follow. The term “curriculum document” was relegated to just a concept that I had heard about in my teacher preparation classes at Hamline, but not ever spoken of for our English learners in either school district.

Due to the emphasis placed on Minnesota Comprehensive Assessments (MCA) and Measure of Academic Progress (MAP) scores, I spent most of my instructional time with students in doing guided reading. I brought in a lot of graphic organizers, pre-taught vocabulary and background knowledge, and incorporated small amounts of writing. However, I did not do a lot of direct speaking instruction. It was never something that I was taught how to do during any of my EL education coursework. At the time, speaking instruction was not considered to be very important for students beyond the newcomer level. It was believed to be embedded in the literacy instruction we did with our students.

In many ways, this incorrect belief was reinforced by the Minnesota Modified Student Oral Language Observation Matrix (MN SOLOM) test, the speaking part of the MN Minnesota Test of Emerging Academic English (TEAE) test that ELs were required to take every year. These were the standardized tests that measured students' English language proficiency. The SOLOM was a rubric that the teacher filled out to measure speaking proficiency. Eventually, the MN TEAE and SOLOM were replaced by the ACCESS and then ACCESS 2.0, which require a very high level of academic speaking in order to be considered proficient in speaking. Looking back, I wish that I had understood the importance of and how to explicitly teach academic speaking to students. I feel that it would have benefited these students immensely.

High School Teaching

I eventually left elementary EL and started teaching high school EL in my current school district. It is a suburban district and our ELs speak many different languages. We have students at all levels of English language proficiency. Some of our students are second and third-generation immigrants, while other students are immigrants themselves. We have students with limited and interrupted schooling, and we have students who were highly educated in their home countries.

It was not until I started in my current district that I was able to fully experience how much collaboration helped with my teaching and planning. Since my district has a large EL population, we are able to do a lot of cross-district collaboration with other high school EL teachers and have professional development specifically for EL teachers.

When I started in the district, some of our classes had curriculum documents, while other classes did not. At one point, I was teaching a combined class of entering and Emerging students. I had 27 students in my class and no curriculum documents. I had a content-based textbook that was okay for my higher Emerging students, but not accessible for my entering students. Not only that but while the textbook was written for English learners and was supposed to include language instruction, it focused heavily on content, with little focus on language development.

Thankfully, that same year, our secondary EL department was really starting to take a closer look at how we taught language. We had several professional development sessions where we took a very close look at the Minnesota 2009 science 9 standards. Science 9 is a class that every student in my district needs to take in order to graduate. However, it is also the class with the highest failure rate across the school district. All of the high school EL teachers spent time unpacking the 2009 standards, looking at what language our EL students needed to know in order to be successful in the class.

That summer, three of us spent two weeks creating an EL Science 2 curriculum document for our Emerging level students. We focused on the language students would need. However, once we started to implement it the following school year, we became aware of several concerns. The first problem was that while we had learning goals for our students, we could not find reading materials at a comprehensible reading level. We also had put too much into our class. By trying to include all of the languages that we thought of as being important, we had lost focus. The following summer, we worked on revising the class.

In subsequent summers, I worked with my colleagues on writing curriculum for EL Social Studies, EL Science 1, and language development classes for our Entering, Developing, and Expanding students. We spent a great deal of time thinking about what type of language structures and functions are needed for various speaking and writing tasks, assignments, and texts. We also learned how to incorporate grammar instruction within content, as well as figuring out what type of sentence frames or starters we should use for assignments. We included speaking and writing activities, but I still felt that the speaking and writing components could be improved upon.

Research Rationale

Even though we created an EL Science 2 curriculum, the curriculum is going to have to be rewritten. The 2019 Minnesota Science standards have recently been published. In these new standards, the science 9 standards are drastically different, both in benchmarks and in theme (Minnesota Department of Education, 2019). Because my district wants our EL Science 2 class to help prepare Emerging level ELs with the language they need for passing science 9, EL Science 2 is going to have to be completely rewritten.

While the old EL Science 2 curriculum included speaking and writing components, I always felt that I could be teaching these components better. Speaking and writing about science is going to be something that students are going to need to be able to do for the new standards, since there is a focus on engineering and solving problems throughout the new standards (Minnesota Department of Education, 2019). Additionally, my school district is in the process of adopting Standards-Based Grading, and the new

science 9 curriculum will likely include several projects that students have to create. Since the science department at my school has been emphasizing Claim, Evidence, Reasoning, this will also likely be included in the new curriculum. This type of argumentation is also supported by WIDA (2016), and can be explicitly taught to students for both speaking and writing purposes (Osborne et al., 2016). Any new curriculum should emphasize academic speaking and writing skills, as well as incorporate a variety of activities for students to practice these skills and increase their English language proficiency. Therefore, I want the new EL Science 2 curriculum to include strong speaking and writing components.

Importance of Teaching Speaking

Early in my teaching career, I underestimated the importance of teaching academic speaking to my ELs. I mistakenly believed that only newcomers needed explicit speaking instruction and that higher students would pick up speaking. At the time, I believed that reading and writing were the most important language domains that I needed to teach. I have since realized just how important explicit speaking instruction is for English learners at all proficiency levels. Many advanced-level, U.S. born ELs are not proficient on ACCESS 2.0 when it comes to speaking. This is likely due to not being explicitly taught academic speaking. Many EL teachers used to view asking reading comprehension questions as a way to embed speaking instruction. However, just answering an occasional reading comprehension question is not sufficient speaking instruction or practice for students. Not having strong academic speaking skills puts students at a disadvantage in their mainstream classes as well.

Academic speaking also connects to reading and writing. Having a high level of academic speaking means that students have a broader range of vocabulary and syntax. This leads to stronger reading comprehension and to more sophisticated writing. After all, it is much easier for someone to write something down if they can also say it.

Importance of Teaching Writing

Like speaking, teaching writing is absolutely critical. Writing is one of the most challenging language domains. Many native English speakers struggle with writing, and many colleges say that their students are underprepared when it comes to being able to write. It is commonly discussed among EL that for many ELs, writing is the last area in which they become proficient. On the ACCESS 2.0 test, developing and expanding ELs tend to plateau when it comes to writing proficiency. This trend is nationwide.

Since it takes a long time to become a proficient writer, it is absolutely crucial that Emerging level high school ELs are explicitly taught the beginning components of academic writing.

Summary

In this chapter, I discussed my professional background. I also explained the importance of having an appropriate curriculum for students with lower language proficiencies. I also referenced the need to develop a new curriculum based on the new 2019 science standards. Finally, I explained the importance of teaching academic speaking and writing and how ELs need to be explicitly taught speaking and writing in order to gain academic language proficiency.

In the next chapter, I will discuss the literature surrounding teaching speaking and writing to ELs, along with teaching academic language within the theme of science. In chapter 3, I will provide a detailed description of my project. Lastly, in chapter 4, I will reflect on my project.

CHAPTER TWO

Literature Review

Introduction

Throughout my teaching career, I have noticed that there is a lack of quality professionally-developed curriculum for English language learners. The curriculum that is available is always missing key components. One of the classes that I teach is for Emerging-level high school English language learners. This class uses the science 9 standards as themes and focuses on language development. However, the science 9 standards are changing, and the class will need to be rewritten. I also feel that the current version of the class does not incorporate enough academic speaking and writing components. This is why I am examining the question: *How can a science-themed curriculum be designed for Emerging-level high school English learners that focuses on teaching productive academic language?*

This chapter reviews the literature connected to the areas that need to be considered when designing curriculum for Emerging-level high school English learners. The first section discusses WIDA and how WIDA views the levels of English language proficiency. It also references the “can do descriptors,” and explains how they give examples of what Emerging level students in grades 9-12 should be able to do as they reach the end of the Emerging proficiency level. It specifically explains Emerging-level can do speaking and writing descriptors.

The next section covers academic speaking. It will explain what academic speaking is and why it is important. Then it will provide strategies to increase students' academic speaking skills, including talking about the use of sentence frames and starters, along with dialogue roleplays. Lastly, this section will explain how academic speaking connects to academic writing.

The third section is centered around academic writing. It references strategies for teaching writing. It also highlights how Claim, Evidence, Reasoning can be used when writing and speaking about science content.

The fourth section focuses on academic vocabulary and language. It will provide an overview of the types of vocabulary, how to choose words to teach, and give examples of activities to do with students. It also discusses academic structure and academic language functions.

The last section explains how the research connects to what is needed for curriculum development in order to design an effective curriculum for Emerging level high school English learners.

Linguistic Needs of Emerging ELs

Under WIDA, English language learners are leveled into five different language proficiencies: Entering, Emerging, Developing, Expanding, and Bridging. Students at each level have a generalized description of what they are able to do linguistically. This section will provide an overview of what high school aged Emerging English learners can do. It will explain this with regards to the four language domains: listening, speaking,

reading, and writing. The next part of the section will then discuss what Emerging language learners need to learn in order to progress linguistically in writing and speaking.

WIDA is a multi-state consortium that guides standardized assessment and instruction for English learners, or ELs. While WIDA (2016) does not include standards, the organization does have what they refer to as “can do descriptors” for each language proficiency level. These “can do descriptors” give examples of what ELs should be able to do by the time they reach the end of each proficiency level. The descriptors explain what students should be able to do with regards to listening, speaking, reading, and writing. These descriptors also explain how ELs can use language in order to recount, explain, argue, and discuss (WIDA, 2016).

Speaking Can Do Descriptors

In order to advance to the next language proficiency level, Emerging ELs in grades 9-12 need to be able to do several specific speaking tasks. According to WIDA (2016), ELs need to be able to use oral academic language to recount, explain, argue, and discuss.

For Emerging ELs, the speaking “can do descriptors” provide some examples of what ELs should be able to do when it comes to recounting, explaining, arguing, and discussing. For example, Emerging ELs can recount by “restating information using content-specific terms” and “providing examples of content-related information previously studied” (WIDA, 2016, p. 4). Besides restating and providing examples, Emerging ELs can also explain by “naming properties, characteristics or features of illustrated content related topics” and “posing and responding to Wh Questions that relate

to phenomena” (WIDA, 2016, p. 6). ELs can explain topics and ask and answer questions. In addition, Emerging ELs can argue by “responding to oral or written claims” and “offering facts or opinion statements as appropriate to discussion” (WIDA, 2016, p. 8). Lastly, Emerging ELs can discuss by “asking and answering questions,” “communicating need for clarity of messages,” and “recognizing intonation used to achieve various purposes of communication (WIDA, 2016, p. 10). Therefore, when considering the content and structure of curriculum design for Emerging level ELs, these speaking descriptors need to be taken into account.

Writing Can Do Descriptors

Similar to speaking, WIDA also has “can do descriptors” for Emerging ELs in the writing language domain. Here, WIDA has descriptors for writing when it comes to arguing, explaining, and recounting. However, unlike speaking, discussing is not an area that is included for writing.

WIDA gives many various examples for what Emerging ELs in grades 9-12 can do when writing. When it comes to recounting, ELs can recount by “following patterns specific to narrative or informational text (e.g., orientation, presentation of events, conclusion)” and “sequencing narratives or informational text using linking words and phrases” (WIDA, 2016, p. 5). When writing to explain, ELs can use “transitions and connectors to show causal relationships or procedures” and choose “everyday or technical language to describe phenomena” (WIDA, 2016, p.7). When writing arguments, ELs can argue by “expressing claims with evidence (e.g., ‘Socialism is a good government system because...’)” and “listing content related ideas that represent

different points of view on issues” (WIDA, 2016, p. 9). Therefore, the writing instruction for Emerging level ELs should either focus on recounting, explaining, or arguing. These are all multi-layered writing tasks, but an effective curriculum design for ELs will include at least one of these areas of writing in each unit. The unit would then need to include lessons and scaffolds in order to help ELs learn how to increase their proficiency within that writing focus.

Summary

This section discussed WIDA and WIDA’s “can do descriptors”. It provided information about what Emerging ELs in grades 9-12 should be able to do by the time they are at the end of the Emerging proficiency level. This section specifically referenced the can do descriptors for writing and speaking, and it gave examples of what students can do when it comes to arguing, discussing, recounting, and explaining. These can do descriptors for both speaking and writing should be considered when designing curriculum for ELs. An effective unit would then highlight one of the areas of arguing, recounting, or explaining, and teach students the skill, vocabulary, and language structures for speaking and writing within that area. Since discussion is specific only to WIDA’s speaking can do descriptors, it is likely something that would also be embedded along with either arguing, recounting, or explaining. The next section will provide ideas for how to teach academic speaking to English learners.

Teaching Speaking

Speaking and writing are two of the language domains that English learners need to master in order to become proficient in English. Yet, many professional English

language curriculums either do not include speaking instruction or they gloss over speaking, almost adding it as an afterthought. This section discusses the difference between conversational and academic speaking. The second part of the section will show different approaches teachers can use in order to help their students grow their academic speaking skills. The last part of the section will explain how teaching speaking improves students' academic skills and how it connects to writing.

Academic Speaking vs Conversational Speaking

While conversational speaking is usually quickly acquired by English learners, academic speaking skills take much longer in which to develop proficiency. This is largely due to the fact that academic speaking requires a greater depth of language acquisition.

Conversational speaking and academic speaking are very different. Basturkmen (2002) explained that in conversational situations, people speak in shorter turns and focus more on relationships with friends and family. Basturkmen (2002) contrasted this with academic speaking, where speakers talk for longer periods of time and focus on complex information that often needs to be previously organized; academic speaking also uses more complex linguistic structures as well. Another component of academic speaking is that speakers can analyze and synthesize information (Fleener & Beene, 2019).

Growing Academic Speaking Skills

Given the complexity and importance of academic speaking for English learners, teachers need to explicitly teach and build in time for academic discourse. Students need to be talking about concepts in the classroom (Fisher et al., 2008). As Fisher et al. (2008)

explained, “If students aren’t using the words, they aren’t developing academic discourse... The key is for students to talk with one another, in purposeful ways, using academic language” (p. 8). The only way students will be able to grow in their academic oral language is by having opportunities to produce academic language.

This academic oral language production goes beyond simply answering teachers’ questions. When the teacher is asking all of the questions, most of the academic discourse is being produced by the teacher, with students usually only giving short answers (Fisher et al., 2008). By giving students a chance to have actual dialogues, they are more likely to learn and grow their academic speaking skills (Fisher et al.).

Fleener and Beene (2019) agreed that students need to produce more academic language and that a teacher asking questions often does not elicit long, complex responses. However, they provide a strategy for teachers to use in order to help students elaborate on their responses. Termed WIT questioning, this strategy involves a teacher making a chart and modeling how to use the chart. This chart includes these follow up questions in order to help students learn how to elaborate: “Why do you think? Is there another...? Tell me more about...?” (Fleener & Beene, 2019, p. 45). While only using this chart does not provide enough oral language practice for students, it is one strategy teachers can use in order to elicit more oral academic language production.

Strategies. Besides WIT, there are many strategies teachers can use in order to help students improve their academic speaking skills. One strategy is through the use of observation (Basturkmen, 2002; Zwiers & Soto, 2016). Basturkmen (2002) suggested having students observe both expert speakers and themselves through a recording in order

to analyze and reflect on language usage. Basturkmen also mentioned using transcripts for analysis so that students are better able to notice the “more subtle and intricate features of language use (e.g., indirect pragmatic acts, hedging, patterns of interaction in complex exchanges, and the sequential organization of long turns)” (Basturkmen, 2002, p. 30). However, Zwiers and Soto (2016) approached observation in a different way.

They suggest the use of observer cards, where a teacher or peer observer has cards with prompts or sentence frames that they can put in front of students during a conversation.

These cards would only be used when students “ need help: they are not talking, they are off topic, they are arguing un-academically, and so on” (Zwiers & Soto, 2016, p. 43).

While Basturkmen (2002) and Zwiers & Soto (2016) had different suggestions for how to use discourse observations, they both agree that the use of observation is one way to help students increase their academic oral language.

Besides observation cards, another visual way to help students is the use of an If-When-Chart. Zwiers and Soto (2016) recommended that teachers create a chart for various struggles or breakdowns in conversation and provide ideas and sentence frames to help support students to be able to move forward again in their conversations.

Conversation prompts are another tool that teachers can use in order to facilitate academic conversations. A conversation prompt is “a deep question that drives a unit or discipline; a thinking skill that students need to use in the discipline; a task or product that shows students’ learning; and a life experience that connects to the learning. These four bases can also overlap” (Zwiers & Crawford, 2011, p. 63). These conversation prompts should be designed to encourage students to talk a lot in their conversations. Not

only do these prompts encourage the development of new ideas, but they should also be structured so that students will be able to use target vocabulary and target grammar (Zwiers, 2019). In order to help students to be able to be successful when responding to the prompts, teachers should “scaffold these academic conversations by modeling the language, offering response starters, and providing word banks” (Zwiers, 2019, p. 97). Another scaffold that teachers can incorporate is to provide organizers for students to organize their thoughts before conversations (Zwiers & Crawford, 2011). For example, if students were asked to justify why one energy source is better than another, there are several supports teachers could provide. First of all, the teacher would need to provide an example of the type of response they are looking for. This would involve modeling the response and using a think aloud. Then, the teacher would need to give students a word bank with words they might need to answer the question, along with sentence starters to help students focus their ideas. The teacher may also choose to include specific grammar structures within the sentence starters in order to facilitate practice of that language structure. The word bank words may also be target vocabulary words that students should practice using as well. These are all ways a teacher can integrate language instruction and speaking practice when designing instruction.

Sentence Frames and Starters. While practicing academic language, students may need additional support. One way for teachers to support students is to provide students with sentence frames or starters. Fleenor and Beene (2019) maintained that “academic conversations must be structured” (p. 43). Sentence frames and starters are ways to help provide structure Overall, the use of sentence frames and starters help

support academic conversations and language development (ColorinColorado, 2016; Fleenor & Beene, 2019).

However, some researchers have mixed opinions on sentence frames and starters, suggesting that teachers need to be careful how and when to use these supports. Ziewers and Soto (2016) believed that sentence frames can stilt conversation and that students need the freedom to have more open conversations. Yet, Zwiers and Soto (2016) also explained that sentence frames “can when used strategically, sparingly, and optionally, help develop students’ academic language as they use language to communicate. They can also hamper, hinder, and halt the flow of conversation as students look at a paper or the wall” (p. 46). Therefore, this seems to imply that sentence frames and starters should not be used all the time, and English learners need to have some opportunities for more open academic conversations. However, sentence frames and starters should still be used in order to help learners acquire more academic language. They provide scaffolded support, and they are a way to help model and teach specific language structures and grammar.

Role Plays. Not only are simulations and role plays another strategy to increase students’ academic speaking proficiency, but they are also a strategy that may involve the use of sentence frames and starters at times. Many researchers advocate for the use of roleplays as a language acquisition tool (Zwiers & Crawford, 2011; Zwiers, 2019; Watson, 2015; Fleenor & Beene, 2019). Simulations and role plays can also be used to incorporate real world experiences with academic discourse (Zwiers & Crawford, 2011). An example of a roleplay is when students can pretend to be two different processes or

objects and have a conversation (Zwiers, 2019). Or, as Fleenor and Beene (2019) proposed, teachers can have students take the roles of an expert and a novice. With this type of roleplay, students brainstorm questions about a topic and then the novice asks the expert questions about the topic. To end the roleplay, the novice paraphrases what the expert says, using the sentence starter “It sounds like you’re saying...” (Fleenor & Beene, 2019, p. 46).

Routine Integrated Structured Academic (RISA) dialogues are another type of roleplay that helps with students practice oral academic language. RISA dialogues should be used after students have artarting learning about a topic, and they should be included in a class at least three times a week (Watson, 2015). There are three different types of RISA dialogues that can be used, depending upon students’ proficiency levels and the targeted language task. The first type of RISA dialogue is a dialogue skit. This type of RISA dialogue is best suited to entering and Emerging level students. Students are either given a complete dialogue text or they are given a dialogue with some missing words and a list of the target vocabulary. Students then act out the dialogue with a partner (Watson, 2015). The next type of RISA dialogue is called “I have a question.” This type of dialogue can be modified for the various proficiency levels, but likely works best with Emerging or developing students. With this type of dialogue, the questions are provided, and then one partner has to answer the questions using sentence starters (Watson, 2015). The last type of RISA dialogue is called HOTS (higher order thinking skills) and is best used with students at the developing level or higher. In this dialogue, students are given

frames and then have to incorporate their own ideas when asking and answering the questions in a way that fits the provided sentence frames (Watson, 2015).

RISA dialogues give students the opportunity to practice structured academic language and vocabulary. By practicing the dialogues multiple times, students start to internalize some of the targeted academic language structures and vocabulary. This helps students to not only become more proficient in academic speaking, but it also helps with students overall academic language proficiency growth. Since Emerging ELs are often still working on trying to think of the correct words for language output, RISA dialogues are one tool that can be used when designing curriculum for Emerging level ELs. They are a scaffolded practice activity that can benefit Emerging ELs by helping to promote speaking fluency, as well as practice grammar structures and using vocabulary words.

Connection to Writing

While incorporating speaking practice activities helps build oral academic language proficiency, these speaking activities also help improve students' writing. Zwiers and Crawford (2011) maintained that "grammar is highly rooted in one's oral language. If the ability to form coherent thoughts in different grammatical ways is already in one's head, then reading, listening, and writing challenging texts becomes more automatic" (p. 91). Increasing academic speaking proficiency can also increase academic writing proficiency.

One direct way that speaking and writing can be connected is through an activity where students talk in paragraphs with topic sentences. Zwiers & Crawford (2011) say that this activity "helps students to elaborate, paraphrase, build on ideas, and synthesize.

It develops students' abilities to generate an idea and craft it into a strong topic sentence that is followed by additional sentences that support it" (Zwiers & Crawford, 2011, p. 94). To prepare for this activity, the teacher thinks of open-ended review questions or student pairs think of questions. Students then take turns asking each other different questions. If extra support is needed, students can use graphic organizers to brainstorm and formulate ideas, but they cannot look at the organizer when speaking (Zwiers & Crawford, 2011). By practicing focused paragraph speaking, students will be better able to write strong academic paragraphs.

Summary

This section discussed academic speaking. It explained what academic speaking is and provided examples of ways teachers can help students grow their academic speaking proficiency. It referenced strategies to use, discussed the pros and cons of sentence frames and sentence starters, and explained different types of speaking roleplays. This section also explained how academic speaking connects to academic writing and how focused paragraph speaking can help improve writing skills. The next section will give ideas for how to teach writing.

Teaching Writing

Similar to speaking, writing is also a form of productive language. It is also often the last language domain that English learners gain proficiency in. This section will give an overview of different strategies for teaching academic writing. The second part of the section will discuss teaching claim evidence reasoning, often referred to as "CER," as it

relates to writing. Lastly, it will discuss specific ways CER is used in science classrooms.

Strategies to Teach Academic Writing

As with academic speaking, academic writing needs to be explicitly taught to English learners. Teachers should approach writing instruction as a process, instead of simply summative products (Heller, 2015). Heller (2015) explained that students need to write more often but teachers should only spend no more than five minutes giving focused feedback for each piece of writing. For instance, teachers should give feedback for the two or three objectives for the assignment, and give feedback on the two or three objectives that students will see in the next writing assignment (Heller, 2015). Focusing the type of feedback given allows teachers to be able to give back feedback quickly, and it also means that teachers are able to assign more writing assignments more frequently.

When teaching writing to English learners, teachers need to connect that writing to a content topic. Hickey and McQuitty (2016) stated that even English teachers should “embed nonfiction writing instruction within authentic activities that reflect disciplinary perspectives” (p. 102). By connecting writing to content topics, students can also learn the academic language that is required by professionals in those fields, and they can have the opportunity to learn how to write and understand meaningful texts (Hickey & McQuitty, 2016).

Science is one content area in which students should be expected to write about. Fleenor and Beene (2019) argued that “writing is particularly important in the conceptually complex, vocabulary-rich environment of the science classroom because it

helps students synthesize new ideas and make new connections within the content” (p. 37). This implies that by incorporating writing tasks, teachers can help students understand ideas and make connections with the material.

When incorporating writing with science content and topics, there are several aspects that teachers need to consider. First of all, these writing tasks can also be a way “for teachers to explain and demonstrate how a discipline's purposes and activities influence its language” (Hickey & McQuitty, 2016, p. 102). Besides drawing attention to language usage, a teacher should consider the types of writing prompts that are often used in that content area. “Prompts for science writing usually use the following verbs: state/identify/label, compare/contrast describe, explain, predict, justify” (Fleenor & Beene, 2019, p. 38). By using these verbs when constructing writing prompts, EL teachers can help students to become not only more proficient in their writing, but also help them to be more successful in their mainstream science classes.

There are also some specific types of writing activities that teachers can use to help teach English learners how to write about science content. One of these activities is called Tales from a Graph, where teachers give students a graph with labels on it. This is an analyzing task, where students “write one or two paragraphs analyzing the experiment on which the graph was based” and include descriptions of scientists’ actions (Fleenor & Beene, 2019, p. 39). The teacher gives students questions and sentence stems in order to help scaffold this activity (Fleenor & Beene, 2019). Another writing task that teachers can use with students is Example/Non-example, where students analyze why a

teacher-provided writing sample is a high quality response and why a different teacher-provided writing sample is not a quality response (Fleenor & Beene, 2019).

Written conversations are another strategy teachers can use, where the class takes the point of view of different structures from the unit and brainstorms how those elements would think and their beliefs. After that, students pair up and take turns writing notes back and forth to each other from the point of view of different structures (Fleenor & Beene, 2019). By incorporating these types of writing tasks, teachers can help ELs increase their writing abilities.

Claim Evidence Reasoning

Claims Evidence Reasoning (CER) is another type of both academic writing and speaking that is beneficial for English learners to know how to utilize. It is a type of academic language discourse that is often found in mainstream science classrooms (Osborne et al., 2016).

CER requires students to make a claim, give evidence, and provide reasons for how the evidence supports the claim. It is a way to help students to move beyond “just because” answers (Grymonpré et al., 2012, p. 24). In one study, when middle school science teachers focused on what they referred to as CERC writing (Claim, Evidence, Reasoning, and Conclusion), they found that their students’ writing scores increased on their state’s standardized writing test (Grymonpré et al., 2012). Additionally, CER also supports WIDA’s argumentation goal for ELs of making claims and supporting those claims with evidence (WIDA, 2016).

CER can specifically be used to write and talk about science content. This is because “scientific claims are statements or assertions about the natural world. Scientific claims include what happens in nature and what causes natural phenomena to occur” (Osborne et al., 2016, p. 5). When talking about claims with regards to science content, a claim is essentially what someone is trying to “argue for” or “justify”(Osborne et al., 2016). Sometimes the data is used for the evidence portion of CER (Osborne et al., 2016, p. 6). Through the incorporation of CERS in curriculum design, English learners will be exposed to scaffolded higher level writing tasks that will provide ways for students to use higher level language and thinking skills. This type of writing will not only help students to be more successful in their mainstream classes, but it will help with their language proficiency as well.

Summary

This section covered the importance of teaching academic writing to English learners. It also explained why writing about content topics is important, and it provided examples of writing activities for teachers to use when having students write about science topics. It explained that structured writing tasks are needed, and it examined different examples of writing activities. One important writing activity that teachers can use when writing about science topics is Tales from a Graph. This section also discussed CER and how it can be used for writing about science content. The next section will cover academic language and vocabulary.

Academic Language and Vocabulary

Academic language and vocabulary instruction are important for helping increase students' overall language development. The first part of the section will give an overview of vocabulary instruction. Then, the second part of the section will cover academic language instruction. Lastly, the third part of the section will discuss academic language and vocabulary that is specific to science content.

Vocabulary Instruction

Before vocabulary instruction can occur, teachers need to select the vocabulary words for instruction. Beck et al. (2013) described classifying vocabulary words as tier 1, tier 2, or tier 3 words. Calderon and Soto (2016) continued to build on this work. Tier 1 words are everyday words, tier 2 words are academic words students will see across content areas, and tier 3 words are content specific words (Kinsella, 2017). Tier 2 and 3 words are where teachers should spend their instructional time. Tier 2 words should be taught prior to students reading a text, while tier 3 words need to be taught as students see the words in their text in context; these tier 3 words should be words that are essential for text and content comprehension. Calderon and Soto (2016) explained that many of the tier 2 words that are essential for teachers to explicitly teach students fall under the following categories: “transition words, phrases and clusters, polysemous words (homonyms or homographs), cognates and false cognates, more sophisticated words for rich discussions and for specificity, [and] idioms and collocations” (pp. 22-23). The tier 2 categories that Calderon and Soto identified contain many types of academic words that students will see and need to understand across many types of academic tasks and various content areas.

While Calderon and Soto believed in classifying words in tiers, Kinsella views vocabulary selection differently. In *languagemagazine.com*, Kinsella (2017) disagreed with simply classifying words into tiers. She advocated that teachers should choose “words that are important to understanding and discussing the key ideas and details within the informational text.” Kinsella (2017) also wanted teachers to balance words connected to the topic with high utility words that students will see across topics and content areas. While Kinsella’s views seem to align with Calderon and Soto’s, the difference with Kinsella’s stance is that there could be times when the words that need to be taught are tier 1 words.

Once a teacher has selected the words, they will then teach the vocabulary words. Vocabulary instruction needs to be explicit (File & Adams, 2010; Pearson ELT USA, 2010). Kinsella said that students need to be given an example of the word in a complete sentence. Kinsella also believed that students need to be given a response frame to help guide their word usage, say their sentence orally, and using the response frame, they need to write the word in a sentence (Pearson ELT USA, 2010).

Vocabulary Strategies. There are several different strategies and activities teachers can for students to practice vocabulary words. One activity involves giving students vocabulary word cards. With this activity, students have to connect the word cards (Zwiers & Crawford, 2011). By connecting the word cards, students are thinking about the words and identifying the connections and relationships between the words.

Tap and Talk is another vocabulary activity. Fleenor and Beene (2019) explained that with Tap and Talk, the teacher gives students pictures and a word bank. Students

work with a partner or group, pointing to pictures and saying which vocabulary word goes with the picture and why. Students are also given the sentence frame “I think this picture represents ___ because___,” which they need to use as they explain why pictures show specific vocabulary words (Fleenor & Beene, 2019, p. 44). Both Tap and Talk and connecting vocabulary word cards are higher level vocabulary activities. They require students to think more deeply about the vocabulary words than simply memorizing definitions requires. Students have to explain their rationale as well, which also requires students to produce more academic language and to use the vocabulary words in authentic ways.

Academic Language Instruction

In addition to academic vocabulary, academic language is also a type of language instruction that needs to occur. Academic language includes language functions, which are used in both oral and written language (Hill & Miller, 2013, p. 2). Hill and Miller (2013) differentiated between language structure and language function. They write, “The term language structure refers to what students say: the phrasing, key words, and grammatical usage that students will need in order to participate in both oral and written communication” (p. 3). This means that language structure is the language production component to speaking and writing. “Whereas language function is the ‘purpose’ for talking, language structure refers to the what” (Hill & Miller, 2013, p. 3). Language functions then are the reason why people speak and write. For instance, WIDA’s focus on argumentation means that “argue” is a language function.

Teaching language functions and language structures helps students increase their academic language production and their academic language comprehension. However, when teaching academic language, teachers also need to teach why those features are present in order to fully help students learn (Hickey & McQuitty, 2016). Other important teaching considerations are to use sentence starters, explicitly teach vocabulary words, and to provide grammar minilessons for use in context (Hill & Miller, 2013).

Summary

This section discussed the three tiers of vocabulary and what teachers should consider when selecting vocabulary words to teach. It also gave ideas for vocabulary activities to do with students. Lastly, it coerced academic language and explained the differences between academic structures and academic language functions. The next section will explain the implications for curriculum development.

Implications for Curriculum Development

A review of the literature showed that while there is a great deal of research and theory about best practices for teaching language to English learners, there still is a great deal of work to be done in curriculum design. The research shows me that the unit I design needs to focus on several elements.

First of all, a unit needs to be language-rich, centered around a science theme. Since one of the themes in the new science 9 standards is water (Minnesota Department of Education, 2019), I designed my unit around this theme. Water is a language-rich theme that can incorporate a great deal of complex language and language tasks. Since one of the areas that WIDA emphasizes is the language function of argumentation, I also

incorporated argumentation in this unit. Additionally, I included a great deal of academic speaking instruction and tasks. Some of the tools I used include conversation prompts, RISA dialogues, sentence frames, and focused paragraph speaking.

Since my unit focuses on argumentation, I also included a lot of Claim, Evidence, and Reasoning instruction and assignments for both speaking and writing.

Summary

This chapter showed the various components that need to be considered when designing curriculum for English learners. It explained WIDA's "can do descriptors" for high school Emerging students. One area of focus for curriculum design that stems from WIDA's can do descriptors is argumentation. Argumentation is a skill students need to know how to do in both academic speaking and writing. This chapter also discussed the importance of and strategies for teaching academic speaking and writing, including CER. Argumentation and CER will be used in designing a science-themed unit for Emerging ELs. Academic vocabulary and language were also covered in this chapter. The vocabulary words selected to be taught are words that students will see in a variety of academic contexts and also words that are essential for understanding the text or topic. This chapter also referenced what research will be used to design a new curriculum unit and the implication for curriculum development. Chapter 3 will then explain how the curriculum was designed and developed.

CHAPTER THREE

Project Description

Introduction

This chapter focuses on my project description. I used the information from my literature review in order to design a project to answer the question: *How can a science-themed curriculum be designed for Emerging-level high school English learners that focuses on teaching productive academic language?* This question is important because English learners need to learn productive academic language in order to be successful in their mainstream classes. I used information from my literature review in order to design a unit of study. This chapter will provide a project description, explain how the project connects to research from the literature review, describe the setting and participants, and give a timeline for the project.

Project Overview

For this project, I designed a 5-6 week curriculum unit for high school Emerging-level English learners. The focus of the design is language instruction, with a particular emphasis on the productive language domains of academic speaking and writing. Within those language domains, I particularly focus on argumentative speaking and writing. A significant portion of the unit is dedicated towards teaching Claim, Evidence, and Reasoning in terms of academic speaking and writing. Not only is argumentation something that WIDA considers to be important for English learners, but it is also an academic skill that students are expected to know how to do in their mainstream science classes.

While the primary focus of this unit is on language instruction, I used the new 2019 science 9 standards to provide a theme. For this project, the theme is water. For this unit, I incorporated the 2019 science 9 standards that science teachers in my district decided were priority standards. The science 9 standards, found on Minnesota's Department of Education website, were used to create thematic activities. The 2019 science 9 standards that I used are 9E.4.2.1.1 and 9E.3.2.2.1. They are listed in the appendix.

These standards were used to determine the texts I chose, the vocabulary words, language structures, and to design speaking and writing prompts. While I used science content, the actual assessments were on the language targets, not the science targets. The science content was just the vehicle I used to teach language.

The reason I designed this unit is that there is no commercially available curriculum for ELs that I am aware of that adequately incorporates these language and science components. Most professional curriculums also do not include many speaking components. Likewise, there are no available curriculums that also incorporate the themes from Minnesota's science 9 standards as a vehicle to teach academic language in an EL classroom. My project focused on designing activities I can use with my students.

Connection to Research

There are many different researchers whose work I drew on in order to design my unit and instructional activities. The researchers' work was also highlighted in the previous chapter's literature review.

One place I found information from as I created my unit was WIDA. I used WIDA's (2016) "can do descriptors" to guide how I approached my unit design and the level of language complexity I expect from my student. I looked specifically at WIDA's Emerging-level "can do descriptors" for argumentation in speaking and writing. Since WIDA believes augmentation is important, this was my rationale for focusing on argumentation in my curriculum design.

There are also many researchers whose work I used in order to create speaking instruction and activities. Watson (2015) is one researcher who advocated using RISA dialogues with sentence frames in order to help teach academic speaking skills. I also used Ziewers and Crawford's (2011) idea of talking in paragraphs with topic sentences. By doing this, students learn how to elaborate. This also helps to improve academic writing. By incorporating structured academic speaking activities, I provided targeted academic speaking activities and helped students to grow in their academic speaking proficiency.

Osborne et al.'s (2016) book looked at argumentation using evidence in a science classroom. While their book focused on middle school science, many of the ideas they presented can be used to create activities for my unit. They focused on Claim, Evidence, Reasoning for argumentation, and they gave ideas for both speaking and writing. Claim, Evidence, Reasoning (CER) is an academic skill that is also being taught in mainstream science classes in my school. Since this is something that English learners are also expected to be able to do, and since CER relates to WIDA's argumentation can do descriptors, teaching students how to create CERs in terms of academic speaking and

writing helps students with their language proficiency growth and with being able to participate in their mainstream science classes.

Additionally, Fleenor and Beene (2019) wrote what is probably the most helpful resource I have found, a book about teaching science to English learners. Fleenor and Beene (2019) gave examples of strategies to use with ELs to both engage with science content and to practice academic language. I incorporated many of their strategy ideas to create activities to teach speaking and writing. One of their activities that I used was Tales from a Graph. This activity involves students writing about a graph as they analyze the data. The teacher gives students questions and sentence frames in order to scaffold this analysis. This activity supports academic writing, visual literacy in science, data analysis, and it connects to math because students have to read a graph.

Another of Fleenor and Beene's (2019) activities that I incorporated into my unit is Tap and Talk. This strategy provides students with the time to practice talking about vocabulary words, and it gives visuals and sentence frames to support their language and vocabulary development. This activity can be used as a pre-reading activity and as a way to practice vocabulary

I used a modified version of Wiggins and McTighe's (2008) Understanding by Design (UbD) format to create my unit. I included unit understandings, essential questions, and common misunderstandings. I also wrote learning targets and organized them by the four language domains: listening, speaking, reading, and writing. After that, I created a scope and sequence to guide a teacher in teaching the unit.

Setting and Participants

The curriculum I designed will be used in high school EL classrooms with Emerging level students. While I designed it for my own use, I will be sharing my finished unit with other high school EL teachers in my district. This is a year long class as well.

All of the students in my class are Emerging-level students. They can be anywhere from ninth graders to twelfth graders, depending on the year. I teach in a suburban school district, but we currently have 135 ELs in my building. My students have a variety of different home languages, and these languages can vary depending on the year. Some of the languages that my previous students have spoken include Spanish, Arabic, Russian, Ukranian, Romanian, Burmese, Vietnamese, Thai, Somali, Oromo, Ahrmaric, Hmong, Afghan, Hausa, and Liberian English. Generally, in this class I have anywhere from 8-19 students. Some of my students can be more transient. I often gain and lose students throughout the course of the school year. For trimester one of the 2020 school year, I had 9 students in this class. In this class, there were 2 Somali speakers, 3 Spanish speakers, 1 Hausa speaker, 1 Russian speaker, 1 Afghan speaker, and 1 Liberian English speaker.

Timeline

I designed my unit from September - December of 2020. Hopefully, I will be able to use and pilot the unit in the spring of 2021. For my project, I selected texts at an accessible reading level and created speaking, writing, listening, and reading learning targets and activities. I looked at the 2019 Minnesota science 9 standards and the selected

texts to unpack the language and determine exactly what language and language structures need to be included in the curricular design.

Assessment

My unit includes assessments for each of the learning targets. The final summative assessment for the unit is a reading, speaking, and writing CER. For this summative assessment, students need to independently read an article and complete a graphic organizer that shows their comprehension of the text. After that, students use the information from the article to complete a speaking and writing CER. For this assessment, the sentence frame scaffolds are removed. This summative assessment is scored by using rubrics. The teacher then uses the information from the rubrics to come up with holistic scores for the assessment. Prior to completing the summative assessment, students are given several formative assessments. They are assessed on how they are completing their reading graphic organizers, their Tales from a Graph, weekly speaking and writing CERs, and how they are using the vocabulary words in their Tap and Talks and their RISA dialogues. I created rubrics for teachers to use to give students feedback on these formative assessments.

Summary

This chapter explained the context, setting, and audience for my curriculum design project. It also discussed the primary researchers whose work I will be referencing as I design my unit. It also discussed why this unit design is important and how it provides much needed curriculum that is not available commercially. It also described the students and setting, gave a timeline, and it explained the unit assessment. The next

chapter will provide a reflection on my curriculum design project. It will also answer the question: *How can a science-themed curriculum be designed for Emerging-level high school English learners that focuses on teaching productive academic language?*

CHAPTER FOUR

Conclusion

Introduction

My capstone research question was *How can a science-themed curriculum be designed for Emerging-level high school English learners that focuses on teaching productive academic language?* To answer this question, I researched best practices for teaching productive academic language. I looked at productive academic language teaching strategies for both speaking and writing. I then designed a unit using two of Minnesota's science 9 standards that focused on building academic language for Emerging-level high school ELs in a sheltered EL class.

This chapter includes my reflection on the capstone learning process and a revisit of the literature surrounding the topic. It also explains my project's implications and limitations. This chapter will then discuss future projects, how the results will be communicated, and how my project benefits the EL education field.

Reflection on the Capstone Learning Process

I feel that I learned a great deal throughout the Capstone process. I learned that I am often very much an auditory processor, and I need to talk ideas out sometimes in order to figure out if an idea has merit or if it can be adapted to work. I have spent many summers over the years writing curriculum with a small group of my coworkers. I have always felt that working as a team was valuable, but I did not realize just how valuable it was until I was writing curriculum by myself for my capstone project. I have since realized just how important it is to be able to talk an idea out with other teachers. By

talking and brainstorming about ideas and concepts, we are often able to come up with better and more creative ideas as a group than we would as individuals. We would often spend hours hashing out course overviews, and it always made our curriculum stronger. I found that I really missed that aspect as I was working on my capstone project.

I also learned about how many different approaches there are to language instruction and the importance for trying to stay focused on using the same strategies for a unit. I had to be very careful in making my unit streamlined and focused so my students could have multiple opportunities to practice the learning targets.

In addition, I discovered some resources that I want to share with my mainstream teaching colleagues. One of the books I found, *Teaching Science to English Learners* by Fleenor and Beene (2019), is a book that I would eventually like to use in a book study with some of the science teachers in my building.

Revisiting the Literature Review

The parts of the literature review that proved to be the most important for my capstone were the sources that provide specific examples of activities for speaking and writing. I was able to look at the provided examples and create my own activities with new content and language learning targets.

Fleenor and Beene's (2019) book, *Teaching Science to English Learners*, shared two different activities that I incorporated into almost every week of my unit design. These activities were Tales from a Graph and Tap & Talk. In Tales from a Graph, students answer teacher-provided questions about a line graph to explain what happened in an experiment. Fleenor and Beene (2019) designed this to be an academic writing

activity. However, I modified this activity in two different ways. First of all, I often used it as both a writing and a speaking activity. Secondly, instead of having students only talk about a line graph, I included question prompts for writing and talking about diagrams, pie charts, and bar graphs. Besides Tales from a Graph, I also included Tap & Talk activities almost every week as well. This speaking activity incorporates picture visuals and sentence frames. Students are asked to explain why a picture represents a certain vocabulary word and which pictures can represent more than one word. While I had previously done a fairly similar activity as a warm up with my advanced ELs, Fleenor and Beene (2019) presented Tap and Talk in a much more structured format.

Another speaking activity that I used almost every week in my unit is RISA dialogues (Watson, 2015). These RISA dialogues are structured dialogues for academic speaking practice. While I had previously used some RISA dialogues, it was not until I researched Watson's dialogue protocol that I realized how different types of dialogues should be used for different proficiency levels. My unit is designed for Emerging levels, who should be acting out dialogue skits with either full text or in a CLOZE format with a word bank (Watson, 2015). I chose to use the CLOZE format with a word bank of students' vocabulary words.

Another resource that I found greatly beneficial was the book *Arguing from Evidence in Middle School Science: 24 Activities for Productive Talk and Deeper Learning* (Osborne, et al., 2017). I used their general format to create a graphic organizer for organizing a Claim Evidence Reasoning argument, but I added my own questions and sentence frames to the organizer in order to better support ELs.

New Connections to Literature

While each piece of literature I reviewed had different strategies for teaching academic language, none of the literature incorporated their strategies and activities together into a unit of instruction. The unit I designed for my capstone project shows how various language acquisition strategies and activities can be combined together into a thematic unit for Emerging level ELs in grades 9-12.

Implications

Since my unit is replacing an existing unit in an already established class, it is unlikely to lead to any major new policy implications in my district. However, if our future curriculum writing team decides to adopt all or parts of the unit I designed, then any teacher who teaches EL Science 2 in my district would be required to use the learning targets that I wrote.

Limitations

There were several obstacles and limitations that I encountered as I designed and created my unit. One obstacle that I was not anticipating was my lack of knowledge on my unit's thematic topic. While my learning targets focused on areas of language production and acquisition, my unit's theme was the human impact on water. I thought I had a deep understanding of this topic, but as I started looking for texts and videos and creating learning activities, I realized that I only had a surface understanding of the topic. While I was able to learn more about the topic as I read various texts, my initial lack of knowledge slowed the writing process down considerably.

Another project limitation was the lack of texts for students written at their reading level. Unfortunately, I was expecting this to be a limitation. There are very few texts written for lower level high school English learners that also encompass complex and specific topics. Because of this limitation, it was challenging to find texts that fit my learning targets and topic theme. I purchased several books, only to discover that the majority of them did not fit the topic or they were written at an incomprehensible reading level. However, I was able to find one book that I thought would work later in the unit, and I found some websites that provided information at a fairly comprehensible reading level. I was also able to find one article from Newsela and a few readings from Science A-Z to incorporate into the unit. However, because many of the texts that I found were more linguistically complex than I would have preferred, I did have to include a greater number of vocabulary words in my unit than I previously had thought I would. I am hopeful that I will continue to discover more appropriate texts as time goes on though.

An additional limitation is tied to the Covid-19 pandemic. Since one of the purposes of my class is to front load some of the language students will need to know in their science 9 class, I had originally planned on looking at my district's new science 9 ubds as a starting point. However, due to the pandemic, the work that they had originally planned on completing last spring and summer has not happened yet. While I was able to use their priority standards to guide my project, I was not able to connect my unit to science 9's units. My unit may undergo changes in the future due to this unforeseen limitation.

Future Projects

My plan is to use the research I conducted in future units I write for Emerging and entering level students. Based on my research, I discovered new ways of incorporating speaking and writing activities into my instruction. I specifically plan on using Tap and Talk, Tales from a Graph, RISA Dialogues, and CERs in other units and other classes.

I also recommend that any curriculum or unit that is designed for English learners to make sure to strongly emphasize academic speaking and writing. ELs need to be explicitly taught and have opportunities to practice both spoken and writing academic language.

Communicating Results

Either this coming summer or the following summer, a group of high school EL teachers from my district (including myself) will start working on designing the rest of the new units for our EL Science 2 class, based off of the new science 9 standards. My plan is to share my research and unit with the other teachers. My hope is that we can incorporate my research and unit into our course. Since EL Science 2 is a three trimester class, we would still have at least an additional five more units to design.

Project Benefits

I believe that my project benefits the EL education profession in many ways. There is a significant lack of content-based EL curriculum that emphasizes speaking and writing. And as far as I am aware, there is absolutely nothing available that connects directly to Minnesota high school science standards in terms of English language development. Therefore, my curriculum unit will hopefully be a tool other EL teachers

can use. Additionally, my unit could also be an example for other teachers to use when designing their own units.

Summary

This section discussed my capstone reflection and what I learned from the process. It also reviewed what literature was the most valuable to my project, and it explained how my project adds to the overall literature. This section also stated my project's implications, limitations, how it will affect future projects, how I will communicate my results, and the benefits of my project.

Throughout the course of my research and my unit design, I looked at how productive academic language--speaking and writing--could be taught and incorporated into a science-themed unit for high school Emerging-level English language learners. I had previously found that academic speaking is an area that is often not explicitly taught in curriculum that is available for purchase. Likewise, my unit design is the first unit that I am aware of that uses some of the new Minnesota science 9 standards, the ones that focus on water, to teach academic English to Emerging-level English learners in a sheltered EL classroom. My hope is that teachers will continue to use grade-level themes as a vehicle for language development and acquisition.

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APPENDIX

2019 Minnesota Science 9 Water Standards

9E.4.2.1.1 Compare, integrate and evaluate sources of information in order to determine how specific factors, including human activity, impact the groundwater system of a region. (P: 8, CC: 2, CI: ESS2, ETS2) *Emphasis is on the making sense of technical information presented in a variety of formats (graphs, diagrams and words). Examples of sources of information may include student experimental data. Examples of factors may include porosity, permeability, sediment or rock type, recharge or discharge factors, and potential energy. Examples of human factors may include usage rates, run-off, agricultural practices, and loss of wetlands.*

9E.3.2.2.1 Evaluate or refine a technological solution to reduce the human impacts on a natural system and base the evaluations or refinements on evidence and analysis of pertinent data.* (P: 6, CC: 7, CI: ESS3, ETS1, ETS2) *Emphasis is on prioritizing identified criteria and constraints related to social and environmental considerations. Examples of data for the impacts of human activities may include the quantities and types of pollutants released into air or groundwater, changes to biomass and species diversity, or areal changes in land surface use (for surface mining, urban development, or agriculture). Examples for limiting impacts may range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).*