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A Text Analysis of How Passive Voice in a Biology Textbook Impacts English Language Learners

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A TEXT ANALYSIS OF HOW PASSIVE VOICE IN A BIOLOGY TEXTBOOK
IMPACTS ENGLISH LANGUAGE LEARNERS

By

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A capstone submitted in partial fulfillment of the requirements for the degree of Masters
of Arts in English as a Second Language

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CHAPTER ONE

INTRODUCTION

“Miss, it’s a teacher’s job to teach.” This sentence will probably haunt me for the rest of my professional teaching career. A struggling English Language Learner (ELL) told me this after I asked what he was thinking. We had just ended our co-taught biology class. The biology teacher was beyond frustrated at the low level of student comprehension in the classroom. My student observed the fact that one of his teachers had given up on him as well as the rest of his classmates. I was caught somewhere in the middle. My obligation is to teach where the principal tells me to teach. As an English as a Second Language (ESL) teacher I do not get to choose which subjects I teach or which classrooms I co-teach in. I cannot control the actions of my colleagues. I can show up, do my best, and believe in my students. However, that is not always enough to create a successful learning environment. This student, whose eyes were moist when he shared his thought with me, felt broken. I did, too.

I work at an urban high school in the upper Midwest. Despite the story above, I absolutely love my job. The students that I work with are wonderful, respectful, responsible, caring, and kind. They work very hard. They have overcome enormous obstacles before arriving in the United States, and they continue to overcome enormous obstacles as they navigate new lives in America. They are the reason I love my job.

My ESL teaching colleagues care so much about our English Language Learners

(ELLs). They give their time, hearts, and money for these students. I feel very fortunate to work with a department of caring teachers who genuinely want our ELLs to succeed. While my ESL colleagues and I feel as if we have won the lottery each day, working with these students, not all high school teachers feel the same. In my three years of experience at this high school I have seen how other teachers feel very frustrated by their own perceptions of our students' lack of shared background knowledge, lack of formal education, and lack of academic English language that they bring to the classroom. Personally, I find it exhilarating to try to learn about my students' lives and see how I can connect my knowledge and experiences with theirs.

As I mentioned above, one of the subjects that I teach is a co-taught biology class designed specifically for ELLs. Typically, biology is designed for tenth grade students. In this class there are a variety of ages and grade levels. I have students who are fifteen, and I have students who are twenty-one years old. Most of my students have never received formal educations, many of them work after school to support their families in the United States as well as in their home countries, and some of them are already married with children. This class is intended for students who have English language proficiency levels 3-5 World-Class Instructional Design and Assessment (WIDA) designation. In my experience, this class has been more successful in the past when the students are actually performing at the intended WIDA level. This year, however, many of our students are below a WIDA level 2. The majority of students are below a WIDA level 3. This has presented numerous academic challenges in our classroom.

While most of the students are able to use English in a meaningful way for

everyday use in informal situations, the use of academic English in the classroom is still quite complicated for the majority of my students. Cummins (1994) explains this as students needing more time to acquire academic language. He notes that it takes approximately two years for students to become fluent in conversational English. Students then need an additional three to five years to become fluent in academic English and to master the skills required for using academic English. In our school, most of my students are pushed into mainstream classes by their third year of high school, which oftentimes means that they have literally only ever attended any kind of school for three years. This presents many challenges in our classroom. One challenge is the designated text that we are required to use. This text was not designed for ELLs and contains very technical academic language, including specific vocabulary, nominalization, and the use of passive voice. All of these features, including many others, interfere with the comprehension of written academic English for ELLs, which I will investigate below.

Challenging Features of Academic Language

According to research by Fang (2007), there are several features that cause challenges for ELLs. Some of these features include technical vocabulary, ordinary words with non-vernacular meanings and usages, relative pronouns, and lengthy nouns. Additionally, Nilagupta (1977) finds that language features such as negative words, embedding, and deletion present problems for ELLs. Both Fang (2007) and Nilagupta (1977) find that nominalization and passive voice construction create challenges for ELLs. I have found that my own students oftentimes struggle with technical vocabulary, passive voice, new meanings for ordinary words, and when words change forms, like

they do with nominalization. Because scientific writing and text are so specific to the science field, the features mentioned above all help play a role in facilitating the understanding of scientific text. Next, I will highlight a few of these features.

Scientific Vocabulary

Technical vocabulary in scientific text plays a large role in student comprehension because scientific texts rely heavily on technical vocabulary. Fang (2007) uses this example to illustrate technical vocabulary in text: “*Protozoans* that move using *flagella* are called *flagellates* and belong to the *phylum Zoomastigina*” (p. 494). In this sentence, the italicized words are technical vocabulary words and account for nearly one half of the whole sentence. When students are unfamiliar with several words in one sentence, and need to pause to look up meanings, it slows down the understanding at an incredible rate. This makes comprehension for ELLs very difficult.

In addition, scientific vocabulary uses Greek and Latin roots in many words, based on the scientific work of Aristotle and Linneaus. According to Fang, Schleppegrell, and Cox (2006), it is helpful for students if root words and affixes are explicitly taught so students can develop a better control over technical vocabulary and improve their overall understanding of science. In my co-taught class, as well as in every biology class in our school, students have Greek and Latin “root word” quizzes each week. Students are expected to learn a minimum of 150-250 vocabulary words within a school year. The biology teachers believe that these quizzes are important for the students. Their hope is that students will be able to memorize the root words from an isolated list and then be able to transfer their meanings to the numerous scientific words that use those roots. This

strategy has been partially effective for ELLs when they are only expected to repeat exact definitions of the root words when prompted. However, ELLs have largely been unable to transfer the definition of the root words to the new scientific words as they appear in class, especially if unprompted.

To improve the transfer of the knowledge of root word and affix meanings to new unfamiliar scientific words, teachers could ask students to use or create example sentences with the new words or definitions. Additionally, when the root word then appears in lessons as a new scientific word, the connection between the root word and the new scientific word should be explicitly taught. Students should also experience meaningful dialogues with the new words. As Schleppegrell (2012) explains it is more effective to teach vocabulary when it is in context and not in isolation, and when students engage in purposeful activities with vocabulary and language.

Another difficult concept for ELLs is when ordinary words have other scientific meanings that students are unfamiliar with. Fang (2007) uses this example, “Fishes that swim in *schools* are often safer than fishes that swim alone...” (p. 495). If students just use the concept of the word “schools” that they are familiar with, then this could lead to much confusion and take away from the meaning that the text is trying to convey. In my co-taught biology classroom students often struggle with the word “genes” during our unit about genetics and heredity. I always make a point to draw a pair of jeans on the board and describe the difference between the words “jeans” and “genes,” to try to make sure that the students’ normal usage of the word “jeans” does not interfere with their understanding of the scientific word “genes.”

Even though students are able to decode words like “genes” and “schools” they do not always realize that these words have other meanings, which can be frustrating and confusing for students. McKeown and Beck (1988) recommend that whenever teaching new meanings of words students should be exposed to rich lessons with many activities and contexts, and high frequency encounters with new words. Extension activities should be given to use outside of the classroom. The extension activities can be particularly helpful to lower achieving students who may have a difficult time finding ways to use the new vocabulary on their own.

Nouns and Nominalization

According to Fang et al. (2006) there are several ways that nouns impact text and comprehension. Nouns can be specific participants (“the cat”), or generalized participants (“rocks”), abstract (“this pattern”), or technical (“undergrowth”), a construction of judgment and value (“dreadful meowing”), or nominalized phrases (“the arrangement of atoms”) (p. 266).

Nominalization is the transformation of verbs or adjectives into nouns or noun phrases. Zwiers (2008) explains that nominalizations are used to shorten long explanations into only a few words. For ELLs this can be quite challenging because students need to process more information in each sentence, which oftentimes includes more abstract concepts, processes, and relationships. Zwiers (2008) uses this example to illustrate nominalization, “The virus adapted to survive outside the body. This *mutation* allowed it to be passed on by casual contact” (p. 37). The word “mutation” is the nominalization, and readers need to understand how this word was condensed and is now

being used as the subject in the next sentence. Fang et al. (2006) note that nominalization can introduce abstraction, ambiguity, and uncertainty, which have the potential to lower the reader's interest, engagement, and understanding of a text.

In my co-taught biology class students particularly struggle with nominalization during the evolution unit. We discuss many concepts like adaptation, variation, overproduction, and evolution. Students are not usually able to make the connections that these words are nouns that have been transformed from verbs or adjectives without direct instruction from the teacher. Students also mix the words and use nouns for verbs and verbs for nouns. From my direct teaching experience, the concept of nominalization can be quite complicated for ELLs to identify, interpret, and use accurately.

Another feature of language that proves to be difficult for ELLs is lengthy nouns. The language of science packs a lot of information into one sentence, and oftentimes uses lengthy noun phrases to accomplish this. Fang (2007) uses this example to demonstrate a lengthy noun, "A tornado is a rapidly whirling, funnel-shaped cloud that reaches down from a storm cloud to touch Earth's surface" (p. 501). He continues by noting that in everyday language this phrase would be broken up into smaller sentences like this, "A tornado is a kind of cloud. It is shaped like a funnel and moves very quickly. It reaches down from a storm cloud to touch Earth's surface" (p. 501). Fang et al. (2006) provide this example for a lengthy noun, "A mineral is a natural nonliving solid with a definite chemical structure" (p. 259). These lengthy nouns can be very difficult for ELLs to comprehend because so much information is packed into one sentence.

Passive Voice

Finally, the use and prevalence of passive voice present very large challenges for ELLs. Passive voice is often chosen over active voice in science texts for many reasons. Cowan (2008) identifies the top reasons that passive voice is used as when the speaker does not know who the agent is or wants to keep the agent concealed, when the identity of the agent is already understood, or when the action is more important than the agent who performed the action. Schramper Azar (2000) uses, “Our house was built in 1980” to demonstrate that it was more important that the house was built, as opposed to who built the house (p. 57). For ELLs it can be quite challenging trying to decide who the agent is or why the agent might be omitted from a sentence.

Fang (2007) adds that passive voice can be helpful for writers to appear to be objective and to also have authority by not mentioning the “...actors involved in the scientific process...” (p. 504). For example, “Photosynthesis and respiration can *be thought of* as opposite processes” (p. 504). Instead of saying “scientists think that...” an author can use passive voice so that the focus is more on the actual scientific process as opposed to the actor doing the thinking (Ding, 2002). This can put distance between the reader and the text, which can be challenging to students who often prefer to feel a human connection to the author of a text (Fang, 2007; Germano, 2005).

My Research

Even though there are many challenging features of academic language for ELLs, I plan to investigate the use of passive voice in our biology textbook. Reasons for my decision will be explained below.

Role of the Researcher

I am currently in my third year as an ESL teacher in the upper Midwest, and I have a K-12 teaching license. I work at a public high school in an urban environment. There are approximately 2,000 students in the school and roughly 40% of them are ELLs, although we only provide direct services to approximately 25% of the ELL population. Most students who receive direct services are new to the United States and have lived here for less than 3 years. Many of the students in our school are considered to be Long Term ELLs, which means that they have been considered an ELL for more than five years. For the most part, our Long Term ELLs do not receive direct services. The students speak a variety of languages; however, the most prominent first languages (L1) are Karen, Hmong, Somali, and Spanish.

In addition to currently co-teaching ESL students in a sheltered (ESL students only) biology classroom, I also teach an English Language Development (ELD) class that focuses on furthering the understanding of biology concepts as well as improving academic English language usage and understanding. In the co-taught biology classes there are about 70 students total, and they are divided into two class periods. I then serve about 60 of those 70 students in the ELD classes. There are two ELD classes. I see 30 of the students on one day, and I see the other 30 on the following day. The 60 students rotate on an every other day basis. On days when students are not in my ELD, they are in a Human Geography ELD.

I also teach a separate class with about 42 Level 1 Language of Science ELLs. These students are all different than my biology students, and they are divided into two

classes. Every Level 1 student starts with this class. The focus of the Level 1 class is reading, writing, speaking, and listening through the topic of science. The majority of my students in all of my classes come from refugee camps, and have had very limited to no previous formal education. Some of them are learning to read and write for the first time in their lives. All of my students are currently grades 9-12 and ages 14-21, and they are mixed together in every class.

Background of Researcher

In the past I have worked briefly at an elementary school that served grades K-4 predominantly Spanish speaking students. My primary job was teaching technology and computer skills to all students in addition to teaching vocabulary and reading strategies in small groups to ELLs. Since then I have taught level 2.5 Language and Literacy to high school students ranging from grades 9-12 and ages 14-21. I have co-taught a grade 9 English Language Arts (ELA) class made up of both mainstream and ESL students. I further supported the ESL students with an English Language Development (ELD) class that was focused on furthering the understanding of the ELA class and improving academic English language usage and understanding. I also spent a summer teaching adult ELLs at both Levels 1 and 5. The Level 1 class focused on reading, writing, speaking, and listening through the topic of health in the United States. The Level 5 class focused on writing for students who were aiming to obtain their General Educational Development (GED).

When I started thinking about the topic for my thesis, I decided to focus on my co-taught biology classes. As I mentioned above we have had numerous academic

challenges with these students this year. I believe that the main challenge has been that this co-taught biology course is designed for students at a WIDA level 3 or higher. This year, the majority of our students scored lower than a WIDA level 3 and several even scored less than a WIDA level 2 (which means that students are able to read at about a first or second grade level). This means that their access to academic English is severely limited. The biology teacher has been frustrated because they are missing out on so much biology content that their English-speaking peers have access to. I have been frustrated because I am not given enough time to focus on further developing their language, as most of the class time (in both the co-taught biology class and the ELD class) is dedicated to biology content. As a teaching pair, we have both been frustrated and upset at the lack of access to academic language and content our students are exposed to.

As I mentioned above, the vast majority of our students come from refugee camps. Most of them have very limited to no prior formal educational experience. With the lack of formal schooling, the lack of academic English, and the “new” concept of Western education, learning styles, and expectations, our students have very limited background knowledge of what we teach in the classroom. They have huge obstacles to overcome in the classroom, not to mention the challenges they face outside of the classroom as they adjust to new lives in the United States. All of these factors have created a very difficult academic learning environment.

With these frustrations in mind, I plan to focus on the textbook intended for our co-taught biology class. Because the students’ academic English levels are so low according to WIDA, we oftentimes do not even use the textbooks. This presents a large

disadvantage to the ELLs because instead of taking the time to teach them how to access and practice using the language in the textbook; we water the text down to a lower level by using other sources of text or paraphrasing in our own words. I want my students to be able to access the language in their textbooks, and the passive voice is something that appears on most pages. I believe that if my students can understand that the passive voice is a tool they can use, it could give them a voice in the classroom and help them to access the textbook. For this study I will analyze the textbook by investigating the prevalence of the passive voice in the biology textbook, challenges that the passive voice present, and research strategies that can help students understand the passive voice.

As far as personal biases, I want to find ways to help my students become more successful in the classroom. I have often heard them making comments about how challenging the language is, and I am struggling to uncover those challenges.

Guiding Questions

My general research questions are: How often does the use of passive voice occur in the textbook *Biology* (Nowicki, 2008)? What does the use of passive voice look like in *Biology* (Nowicki, 2008)? What types of issues can passive voice cause for teachers and students, including classroom expectations of using the textbook? What strategies can help ELLs better understand and use the passive voice?

Summary

In this study, I will focus on the use of the passive voice in a biology textbook in a co-taught biology ESL classroom because I want to find out how this type of academic

text interferes with the general understanding of the text for ELLs. This is important because understanding the role of the passive voice and the challenges it presents to ELLs in a co-taught biology ESL classroom will shed light on what its role is, how it may impact learning, and how students can better understand and use the passive voice.

Chapter Overviews

In Chapter One I introduced my research by establishing the purpose for the study and providing general research. The context of the study was briefly introduced, as was the background of the researcher. In Chapter Two I provide a review of the literature relevant to the understanding, construction, and usage of the passive voice. Additionally, challenges to student learning are also presented. Chapter Three includes a description of the research design and methodology that guide this study. Chapter Four presents the results of this study. In Chapter Five I reflect on the data collected and discuss the limitations of the study, its implications, and recommendations for further research.

CHAPTER TWO

LITERATURE REVIEW

The Purpose of this Study

The goal of this paper is to investigate the use of passive voice in a textbook used for an ESL co-taught biology classroom. I will specifically explore how often the use of passive voice occurs and what it looks like in the textbook *Biology* (Nowicki, 2008), what types of issues the passive voice can cause for teachers and students, including classroom expectations of using the textbook, and strategies that can help ELLs better understand and use the passive voice. This chapter presents the language of science in relation to student comprehension. Next, the construction of the passive voice is explored, including a discussion of agent and agentless passive examples. This is followed by a discussion of when and why the passive voice is preferred in scientific text. Finally, the challenges that passive voice presents to students are examined.

The Language of Science

The language of science presents many challenges for students. Fang (2007) examines how scientific writing challenges middle school ELLs. He finds many text features that impact student understanding such as: nominalization, technical vocabulary, ordinary words with non-vernacular usages, prepositions, conjunctions, pronouns, ellipsis, subordinate clauses using passive voice, lengthy nouns, complex sentences, and the use of passive voice. Additionally, Nilagupta (1977) finds that for university students,

language features such as negative words, embedding, deletion, nominalization, and passive voice construction present problems for both native English speakers and ELLs.

Fang (2007) discusses the importance for all science teachers to teach the language of science and not just the content of science. He discusses the importance of explicit and authentic teaching in context and how using student writing can help facilitate reading comprehension. He warns against using watered-down texts and emphasizes that in order for students to fully understand scientific thinking and understanding, they need to have an understanding of scientific language. These are all reasons why it is so important for all science teachers to teach the language of science, in addition to teaching the content of science.

Construction of Passive Voice

Put simply, in an active voice sentence the subject does the action. For example, “Mark played the saxophone.” Mark is the subject, and he performed the action of playing the saxophone. In a passive voice sentence the subject receives the action. For example, “The saxophone was played by Mark.” The saxophone is the subject that received the playing by Mark.

Sometimes the “doer” of the action is omitted in passive voice construction. An example would be “The saxophone was played.” In this case it is not important who played the saxophone (the “doer”), but it is more important that the saxophone was played (by someone). While active voice sentences are direct and show who does the action, passive voice sentences are usually less direct. This can be very beneficial in

scientific text, even though this often presents challenges for ESL students. The benefits of the passive voice will be further discussed later on.

Schramper Azar (2000) describes the passive voice as when the object of an active verb becomes the subject of the passive verb. Stanley (1975) describes the passive as when the object of an active sentence becomes the subject of the passive sentence and notes that the structure of the sentence changes from SVO (Subject Verb Object) to OVS (Object Verb Subject). In addition, Cowan (2008) identifies the passive voice as when the object noun phrase in the active sentence moves into the subject position in the passive sentence. Following that change, the subject noun phrase then moves to the end of the sentence.

Schramper Azar (2000) gives this example of active voice: “Mary (subject) helped (verb) the boy (object)” (p. 56). Mary is doing the action; she is helping the boy. The passive example becomes “The boy (object from previous sentence) was helped (verb) by Mary (subject from previous sentence)” (Schramper Azar, 2000, p. 56). The boy, who was the object in the active sentence, now becomes the subject in the passive sentence. Now the emphasis is on the boy and the fact that he was helped. The important part is not about who helped the boy; instead the important part of the sentence is that the boy was helped.

Agent and Agentless Passives

As Watabe and Brown (1991) note, when using passive voice there is the option of using an agent by phrase. This means that the word “by” can be optionally inserted before the subject noun phrase. Because using an agent is optional, Cowan (2008)

explains the two types of passive sentences as being either passives without agent by phrases or passives with agent by phrases. Here is an example using an agent by phrase:

“These spare parts were manufactured in Thailand by highly trained workers” (p. 394).

The subject noun phrase is “highly trained workers” and by is inserted directly before this phrase.

Schramper Azar (2000) identifies the subject noun phrase as the agent. The agent always follows the word “by” in a passive sentence and causes the action in a sentence.

The active example would be “Mary helps the boy,” which would become, “The boy is helped by Mary” (p. 56) in the passive voice. The agent in this example is the word

“Mary,” because Mary is the noun that does the action and follows the word by. The agent causes an event to happen (Ding, 2002).

The more common form of passive voice, especially in scientific texts, is the agentless passive (Cowan, 2008). This is because oftentimes it is either not known or not important who performs the action (Cowan, 2008; Schramper Azar, 2000). An example of an agentless passive is, “These spare parts were manufactured in Thailand” (Cowan, 2008, p. 394). Here the word by is not used, because it is not known and/or not important who manufactured the parts (that would be the agent), but it is more important that the parts were manufactured.

Verbs, Tense, and Aspect

Additionally, the verbs require changes to be grammatically correct in the passive voice. The main verb needs to be changed to its past participle form, and the auxiliary verb “be” needs to be changed to its appropriate form (Cowan, 2008; Watabe & Brown,

1991). An example in active voice is “Anders Celsius (subject) invented (verb) the centigrade thermometer (object)” (Cowan, 2008, p. 392). This example becomes “The centigrade thermometer (subject) was invented (verb) by Anders Celsius” (p. 392) in the passive voice. Here the past participle “invented” is used and the appropriate form of the auxiliary verb “be” becomes “was.”

According to Schramper Azar (2000) only transitive verbs can be used with the passive voice. Transitive verbs are verbs that can be followed by an object. Examples of transitive verbs are: build, cut, find, like, make, need, send, use, and want (p. A1). An example sentence using a transitive verb would be, “The student needs a pen” (p. A1). In this sentence the pen is the object and follows the transitive verb “needs.” Intransitive verbs do not work with passive voice, because an object cannot follow them. Examples of intransitive verbs are: agree, arrive, come, cry, exist, go, happen, live, occur, rain, rise, seem, sleep, stay, and walk (p. A1). An example sentence with an intransitive verb would be, “The baby cried” (p. A1). This sentence only has a subject (baby) and a verb (cried) and does not have an object. An example of an intransitive verb used incorrectly is, “I am suffered from a cold and feel terrible” (Hinkel, 2002, p. 233). In this example “suffer” is an intransitive verb and cannot take a direct object. Therefore, this example is ungrammatical.

Cowan (2008) explains that the passive voice can exist in all tense and aspect combinations and describes tense in relation to verbs expressing “...the time that an action occurs in relation to the moment of speaking” (p. 350). Cowan (2008) and Hinkel (2004) describe the three English tenses as the past, the present, and the future. Cowan

(2008) lists these examples of tense: “He *helps* her” (present tense), “He *helped* her” (past tense), and “He *will help* her” (future tense) (p. 351).

Hinkel (2004) describes the two English aspects as the perfect and the progressive. Cowan (2008) explains that, “Aspect expresses how the speaker views the action of the verb” (p. 351). If an action is viewed as complete it is considered to be the perfect aspect, while an action that is viewed as ongoing is considered to be progressive (Cowan, 2008). An example using the perfect aspect is, “The book *has been read* by John” with “has been read” representing the perfect aspect (Hinkel, 2002, p. 233). An example using the progressive aspect is, “The letter *is being written* by Mary” with “is being written” representing the progressive aspect (Hinkel, 2002, p. 233).

According to Cowan (2008) here are the twelve possible combinations of tense and aspect in English: “She *works*” (simple present), “She *worked*” (simple past), “She *will work*” (simple future), “She *is working*” (present progressive), “She *was working*” (past progressive), “She *will be working*” (future progressive), “She *has worked*” (present perfect), “She *had worked*” (past perfect), “She *will have worked*” (future perfect), “She *has been working*” (present perfect progressive), “She *had been working*” (past perfect progressive), and “She *will have been working*” (future perfect progressive) (356).

While Schramper Azar (2000) notes that some forms of tense and aspect are rarely used in the passive, such as progressive forms of present perfect, past perfect, future, and future perfect, she lists these passive voice examples: “The boy *is helped* by Mary” (simple present), “The boy *is being helped* by Mary” (present progressive), “The boy *has been helped* by Mary” (present perfect), “The boy *was helped* by Mary” (simple

past), “The boy *was being helped* by Mary” (past progressive), “The boy *had been helped* by Mary” (past perfect), “The boy *will be helped* by Mary” (simple future), and “The boy *will have been helped* by Mary” (future perfect) (p. 56).

Why Passive Voice is Preferred in Scientific Text

When considering the impact that passive voice has on ELLs it is important to understand not only what the passive voice is, but also what it does in a text. The passive voice is predominantly used and preferred over active voice in scientific text because the passive voice has specific purposes in scientific text (Ding, 2002; Fang, 2007).

Ding (2002) describes the two main reasons why scientific writing uses the passive voice as being necessary for what he refers to as the “falsifiability” of science and for cooperation among scientists. The “falsifiability” of science refers to the fact that scientists do not always have valid theories, so other scientists must be able to repeat the experiments and potentially find them to be invalid. The theories are usually written in passive voice without a “by phrase,” which allows the experiments to have the potential to be invalid and for the scientists to express their beliefs in the “falsifiability” of science. Additionally, using passive voice helps the authors to “...remove these personal privileges, qualifications, or reservations from accounts of scientific experiments” (Ding, 2002, p. 146). By doing this, the focus is not on the scientist involved and their potential bias, but on the experiment itself.

The cooperation of scientists is needed because scientists themselves are not usually the main focus of a sentence (Ding, 2002). Instead, the work of scientists is the focus of a sentence, and passive voice can be used to articulate this. Oftentimes the most

important focus of a scientific text is not on who conducts the experiment, but on the “materials, organisms, methods, theories, figures, symbols, findings, analyses, processes, tables, and concepts” that are used (Ding, 2002, p. 138). Additionally, scientists need a cooperative understanding that there is a shared knowledge base of scientific work in their community. This helps to both collectively advance science and to talk about the objects of science, since “Science represents the world in terms of things and objects...and appears to be thing-centered instead of human-centered” (Ding, 2002, p. 143). Passive voice is used to best express these ideas and keep the scientific writing focused on objects as opposed to the people conducting the experiments and research.

Another very important reason that passive voice is used in scientific text is because it allows the author to appear to have more authority and be viewed as more objective by readers (Fang, 2007; Germano, 2005). The passive voice is used when the people or objects impacted by the action are more important than the actor doing the action (Schramper Azar, 2000; Zwiers, 2008). Additionally, the passive voice can be used when the actor is unknown or irrelevant (Cowan, 2008; Stanley, 1975). Cowan (2008) lists this as an example, “His car was stolen in Detroit” (p. 395). In this sentence the most important aspect is that the car was stolen. It is not known who stole the car, so the actor remains unnamed.

Passive voice focuses more on the object rather than the subject. This allows the subject to remain nameless and allows the author to avoid assigning blame or reveal who the actor is (Cowan, 2008; Germano, 2005; Stanley, 1975; Zwiers, 2008). An example with a nameless subject is, “The radius is then plugged into the formula for the area of a

circle” (Zwiers, 2008, p. 36). The important part of the sentence is that the radius is used in a formula to find an area of a circle; it is not important who plugs in the radius (the subject). An additional example from Cowan (2008) is, “Rather than dwelling unnecessarily on the causes of this fiasco, let’s just say that mistakes were made” (p. 395). In this example blame is not put on the actor, nor is the actor revealed. The focus is on the fact that mistakes happened and not on who made the mistakes.

Similarly, textbook companies and authors can benefit from using the passive voice because it has the ability to omit the person at fault for certain acts. This can allow people to avoid taking responsibility for their actions (Fang, 2007; Germano, 2005; Plummer, 1988). Then textbook companies and authors do not need to get involved with blaming companies, institutions or people for an act, or force others to take responsibility for an action. Instead they can discuss the result of the action without placing any blame. Fang (2007) lists this as an example, “As forests were cut down, firewood became more expensive” (p. 505). This construction allows for the person or institution responsible for deforestation and higher prices of firewood to go unnamed. If the author were to use an active construction like, “As logging companies cut down forests, firewood became more expensive” this could open up the potential of a lawsuit to the author or textbook company from logging companies (p. 505).

Furthermore, passive voice can be used when the identity of the agent can be assumed or understood, thus making it redundant to name the agent. For example, “Our grapes are usually harvested in late August” (Cowan, 2008, p. 395). In this example it is assumed that workers harvest the grapes and that readers would already anticipate this

information. Another example from Schramper Azar (2000) is, “Rice is grown in India” (p. 57). The reader infers that rice is grown by someone, most likely by farmers.

Lastly, according to Fang (2007) the use of passive voice in scientific text can be helpful because a lot of information can be packed into the sentence after the verb. For example, “Much of this plain [Gulf Coastal Plain] was formed from sediments deposited by the Mississippi River as it entered the Gulf of Mexico” (p. 504). The information following the verb phrase “was formed” does not need to be broken down into several sentences, which can save space in a textbook.

The Role of Passive Voice in Learning

Difficulties for Students

There are many reasons why the passive voice can be difficult for students, particularly for ELLs. Students need to constantly navigate between everyday English and academic English. Everyday English is spoken in a non-academic environment like with friends or in a store, while academic English is spoken in the classroom (Zwiers, 2008). Zwiers (2008) also observes that academic English, particularly the language of science, uses the passive voice much more than everyday English. Therefore, the passive voice can seem very unfamiliar and daunting for students to use in an accurate manner in a classroom setting.

Additionally, native speakers of English do not usually use the passive voice when speaking. Instead the passive voice is typically used when writing in the English language. If ELLs do not often hear native speakers of English or see writing of native

speakers of English using the passive voice construction, then perhaps it could seem more foreign, awkward and difficult to use (McDonough, Trofimovich & Neumann, 2015; Plummer, 1988).

If the passive voice is discussed in a classroom, oftentimes it is to express the fact that passive writing is generally viewed as being weak academic writing (Germano, 2005). Teachers and professors often discourage the use of passive writing and prefer active or direct writing. Hinkel (2004) explains that almost every textbook used for teaching writing views the passive voice as being very undesirable. Even Microsoft Word considers passive voice sentences as being grammatically undesirable and underlines them, suggesting more favorable active sentences instead. With such a negative view of passive sentences, ELLs may have very limited exposure of the passive voice being used for positive and intentional purposes, such as in scientific writing.

The Challenges of the Construction of Passive Voice

According to McDonough, Trofimovich, and Neumann (2015) passive voice can be challenging for students to use not only because of its difficult language construction but also because of the influence their L1 has on the understanding of passive voice. Nilagupta (1977) finds that it is difficult for students to process the construction of passive voice if it is rarely used in the writing or speaking of the students' L1. Zwiers (2008) observes that the passive voice oftentimes does not even exist in other languages. If students do not have this type of language construction in their first language, or if it is rarely used then it can be very confusing and challenging to use in English.

Additionally, Hinkel (2002) explains that the construction of passive voice in a student's L1 can be so different than the construction of the English passive that it can cause a lot of confusion and misunderstandings. He discusses speakers of Asian languages, particularly Japanese speakers, who have difficulties with English passives because of the animacy within a sentence. Japanese sentences do not allow for active verbs to have inanimate subject nouns, while in English this is not a problem. His example is, "A thermometer measures the temperature" (Hinkel, 2002, p. 233). The "thermometer" is an inanimate noun and in English it can be used with the active verb "measures" even though this would not be grammatically correct in Japanese. Because of these differences, students may have difficulties when constructing English passives.

Because the passive voice can optionally use an agent by phrase and does not absolutely require an agent by phrase, students might be confused if the agent by phrase is omitted. When there is not an agent by phrase then the subject must be inferred, which can potentially be very difficult and present problems for learners (Kline & Demuth, 2010). This can especially be a problem in scientific text, when the agent by phrase is most often not used (Cowan, 2008).

As mentioned above, Fang (2007) notes that the passive voice construction is able to pack much information into a sentence following the verb. Therefore, students can have a difficult time pulling out all of the information in a sentence and then organizing the information in a useful or meaningful way. As noted above Fang used this example, "Much of this plain [Gulf Coastal Plain] was formed from sediments deposited by the Mississippi River as it entered the Gulf of Mexico" (p. 504). Students have to be able to

organize the different facts about the Gulf Coastal Plain. They need to know that a lot of the Gulf Coastal Plain was formed from sediments. Then, the sediments were deposited by the Mississippi River. Finally, the Mississippi River deposited the sediments where it entered the Gulf of Mexico. While it can be beneficial for textbooks to use passive voice to save space, it can be challenging for students to unpack all of the information in passive voice sentences.

Finally, Fang (2007) discusses that because of the way the passive voice is constructed, it can seem particularly alienating to students and make them feel less involved in the text. He notes that students usually prefer narrative stories or informational storybooks in science. This is because they make the students feel personally involved and evoke emotions and connections from the students. Germano (2005) adds that students listen more actively to these types of texts because they feel a human connection to the author. Unfortunately, students cannot always use narrative texts and must often use texts filled with passive voice constructions, which can make them feel more distance from the text.

The Gap

Even though there has been previous research and text analyses conducted on passive voice construction, why it is preferred in scientific text, and challenges that it presents to students, to my knowledge there has not yet been a textbook analysis of a typical high school biology text, like with the text *Biology* (Nowicki, 2008). For this reason, I plan to analyze this specific textbook to gain more information that could be helpful for teaching my students. *Biology* (Nowicki, 2008) is used widely in the state and

especially in urban areas, including where I teach. This study could help inform educators who use this textbook.

Research Questions

This paper aims to cover: How often does the use of passive voice occur in the textbook *Biology* (Nowicki, 2008)? What does the use of passive voice look like in *Biology* (Nowicki, 2008)? What types of issues can passive voice cause for teachers and students, including classroom expectations of using the textbook? What strategies can help ELLs better understand and use the passive voice?

Summary

This chapter highlighted challenges that the language of science presents. Then, it defined the construction of passive voice with many examples, including agent and agentless passives. From there, it considered reasons why passive voice is preferred in scientific text, while providing examples. In addition, the role that passive voice has in learning was considered, with emphasis on difficulties that impact students and challenges that the construction presents. Finally, the gap in research was addressed and the research questions were revisited. Chapter Three discusses the methodologies that will be used for this research.

CHAPTER THREE

METHODOLOGY

This text analysis has been designed to investigate the use of passive voice in the high school textbook *Biology* (Nowicki, 2008). This study is important because my ELLs struggle with the use of passive voice in their prescribed textbooks, and I want to find strategies to help them better understand and use the passive voice, so that they can access the meaning of the text. For this study I plan to explore how often the use of passive voice occurs in the textbook *Biology* (Nowicki, 2008), what the use of passive voice looks like in *Biology* (Nowicki, 2008), what types of issues passive voice causes for teachers and students (including classroom expectations of using the textbook), and what strategies can help ELLs better understand and use the passive voice.

For this study I performed a text analysis that closely examined one specific textbook, *Biology* (Nowicki, 2008), in regards to how often passive voice is used and what passive voice looks like in the text. I performed a quantitative analysis by collecting data that included counting the numbers of passives, passives with agents, agentless passives, regular past tense verbs, and irregular past participles. The regular past tense verbs and irregular past participles were active voice constructions. I counted them so I could compare the number of active voice and passive voice past tense verbs in the chapter. When collecting data about the regular past tense verbs and irregular past participles in active voice constructions, I did not recount verbs that were already

accounted for in the passive voice examples. I did this because I wanted to keep the categories of passive voice and active voice examples as separate as possible for making comparisons. Two specific chapters of *Biology* (Nowicki, 2008) were examined. Chapter 3, *Cell Structure and Function*, was chosen because of the importance it has in the biology curriculum. This chapter sets the foundation for the remainder of the school year, and each unit that follows refers back to information learned in this chapter. Chapter 10, *Principles of Evolution*, was chosen because it usually presents several linguistic challenges for students. I wanted to find out if passive voice could be contributing to those challenges.

A text analysis is important because it can inform teachers about grammatical and linguistic issues that students have with their textbooks. This information can inform teachers and hopefully enable them to better serve their students. The teachers can use the text analysis, to create lessons to help students better understand the text. Hopefully this will help students to feel empowered to use their textbooks successfully. This text analysis included a mixed paradigm of both a quantitative and qualitative analysis. The quantitative analysis focused on counting the numbers of passives, passives with agents, agentless passives, regular past tense verbs and irregular past participles in active voice. This showed how often passive voice is used and what passive voice looks like in two of the chapters of the textbook. The qualitative analysis focused on the types of issues that passive voice can cause for teachers and students, which includes classroom expectations of using the textbook, and what strategies can help ELLs better understand and use the passive voice.

Overview of Chapter

This chapter explains the methodologies that were used in this research based text analysis of *Biology* (Nowicki, 2008). I will discuss quantitative and qualitative research paradigms and why these research paradigms were chosen for this study. Then I will explain how the data will be collected and the rationale for conducting a text analysis. This will be followed by a data analysis and the verification of the data.

Quantitative Research Paradigm

Mackey and Gass (2005) describe quantitative research as an experimental design that begins with a hypothesis and involves the quantification of data and some kind of numerical analysis to examine the data. Quantitative research involves controlled measurements and objectivity. It is generalizable, reliable, replicable, and outcome oriented (Mackey & Gass, 2005). McKay (2006) explains that quantitative research is able to break down reality and study its parts. The researcher observes and measures the data using statistical analysis and technical language. Typically quantitative research involves a short period of time and a large, random sample. Additionally, surveys are often used with quantitative research. The purpose of quantitative research is to generalize and predict, while creating a study that has validity (McKay, 2006). This is relevant to my research because I was able to break down parts of the textbook that my ELLs use by counting different grammatical structures that influence the passive voice in the textbook. This was completed in a short period of time and helped me to generalize and make predictions about the text.

Qualitative Research Paradigm

Mackey and Gass (2005) describe qualitative research as not involving an experimental design or hypothesis. Qualitative research cannot be easily quantified. The analysis of qualitative research involves interpretation as opposed to a numeric or statistical analysis. Qualitative research is naturalistic and controlled, subjective, process and discovery oriented, and not generalizable (Mackey & Gass, 2005). McKay (2006) explains that qualitative research can only be studied holistically and that the researcher becomes a part of what is being studied. Typically qualitative research involves a long amount of time and a limited number of participants. Oftentimes qualitative research involves case and ethnographic studies with the use of field notes and interviews. The purpose of qualitative research is to contextualize, interpret, and look for patterns in the data, while using descriptive language (McKay, 2006). This is relevant to my research because I was able to explore what types of issues passive voice causes for both teachers and students, especially when including expectations of using the textbook in class. This also led me to find strategies to better help my students understand and use the passive voice. I was able to interpret and look for patterns in the data that can potentially help guide my future instruction. Additionally, I looked at passive voice with the challenges my students face in mind and was able to use those challenges to inform my interpretations.

Mixed Research Paradigm

This text analysis is a mixed study that incorporated both quantitative and qualitative methods. Both methods are valuable and needed to analyze this textbook.

Quantitative research was used to count frequencies of passive voice, including passives with agents, agentless passive examples, as well as regular past tense verbs and irregular past participles that were used in active voice construction. This information was counted in order to find out how often ELLs in my co-taught biology class encounter this type of grammar. Quantitative research allowed me to make generalizations about the language in the textbook. This is important for guiding my future instruction and to better be able to meet the needs of my students. Qualitative research was also used to interpret and look for patterns in the data. This allowed me to look at the text in a holistic way, while thinking about my students and their learning challenges. This can help my instruction in the future, because I will be more aware of what struggles the passive voice may cause for my students and what strategies can be useful for ELLs to interact with the passive voice in a successful way.

Data Collection

Participants

For this research I did not actually study any students, but performed a text analysis on the textbook that my ELLs use in my sheltered, co-taught, biology classroom. This research is intended to help guide my instruction, which will hopefully help the students to interact in a more meaningful way with their textbooks in the future.

Even though biology class is typically intended for tenth grade students, my students range in ages and grade levels. I have students who are fifteen, and I have students who are twenty-one years old. Most of my students have never received formal

educations, and many of them have received limited educations in refugee camps, mainly in Asia and Africa. Almost all of their families have fled their home countries because of war and religious or cultural persecution. The majority of the students and their families have dealt with injury, loss, devastation, and have been faced with extremely challenging and heartbreaking circumstances. Many of my students work after school to support their families in the United States as well as in their home countries. Some of the students are in the United States illegally, and they are in constant worry about their legal statuses and if they will be able to continue to work to send money to their families. Some of my students are already married with children. A few of them were forced into marriages before they came to the United States, which places a significant amount of stress on the students. Additionally, the vast majority of my students have only been in the United States for about two to three years.

The majority of my students are refugees who come from lower socioeconomic statuses. Most of the students are Karen and come from refugee camps in Thailand. In addition to Karen speakers, we have a large group of Somali speakers and smaller groups of Spanish and Hmong speakers. Other languages spoken in our class include Nepali, Karenni, Burmese, Thai, Lao, Tigrinya, Amharic, Swahili, Luganda, and Sarakole.

In the co-taught biology class there are about 70 students total and they are divided into two class periods. The class is intended for students who have English language proficiency levels 3-5 World-Class Instructional Design and Assessment (WIDA) designation. However, many of our students are below a WIDA level 2. The majority of students are below a WIDA level 3. A student at a WIDA level 2 is basically

able to read at about a first or second grade level and has very limited mastery of grammar, including irregular verbs. This means that my students' access to academic English is severely limited, which has presented numerous academic challenges in our classroom. While most of the students are able to use English in a meaningful way for everyday use in informal situations, the use of academic English in the classroom is still quite complicated for the majority of my students. In addition to dealing with the challenges from inside of the classroom, students also have to try to balance challenges from outside of the classroom, which can make high school a very daunting place.

Location/Setting

I work at a public high school in an urban environment in the upper Midwest. There are approximately 2,000 students in the school and roughly 40% of them are ELLs, although our school only provides direct services to approximately 25% of the ELL population. Most students who receive direct services are new to the United States and have not lived here for longer than three years. Many of the students in our school are considered to be Long Term ELLs, which means that they have been designated as an ELL for more than five years. For the most part, our Long Term ELLs do not receive direct services. The students speak a variety of languages; however, the most prominent first languages are Karen, Hmong, Somali, and Spanish.

Data Collection Technique 1

According to McKay (2006) text analysis is used for a variety of reasons, including examining syntactic, rhetorical, or cultural features of a text. Text analysis can

include counting specific features of a text while using predetermined categories or examining the research data to develop specific categories for text analysis. I used a text analysis that examined the grammatical features of a text in relation to the use of passive voice, while using predetermined categories to collect my data.

Because passive voice occurs frequently in scientific text, including this classroom textbook *Biology* (Nowicki, 2008), I chose to examine two chapters from the textbook. The chapters that were chosen are Chapter 3, *Cell Structure and Function*, and Chapter 10, *Principles of Evolution*. Chapter 3 is the basis of the entire year's curriculum, and we refer back to it often throughout the year. Chapter 10 is a good example of a chapter that often presents numerous linguistic and comprehension challenges for students and is important to examine. My hope in examining this chapter was to better understand what those challenges are so I can improve my instruction.

For this study, I wanted to know exactly how often the passive voice is used and what it looks like in *Biology* (Nowicki, 2008). Therefore, the categories that I investigated were the number of times that passives, passives with agents, agentless passives, regular past tense verbs in active voice construction, and irregular past participles in active voice construction were present in the chapters. This not only showed me data based on research, but also provided insight as to what types of issues passive voice presents to my students. I wanted to know if the structure of passive voice, the use of irregular past participles in active voice, or both, are challenging to students and influence their understanding. I want my ELLs to be able to have a voice in the classroom, and I believe that understanding their textbook and the grammatical and

linguistic features within the text can give them the power to be heard.

As mentioned above, the text that was analyzed is called *Biology* (Nowicki, 2008). This text was chosen because it is the required text that was chosen by the district that I work in. All biology students in the district use this text, including ELLs. There are thirty-four chapters in the textbook, and the units include an introduction to biology, cells, genetics, evolution, ecology, classification and diversity, plants, animals, and human biology. This textbook has been written for general high school biology students and was not specifically written for ELLs. Therefore it is an authentic text that ELL students are expected to read, interpret, and understand to help guide their biology studies.

Data Collection Technique 2

Science texts use passive voice frequently and with purpose. This is why I asked the questions: How often does passive voice occur and what does the use of passive voice look like in the textbook *Biology* (Nowicki, 2008)? What types of issues does passive voice cause for students? How do the classroom expectations of using the textbook impact students and teachers? What strategies can help ELLs better understand and use the passive voice? While I explored these questions I was thinking about my students and the challenges they face with the textbook. These questions came to mind: Does passive voice interfere with understanding for ELLs more than other types of grammar or structure? Does the amount of passive voice examples impact student comprehension? Will it take only one sentence that uses passive voice to deter students from understanding? Can students get back on track after they misunderstand one part of the

text? How can I teach more strategically to help students understand their textbooks? What strategies can help students understand the use of passive voice and then transfer that knowledge so they can better understand their textbooks?

Now that I have collected all of my information and data, I plan to discuss my findings with other ESL, biology, and science teachers. I am hopeful that I will be able to teach my colleagues about this important text feature and offer strategies for them, so students can better understand how to use the passive voice and their textbooks. I am hoping to present this information to my colleagues at future Professional Learning Communities (PLCs). PLCs generally meet a few times a week in small groups. This would be a great opportunity to present information and collaborate with my colleagues to get further ideas.

Data Analysis

Text analysis is a good technique because it can be used for a variety of purposes (McKay, 2006). Text analysis can examine syntactic, rhetorical, or cultural features of a text. Text analysis includes the counting of specific language features with or without predetermined categories. McKay (2006) also notes that text analysis can be advantageous because researchers can pay attention to patterns found in the data.

I collected information by counting the numbers of passive examples, passive examples with agents, agentless passive examples, regular past tense verbs and irregular past participles used in active voice constructions that occur in Chapters 3 and 10 of *Biology* (Nowicki, 2008). I used specific colored highlighters to identify examples from each of those categories in both chapters. Then I tallied the results and recorded them in a

chart. Those categories are important because I wanted to know how often passive voice occurred in the text, so that I could find strategies to help my ELLs better understand and use the passive voice. I want my learners to be able to successfully use their textbooks and find meaning from them, so they can have a voice in the classroom. My text analysis is reliable, because another person could easily replicate the study. The findings of my research will be listed in Chapter Four. The following table is what I used to collect my data.

Table 3.1

Template to collect data

Categories	Number of Passive Examples	Number of Passive Examples with Agents	Number of Agentless Passive Examples	Number of Regular Past Tense Verbs in Active Voice Constructions	Number of Irregular Past Participles in Active Voice Constructions
Chapter 3					
Chapter 10					

Verification of Data

A professional colleague served as a peer reviewer to verify the findings of this analysis. She has been an ESL teacher for about 25 years in the same district that I work in. My professional colleague holds a Master of Arts in Education with an ESL emphasis from Hamline University and a Bachelor of Arts in Elementary Education from Gustavus Adolphus College. She is licensed to teach ESL grades K-12 and has spent the majority of her career teaching elementary students. My professional colleague examined the same

sample of the chapters that were investigated. She independently verified that the examples provided were accurate counts of passive voice examples, agent and agentless passive examples, regular past tense verbs and irregular past participles used in active voice constructions.

Conclusion

This chapter began by describing the purpose of this study and restated the research questions and why they were important to answer. Then an overview of the chapter was provided. Next I described the research paradigms that were used to conduct the text analysis, including quantitative, qualitative, and mixed research paradigms. The data collection and data collection techniques were explained. I did not use human subjects in my research. I only did a text analysis of the textbook *Biology* (Nowicki, 2008) that my students use. I provided background information about the school I work in and the students that I teach. Next a data analysis was presented, as well as the chart used to collect my data. Finally the verification of data was discussed. The following chapter presents the findings and results of the research questions that I have been investigating.

CHAPTER FOUR

RESULTS

This study investigated the use of passive voice in the textbook *Biology* (Nowicki, 2008). To complete this text analysis, I made a copy of Chapter 3 and Chapter 10, the two chapters that I examined. First I examined Chapter 3 by completing the following: I underlined all of the verbs in the chapter and then went back to identify all of the passive voice examples. Following that, I looked at the text again and distinguished between passives with agents and agentless passives. Then I reviewed the chapter and found examples of regular past tense verbs in active voice constructions ending in “ed.” Finally, I examined the text and found examples of irregular past participles in active voice constructions. I then repeated this process with Chapter 10.

To organize my findings, I used specific colored highlighters to represent each category. The categories were: yellow to represent agentless passive examples, green to represent passive examples with agents, pink to represent regular past tense verbs used in active voice constructions, blue to represent irregular past participles used in active voice constructions, and orange to represent any items I was unsure of and wanted to specifically ask my peer reader to look at. On each page, I numbered each example based on its color and wrote totals on the bottom of the page. For the chapter total, I added each number, according to color, using the totals from the bottom of the pages.

By collecting this data, I was trying to answer the following questions: How often does the use of passive voice occur in the textbook *Biology* (Nowicki, 2008)? What does the use of passive voice look like in *Biology* (Nowicki, 2008)? What types of issues can passive voice cause for teachers and students, including classroom expectations of using the textbook? What strategies can help ELLs better understand and use the passive voice?

Findings

To answer the questions about how often passive voice is used and what the use of passive voice looks like in *Biology* (Nowicki, 2008), I used a table to help sort my data. My findings are presented below.

Table 4.1

Collected data

Categories	Number of Passive Examples	Number of Passive Examples with Agents	Number of Agentless Passive Examples	Number of Regular Past Tense Verbs in Active Voice Constructions	Number of Irregular Past Participles in Active Voice Constructions
Chapter 3	131	15	116	48	42
Chapter 10	77	7	70	110	109

When collecting data about the regular past tense verbs and irregular past participles in active voice constructions, I did not recount verbs that were already accounted for in the passive voice examples. I did this because I wanted to keep the categories of passive voice and active voice examples as separate as possible. This helped me compare the total numbers of regular past tense verbs and irregular past participles in

active voice constructions and agent and agentless passive voice instances in the chapter. For both chapters, I only examined the “main” part of the text. I did not examine the headings, figures, captions or interactive parts of the text, including questions to ask students, investigations, or data analyses. This meant that some pages within chapters were skipped.

For Chapter 3, I examined the main text on pages 70-73, 75-79, 81-87, and 89-91. On each page that I examined there was at least one example of passive voice, specifically agentless passive voice. Not every page had passive examples with agents, regular past tense verbs in active voice, or irregular past participles used in active voice. The beginning of the chapter had more examples of all of the text features that I was looking for on each page than the end of the chapter did. The highest number of occurrences of both regular past tense verbs in active voice and irregular past participles in active voice were found in the section about cell theory, pages 70-71. The sections about cell structures and functions had significantly lower numbers of those types of verbs. Because passive voice in scientific text allows the author to appear to have more authority and be viewed as more objective by readers, it is beneficial to write about structures and functions using the passive voice (Fang, 2007; Germano, 2005). For passive voice examples, including both passives with agents and agentless passives, many examples were found throughout the chapter. Overall, Chapter 3 had more passive voice examples than examples of regular past tense verbs and irregular past participles in active voice construction.

For Chapter 10, I examined the main text on pages 298-314. Again, on each page that I examined there was at least one example of passive voice, specifically agentless passive voice. Every page also had at least one example or more of regular past tense verbs in active voice construction. Every page had at least two or more examples of irregular past participles in active voice construction. Examples of passives with agents were not found on every page. Even though this chapter was largely about theories and history of evolution, the amounts of passive examples, as well as amounts of regular past tense verbs and irregular past participles in active voice constructions, remained fairly consistent throughout the entire chapter. Overall, Chapter 10 had more examples of regular past tense verbs and irregular past participles in active voice than examples of passive voice. Fang (2007) describes how passive voice can have so much information located after the verb, which was helpful when describing cell structures and functions in Chapter 3, but less helpful in Chapter 10 when describing theories and the history of evolution.

To answer the question about issues that passive voice can cause for students, I noticed that the use of passive voice occurred on every page that I examined. Specifically, the use of agentless passive voice occurred on every page. If students do not have a strong understanding of the passive voice, and are unfamiliar with who the agent could be when reading agentless passive examples, then this could interfere with learning. The expectation of using the textbook for class will be problematic for students and teachers because the text is so grammatically and linguistically confusing for

students. In order for students to achieve understanding, teachers would need to heavily supplement the text, which can be daunting for teachers, as it creates more work.

I also observed another passive voice structure that could be causing issues for students. Between the auxiliary verb and the main verb in many of the passive examples, an adjective, adverb, noun or conjunction appeared. For example, “is highly organized” (Nowicki, 2008, p. 73) is divided by an adverb. This type of passive example is not easily found in grammar books or commonly taught with passive voice instruction because it is specific to scientific writing. Because this structure appeared fairly often in Chapter 3, 28 times out of the 131 passive examples, I am wondering if it could also be contributing to challenges students face when reading the textbook. It should be noted that in Chapter 10, only 4 out of 77 passive examples were split.

Conclusion

This study showed that passive voice was used on every page of the textbook *Biology* (Nowicki, 2008) that was examined. The vast majority of the passive voice examples were agentless examples. In Chapter 3, 116 out of 131 passive voice examples were agentless. The highest number of occurrences of both regular past tense verbs in active voice and irregular past participles in active voice took place in the section about cell theory, whereas the other sections about cell structures and functions had significantly lower numbers of those types of verbs. There was a higher frequency of passive voice examples in Chapter 3 than in Chapter 10. In Chapter 10, 70 out of 77 passive voice examples were agentless. The amounts of passive voice examples, regular

past tense verbs and irregular past participles in active voice were fairly consistent throughout the entire chapter. There was a higher frequency of regular past tense verbs and irregular past participles in active voice in Chapter 10 than in Chapter 3. Because passive voice is used so frequently and appeared on every page that was examined, this could be causing issues for the ELLs and their expected use of the textbook in class. Teachers and students might hesitate to use a text that causes such grammatical and linguistic challenges for students. Additionally, some of the passive voice examples were split with adjectives, adverbs, nouns or conjunctions, which could also be contributing to student confusion. This is why it is necessary to create strategies to teach ELLs how to interpret passives with and without agents, as well as split passives.

In this chapter I discussed the findings of my data. In Chapter Five I will discuss my major findings, limitations of this study, implications of this research, and suggestions for further research.

CHAPTER FIVE

CONCLUSIONS

The goal of this study was to try to answer the following questions: How often does the use of passive voice occur in the textbook *Biology* (Nowicki, 2008)? What does the use of passive voice look like in *Biology* (Nowicki, 2008)? What types of issues can passive voice cause for teachers and students, including classroom expectations of using the textbook? What strategies can help ELLs better understand and use the passive voice? I conducted a text analysis of two important chapters from *Biology* (Nowicki, 2008) and examined the number of passive voice examples, including passives with agents and agentless passive examples, the number of regular past tense verbs in active voice, and the number of irregular past participles in active voice. I used a mixed research paradigm that included both quantitative and qualitative analyses. This chapter will address the following topics: major findings of my research, limitations of the study, implications of the research, and suggestions for further research.

Major Findings

Because I already know that my students have difficulties understanding the text *Biology* (Nowicki, 2008), this study informed me about certain grammatical features that may be contributing to the difficulties my students experience with the textbook. By

examining how often the passive voice occurred and how it was used, I learned how prevalent passive voice is in the textbook. Particularly, I am now aware of how often examples of agentless passive voice occur. As I discovered in my literature review, Cowan (2008) notes that agentless passives are more common in scientific text. This was true for the text I analyzed, *Biology* (Nowicki, 2008). As noted in my literature review, Kline and Demuth (2010) discuss that when there is not an agent by phrase and the subject must be inferred, students can have difficulties inferring this information. Most of the ELLs that I teach do not have the same background information that their native English-speaking peers have. Therefore, trying to determine who the agent might be in the sentence, along with all of the other grammatical and linguistic challenges within the sentence, is very difficult for many of them. This information will help inform my instruction so that I can specifically teach examples of what passive voice is and how to use passive voice, with emphasis on agentless passive voice examples.

The data from the text analysis also informed me that the highest number of both regular past tense verbs and irregular past participles in active voice occurred in the section discussing cell theory in Chapter 3, as opposed to the bulk of the chapter, which discussed cell structure and function. However, in Chapter 10, which mostly discussed theories and the history of evolution, the number of passive voice examples, regular past tense verbs and irregular past participles in active voice were fairly evenly spread out through the entire chapter. Because of this, when students read about scientific theory, there will be many challenging text features for them and they will need to switch between active and passive voice within paragraphs, which helps me as a teacher to be

more prepared to anticipate those grammatical challenges. Additionally, I was surprised to see how many verbs, both regular past tense verbs and irregular past participles in active voice, appeared in the textbook. Many of my students have had very limited exposure to using irregular past participles, which could also be contributing to grammatical challenges that they encounter. This could be especially important to pay attention to, now that I know some chapters have a much higher frequency of using irregular past participles in active voice than other chapters.

There is an expectation that the textbook, *Biology* (Nowicki, 2008) will be used, by all biology teachers in my district. The biology teachers that I work with are aware that this textbook is very challenging for ELLs. Therefore, the teachers often times avoid using the textbook. Additionally, in my experience, science content teachers much prefer to teach science content and not language to students, which increases the gap between ELLs and non-ELLs. Science content teachers have told me that they feel underprepared and intimidated to teach language to students. So then teachers usually choose to use watered-down texts instead of taking the time to teach language and difficult grammatical structures. Students then end up not knowing how to use certain grammatical structures like the passive voice, and miss out on the same educational experiences that their peers are exposed to by using the actual textbook.

To help with this issue at my school, I plan to use my findings to inform the science content teachers about the use of passive voice in *Biology* (Nowicki, 2008). Each week we have department meetings called Professional Learning Communities (PLCs). I plan to take time during a few PLCs to teach about passive voice, its construction and

purpose in scientific text, split passives (which includes understanding adjectives, adverbs, nouns, and conjunctions), and a few strategies that teachers can use to help learners better understand and use the passive voice. For example, Fang (2007) and Nilagupta (1977) both suggest that students practice with cloze passages to get acquainted with the passive voice. Fang (2007) and Plummer (1988) both suggest using actual student writing to practice using passive voice so that the experience is more meaningful and authentic. Additionally, Fang (2007) suggests that students practice paraphrasing academic scientific language into everyday language that they are more familiar with to build understanding. By using strategies like teaching explicit examples of passive voice, using the actual textbook and not a watered-down version, and using actual student writing, I am hopeful that science content teachers will feel more prepared to teach language to their students. I am also hopeful that both teachers and students feel successful with this grammatical structure and will be more willing to use the actual textbook *Biology* (Nowicki, 2008) so that ELLs have the same opportunities as their native English-speaking peers.

In my role as a co-teacher, it is my job to advocate for my ELLs. With this new information about the grammatical challenges of the textbook, particularly with the finding of the high amount of split passives, I will advocate for more time in class to be dedicated to the explicit instruction of passive voice within the context of science. To understand split passives, students will also need to understand adjectives, adverbs, nouns and conjunctions. As Fang (2007) discusses, passive voice can have a lot of information packed into the sentence after the verb that students must understand, in addition to other

challenging text features like split passives. Because of all of the challenging grammatical layers, students will need even more time dedicated to learning about language and these grammatical issues in scientific text.

Limitations

Understanding grammatical structures and being able to confidently identify them takes a lot of knowledge and experience. Being that I am not a grammarian or an experienced professor, one of the limitations to this research was being able to trust myself to collect valid quantitative data about the number of examples of passives with agents, agentless passives, regular past tense verbs and irregular past participles in active voice in the two chapters that I examined. There were several times that I was unsure how to categorize what I was looking at, particularly because some of the passive examples were split with an adjective, adverb, noun, or conjunction. I had not previously encountered passive examples that were split like this, so I was not sure if I was accurately assessing the data. In the end, I cross-referenced my questions with my peer reader to be sure that I was collecting data as accurately as possible.

Additionally, I believe that examining more chapters in *Biology* (Nowicki, 2008) would increase the validity of this research. Then I would be able to make even more generalizations about the textbook and how passive voice, regular past tense verbs and irregular past participles in active voice are used, which would help to further inform my instruction.

Implications

My findings reinforce Fang's (2007) idea that teaching both content and language in science is crucial for student understanding. Science content and language should not be separated, but should be taught together. In my opinion, it is definitely valuable and necessary to take time in class to teach language. Then students will have better access to the textbook, have a voice in class, and have similar exposure to educational opportunities to those that their native English-speaking peers experience.

Fang (2007), Nilagupta (1977), and Plummer (1988), discuss highly valuable ideas about teaching passive voice to students. Fang (2007) suggests that students compare their own writing to the scientific writing in the textbook and look for the differences in active and passive voice. He recommends that students practice paraphrasing scientific text into language that they use everyday to become more familiar with the scientific language. Fang (2007) also recommends using sentence strips and cloze passages to explore subordinate and embedded clauses in relation to passive voice, while not using watered-down text. He encourages explicit teaching of the passive voice with a gradual release of responsibility approach (teacher models an example and a think aloud, then teacher and students work on an example together, finally students work independently) for better student understanding.

Nilagupta (1977) suggests that students first practice the passive voice with cloze passages, and that teachers should use simplified text to bridge students to more difficult readings. Plummer (1988) suggests that teachers should use actual student writing to help facilitate understanding of the passive voice, as opposed to just memorizing a set of

grammatical rules about passive voice. He argues that memorizing a set of grammatical rules does not carry meaning and is, therefore, not effective. Plummer (1988) continues explaining that by using student writing the students will apply grammatical rules in a way that is relevant and authentic. He also recognizes that because students do not often speak using the passive voice, it can be difficult for them to recognize and use passive voice in writing.

I plan to teach my colleagues the strategies mentioned above that those researchers find valuable. I also plan to use these strategies in my own classroom. I would advise teachers to use explicit instruction focused on passive voice and a gradual release of responsibility approach, while using the actual textbook. If teachers use a watered-down version of the textbook and avoid teaching new or difficult grammatical structures like passive voice, it puts ELLs at a disadvantage because they would not be exposed to the same texts or language as their native-English speaking peers. This would limit their academic opportunities. Fang (2007) warns against using watered-down texts. He emphasizes that in order for students to fully understand scientific thinking and understanding, they need to have an understanding of scientific language. Not using the actual textbook just continues to add fear and anxiety about the textbook, which is not helpful to teachers or students.

Additionally, students could complete cloze sentence activities to learn more about passive voice and practice changing the academic scientific language of the textbook into everyday language, for better understanding. This is important because it allows students time to take unfamiliar words and change them to familiar words. By

breaking down scientific language like this, students will better be able to relate to and find meaning in the text. This will help students remember and understand the text, and hopefully add the new words to their vocabularies. If students do not use the scientific language in a way that they are familiar with, then they will not ever make connections to the meanings of those scientific words. Teachers should use actual student writing and compare it to the writing in the textbook so that the experience is more authentic for learners. Lastly, these ideas should be used weekly so that both students and teachers feel more confident and successful with the language of science. By explicitly teaching language and grammar structures within a science textbook, ELLs will have more educational opportunities in their futures.

Further Research

This study left me with further questions about the verbs, tenses, and aspects used in the textbook *Biology* (Nowicki, 2008). It would be interesting to conduct further research by categorizing all of the verbs, along with their tenses and aspects, in the chapters to see what other types of grammatical challenges would arise. Additionally, further research on other challenging grammatical text features, like those mentioned in Chapter One, would be very useful. For example, I would like to know if the number of nominalizations used in *Biology* (Nowicki, 2008) has as high of a frequency as the passive voice does. Lastly, now that I know how often passive voice is used in our textbook and what it looks like, I would like to try some of the teaching strategies that were presented and report on how effective they are with actual students.

Overall, this study confirmed for me that the use of passive voice, particularly agentless passive voice, is very frequent in our class textbook *Biology* (Nowicki, 2008). I also learned how often both regular past tense verbs and irregular past participles in active voice appeared, and that they are mixed in with the passive voice, which adds more challenges to student understanding. My research reaffirmed my belief that teaching language is just as important as teaching science content, especially in context. I believe that it is always more important to teach students about challenging language features, like passive voice, as opposed to ignoring those challenges in favor of using an easier or watered-down text. By taking on these challenges directly, English Language Learners will be more successful in their classrooms, which will ultimately present them with more educational opportunities in the future.

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