The Impact Of Risa Oral Interactions On The Acquisition Of Scientific Classification Language For Slife

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THE IMPACT OF RISA ORAL INTERACTIONS ON THE ACQUISITION OF
SCIENTIFIC CLASSIFICATION LANGUAGE FOR SLIFE

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

Hamline University

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4.0 International License.
To Stephanie, who looks past my faults when helping me to be the best version of myself.
And to my students, who constantly inspire me to reach for what others say is impossible.
“Instruction that involves only reading, writing, and the teacher talking dooms SLIFE to fail.” - *Watson's Law*, Dr. Jill Watson
ACKNOWLEDGEMENTS

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Thank you to all the family and friends who have been there for me in those times when my running has become a walk, my walking has become a crawl, and my crawling has become a need to be carried. I love you all.

Finally, I would like to give a special thank-you to the staff and administrators at my school, especially Manyi Tambe, for their confidence in me and my (admittedly, sometimes quixotic) vision, and for their tireless work in making Hamilton High School an exceptional place for our students to learn and build a better future for themselves.
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CHAPTER ONE

Introduction

Issues surrounding the education of students with limited or interrupted formal education (SLIFE) have been a passion of mine throughout the entirety of my teaching career. I remember beginning work at my first US school, a small charter school situated in Minneapolis. After a tumultuous first year of teaching, I enrolled in a summer course focused on the history of the Somali diaspora. One of our assigned readings was a published work on the professor’s experience as an expert witness for a lawsuit brought against a school for failing to educate its students. To my chagrin, I discovered the school in question was the one I had been working for! Admitting this during class discussion initiated a relationship at my school with academics at Hamline University and the University of Minnesota.

This relationship has included specialized training on SLIFE. One important element in the resulting professional development is the study and use of Marshall and DeCapua’s (2011) Mutually Adaptive Learning Paradigm© (MALP©) as a guiding tool for curriculum and lesson planning. By studying MALP©, I could confirm that my students are not “bad students,” nor is my school unique in the challenges it faces educating them. While English Learners (ELs) in general have needs beyond those of the
mainstream, the conditions of learning for SLIFE are even more exceptional. The students I routinely work with are not able to use advantages students with developed academic and literacy skills have to acquire language and succeed in school. SLIFE arrive in this country unfamiliar with many school skills and habits US educators take for granted, such as how to take and use notes, read textbooks, or learn independently. Yet, despite all of the conditions working against them, the SLIFE I teach are also among the most motivated students I have ever encountered. I want to find ways to empower them to be successful in the classroom, and I know that in order to do so, I will have to tap into their funds of knowledge.

In the course of my relationship with these university academics, I have become involved with MinneSLIFE. MinneSLIFE, a standing committee of MinneTESOL (the Minnesota professional association for ESL educators), is a concerned group of English Learner (EL) educators who witness the same challenges in their classrooms and are passionate about pursuing solutions to improve educational outcomes for SLIFE. Dr. Jill Watson, a professional contact within MinneSLIFE, conducted a multi-day training session at my school on an innovative new classroom technique involving oral interactions (2015).

As the oral interactions imparted by the training are routinized, integrated with content, structured, and academic in nature, they have become known as RISA oral interactions. These interactions take inspiration from scripted dialogues found at the beginning of many chapters of foreign language learning textbooks. Individual instances of RISA oral interactions emulating academic conversations are now referred colloquially
in my school as RISA dialogues. RISA oral interactions are also developed in accordance with the tenets of MALP©. When implemented as designed, students take about five minutes in each class period to engage in structured academic conversations as they rehearse their RISA dialogue. RISA oral interactions use a combination of scripted and unscripted elements scaffolded to the language proficiency of the participants in order to elicit the application of content knowledge. Typically, the exchanges comprise three to five utterances per speaker at a beginning proficiency level. When the interactions are used as an assessment tool, students are expected to perform the memorized scripted portions of a RISA dialogue with a partner and to fill in the unscripted portions with additional information provided by the teacher. For example, in a science class, students may use a RISA dialogue to justify their reasoning for the classification of an animal when given a prompt with its traits. This active learning time conforms with Watson’s Law: “Instruction that involves only reading, writing and the teacher talking dooms SLIFE to fail” (Watson conference notes, 2015).

The teachers at my school have quickly realized how beneficial RISA oral interactions can be. Likewise, as communications with my professional contacts often revolve around finding effective classroom procedures for SLIFE, an actual, concrete procedure teachers could easily implement is a welcome resource for their pedagogical practices. In addition, the integrated nature of RISA oral interactions allow for implementation within all academic fields.

Anecdotally, the positive feedback students give in my class is encouraging. Many students comment about how much they love practicing RISA dialogues. Some
also remark on how it helps them with pronunciation and academic terms. However, I
want to provide empirical evidence as to whether this technique is useful in increasing
students’ ability to use academic language. That desire is the spark that motivates this
study.

If RISA oral interactions are in fact shown to be effective in the acquisition of
academic language and corresponding content knowledge, it will be in no small part
because of its ability to tap into the cultural strengths of SLIFE. SLIFE rely on and are
skilled in using oral transmission of information in non-literate cultures (Freeman,
Freeman & Mercuri, 2002). RISA oral interactions also tap the capacity of SLIFEs’
memorization skills, a strength often found in oral cultures. In these ways, RISA oral
interactions draw on the funds of knowledge of SLIFE, a critical component for their
success (Zacharian & Haynes, 2012).

This study examines the impact of RISA oral interactions on the language
learning of SLIFE and their ability to extemporaneously engage in cognitively complex
language tasks. Specifically, the study looks at the semantic and syntactic usage of
taxonomic classification language in a newcomer science classroom, a decontextualized
academic task many SLIFE struggle with (Marshall & DeCapua, 2011). Data is tabulated
quantitatively and described through transitivity analysis, an element of systemic
functional linguistics. Elements of analysis include correct syntactic placement of whole-
part sentence structures (also known as intensive and possessive transitive relational
processes), correct semantic usage of classification lexis key terms, instances of generic
referents, and fluency measures as determined by words per minute (WPM). Specifically,
the research question guiding this study is: “How does the use of RISA oral interactions as a technique for scaffolding academic conversations impact the use of scientific classification language features, development of scientific classification language, and ability to engage in more cognitively complex forms of academic tasks for SLIFE in a high school setting?”

The study takes place in an EL newcomer science classroom in an urban Midwest charter school. It uses a quasi-experimental action research method to analyze language growth following treatment with multiple interventions involving RISA oral interaction. These interactions take place over a five-week period in a unit on animal classification. Students digitally record oral samples both pre- and post-intervention. I hypothesize the study would show RISA to be an effective classroom technique for the acquisition of classifying language and possibly other academic language by SLIFE, particularly when used in conjunction with the MALP© design for curriculum and lesson planning. If shown to be successful, it is hoped that the use of RISA among educators of SLIFE will increase.

**Conclusion**

As described in this chapter, the education of SLIFE demands innovative answers to challenging classroom needs. Through the use of RISA oral interactions (among other culturally-responsive teaching practices), educators of SLIFE can begin to meet those demands. In order to properly evaluate RISA oral interactions, it is first necessary to understand certain elements underpinning its use in this context. These include: characteristics of SLIFE and the strengths and challenges they bring into classrooms;
features of scientific language, including classification language; and the use of academic conversations. A discussion of current literature on these topics follows in Chapter Two. Chapter Three discusses the setting, scope, and methodology of the study in further detail. In Chapter Four, the results and findings of the data are presented. Chapter Five addresses implications of the results, limitations within the study, and possibilities for future research.
CHAPTER TWO

Literature Review

This chapter covers relevant information needed to address the research question: “How does the use of RISA oral interactions as a technique for scaffolding academic conversations impact the use of scientific classification language features, development of scientific classification language, and ability to engage in more cognitively complex forms of academic tasks for SLIFE in a high school setting?” The chapter is broken into six sections. The first section is concerned with general characteristics of SLIFE and implications for their educational outcomes. The second section focuses on MALP©, a framework used among other best practices in classrooms to bridge educational differences of SLIFE. In the third section, aspects of cognition and ideational meaning necessary for academic tasks, including classification, are discussed. Specific components of scientific classification language are discussed in the fourth section. The fifth section reflects on current theory of science pedagogical best practices for ELs. The last section covers the significance of academic conversations and speaking tasks on language development and best practices for designing and facilitating them.
Characteristics of SLIFE

In order to effectively educate students, it is important to understand who they are. SLIFE bring a unique set of strengths and challenges to US classrooms (Porter, 2014). However, while there are different reasons students have limited or interrupted formal education, they share some common characteristics (Zacarian & Haynes, 2012). Often, SLIFE arrive in the US as refugees or asylum-seekers, although some come for economic opportunities. According to Minnesota state statute (120B.36 Subd. 1(e)), all students identified as SLIFE must: speak a home language other than English; enter US schools after grade 6 (when the foundations of literacy and numeracy are already typically developed); have at least two fewer years of schooling than their peers; and function at least two years below average in reading and math.

Such characteristics often have significant impacts on educational outcomes for SLIFE (Bangura, 2012; Hos, 2016). While unfortunately data for SLIFE in Minnesota is currently unavailable, an ethnographic study of female African SLIFE in New York City finds SLIFE have far lower graduation rates than their peers (Bangura, 2012). The overall state graduation rate for SLIFE in New York is less than 30 percent. In one school with a high SLIFE concentration, graduation rates were only 1-2 percent. These factors are further complicated by pressures many SLIFE face from their families. Many SLIFE are expected by their relations to begin working and raising families as soon as possible (Bangura, 2012). SLIFE who do succeed in school often do so because of the help-seeking relationships they form.
Mere knowledge of the conditions and characteristics of SLIFE is not sufficient to improve their classroom outcomes (Porter, 2014). Educators must adapt and design curriculum and lessons with their needs in mind, as current educational structures produce inadequate results (Bangura, 2012; Browder, 2014). One current framework used to conceptualize lessons and curriculum is the Mutually Adaptive Learning Paradigm (MALP©), designed by DeCapua and Marshall (2011).

MALP©

MALP© instructional design is composed of an awareness of, and intentional lesson planning for, the conditions, processes, and activities for learning of both the home cultures of SLIFE and the US educational system. As conditions for learning can be adjusted to accomplish the aims of US schools, the authors argue for accommodations on behalf of learners in US classrooms. For instance, whereas US schools stress the importance of future relevance, informal education for SLIFE in their home culture typically centers on matters of immediate relevance to their lives. MALP© instructional design therefore advocates for lesson design that is immediately relevant to SLIFE. US education places importance on the independent learning of individual pupils, while SLIFE see themselves as members of an interconnected learning group. MALP©, therefore, strongly encourages a classroom curriculum with a pronounced integration of collaborative learning.

MALP© emphasizes a blended approach regarding the educational processes familiar to SLIFE and those in US schools (DeCapua & Marshall, 2011). MALP© instructional design, as outlined in figure 1 below, addresses two major components of
processes: accountability and literacy. In traditional SLIFE educational settings, a group shares responsibility for accomplishing a task. Individual members contribute according to their ability and the task is generally approached with the use of relationships. Western schooling is primarily concerned with individual accountability, as can be evidenced by the high-stakes testing environment generated after the passage of the congressional reauthorization of the Elementary and Secondary Education act known as No Child Left Behind. Consequently, MALP© recommends incorporating both dimensions of responsibility into classroom learning structures. Another difference is how information is transmitted. SLIFE may be from cultures with no written language (or one with a new writing system). Additionally, some SLIFE are from cultures in which they have received limited exposure to literacy of the dominant language group, which may not be their home language. As a result, SLIFE generally do not turn to print forms as sources of

<table>
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<th>Components of Learning</th>
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<th>Western-style education</th>
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<td>Accept conditions from learners</td>
<td>Immediate relevance</td>
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<td></td>
<td>Interconnectedness</td>
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<td>Combine processes from learners and Western-style education</td>
<td>Shared responsibility</td>
<td>Individual Accountability</td>
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<td>Oral transmission</td>
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<td>Focus on Western-style learning activities with familiar</td>
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<td>language and content</td>
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Figure 1. Overview of MALP Components. Shaded areas indicate elements of emphasis within a classroom employing a MALP design.
information. By contrast, fluency with various forms of media is seen as a requirement in countries using the Western model of education.

Of particular note is that many cultures of both SLIFE and US schools emphasize group work, but have disparate conceptions of how the group should function (DeCapua & Marshall, 2011). In many cultures of SLIFE, the group all shares accountability for the knowledge, with one person typically taking responsibility for disseminating the information to group members. However, group work in US schools emphasizes each student taking responsibility for a segment of the knowledge to be acquired and/or work to be done. The implications of these differences complicate life in US classrooms for SLIFE. For instance, significant differences exist on how homework should be done. While a SLIFE might see giving answers to an assignment as helping her friend, her teacher might interpret this act as plagiarism.

Finally, MALP© advocates for the transition of SLIFE from pragmatic tasks to academic tasks (DeCapua & Marshall, 2011). While SLIFE are accustomed to learning with immediate impacts, they require practice with the analytical language expected in US schools. In particular, SLIFE struggle with decontextualized lessons, or lessons without an immediate real-world analogue. MALP©-influenced curricula prioritize explicit additional practice with academic tasks and the taxonomic thought processes accompanying them first set out in Bloom’s Taxonomy (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956) and further revised by modern cognitive psychologists (Anderson et. al., 2001).
As is evident by the emerging research cited above, educators have begun to invest significant time and energy into culturally responsive pedagogy and classroom practices for this underserved population (DeCapua & Marshall, 2011; Freeman et al., 2002; Miller, 2009; Nargund-Joshi & Bautista, 2016). However, empirical evidence about the effectiveness of discrete classroom activities, such as RISA, continues to be scant. Therefore, an investigation into the effectiveness of RISA is warranted by this research.

**Cognitive and Ideational Elements of Classification**

Classification is a common academic task within the science classroom (Huang & Morgan, 2003). Cognitively, classification relies on the twofold ability to conceptually convey how relationships between elements in a larger structure are connected and to construct meaning from oral, written and/or graphic representations (Anderson et. al., 2001). As mentioned above, Bloom’s Taxonomy was revised to rank academic tasks into two intersecting hierarchical cognitive dimensions, the use of knowledge dimension and cognitive processes dimension. In language objectives, cognitive dimensions are typified by the verb and noun phrase following a standard clause of “The student will be able to” (Krathwohl, 2002). For example, in the objective, “The student will be able to describe animal features based on illustrated data,” “describe” is an element of the cognitive process dimension, while “using a classification chart” reflects the demands of the knowledge dimension. The cognitive levels of complexity for classifying are known as the conceptual knowledge dimension and the understanding cognitive process dimension. (Krathwohl, 2002).
Conceptual relationships between elements in classification tasks are more cognitively demanding than those of description, which merely require the understanding of basic factual information (Schleppegrell 1998; Mayer, 2002). Increased cognitive demands change the requirements of linguistic performance and the effects on its aspects, namely linguistic complexity, accuracy and fluency, (Robinson, 2001; Robinson & Gilabert 2007; Skehan & Foster, 2001). According to Robinson’s Cognition Hypothesis, engaging in cognitively more demanding tasks also produces greater accuracy and linguistic complexity (Robinson & Gilabert, 2007). An increase in cognitive demands of tasks also promotes greater ability to learn from input and retain the knowledge learned. The careful sequencing of tasks from simpler to more complex forms also produces gains in automaticity and ability to organize elements of higher linguistic performance in L2 academic tasks. Accordingly, meaningfully engaging in academic tasks with higher cognitive complexity levels results in more meaningful learning (Mayer 2002). However, increased linguistic complexity or accuracy comes at the expense of fluency, since speakers must attend to more explicit and conscious language processing (Robinson & Gilabert, 2007; Skehan & Foster, 2001).

The function of scientific language is to create an abstracted interpretation of our world separate from physical reality (Halliday & Martin, 1993). This construction is accomplished through chains of reasoning linking one idea to the next. To create an linguistic structure suitable for classification, reference chains must be present in the language used (Christie & Unsworth, 1986; Schleppegrell, 1998). Conversely,
Schleppegrell posits, without causal or conditional conjunctions, a chain cannot be established.

According to Huang and Morgan (2003), classification knowledge structures are concerned with the ideational meaning and semantic relationship between members and groupings. One pertinent component for this study is the relational difference between nominal groupings in subject and adjunct positions of part-whole relationships. The classic grammatical concept of subject has in fact three separate functions in systemic functional linguistics (Halliday & Matthiesen, 2004). The grammatical subject, which syntactically precedes the predicate, is known as the subject. The logical subject, concerned with the meaning rather than position of the nominal group, is termed the actor. Finally the psychological subject, or the nominal grouping which is the chief concern of the message, is referred to as the theme.

Functional differences between subject, actor and theme can affect the linguistic complexity of relational processes in classification tasks. For instance, in the utterance, “A bird has feathers,” the nominal grouping of “a bird” functions as the subject, actor and theme, (Halliday & Matthiesen, 2004). However, in the utterance, “Feathers are a feature of birds,” birds retains the theme, while the subject and actor are now feathers. The shift in function of theme to the adjunct nominal grouping in “is a feature of,” a classification key lexis in this study, is similar to passive tense constructions in traditional grammar, which are generally regarded as more linguistically complex than active tense (Wright, 1969).
Language Features of Scientific Classification

Science and scientific thinking is accompanied by its own specialized language and ways of thinking (Zwiers & Crawford, 2011). Major areas of scientific language and cognitive academic tasks include explanation, definition, classification, and logical reasoning. These schemas permeate academic thought, but unfortunately are often underdeveloped in SLIFE (DeCapua & Marshall, 2011). Since this study is principally concerned with the development of language used for the taxonomic function of classification, this section will focus on an explanation of some of its pertinent linguistic features, drawn from work in Systemic Functional Linguistics (Huang & Morgan, 2003).

Studies in Systemic Functional Linguistics have identified several common linguistic properties of classification language. One common feature encountered in classifications is generic reference (Christie & Unsworth, 1989). In this context, generic reference refers to the use of a genus, or group, in an utterance. For instance, the utterance “Snakes have scales” is considered a generic reference, as it refers to the entire class of snakes. “This snake has scales,” by contrast, references a specific snake.

Another feature of classification language is the use of possessive and intensive transitive relational processes (Huang & Morgan, 2003). Transitive relational processes take as their central semantic meaning a reference that one thing is connected with another in some way. Both intensive and possessive transitive relational processes are used in classification. Intensive transitive relational processes follow the syntactic pattern “X is a Y” These are used to indicate taxonomic relationships (e.g. snakes are a (kind of) reptile). Possessive transitive relational processes indicate part-whole relationships, i.e.
“X has a Y.” These processes are used to indicate traits used to classify (e.g. “snakes have scales”) (Huang & Morgan, 2003).

Huang and Morgan (2003) also analyzed classifications using lexis, or word choice. One way lexis can create classification is through the use of single nouns used specifically for classification (e.g. kind, class, example, etc.) These key words comprise logical choices for increasing students’ academic language proficiency, since many EL teachers would consider them Tier II vocabulary.

Yet another component of classification language is nominal grouping (Huang & Morgan, 2003). Modification of nominal grouping is commonly used in the establishment of sub-categorizations, or a group within another group (e.g. “Reptiles are animals that have scales and hatch from eggs.”) As this feature employs relative clauses, it was determined to not be an appropriate feature to analyze in the utterances of students at a beginning language proficiency.

**ELs and Scientific Language: Pedagogical Best Practices**

Research has shown that SLIFE greatly desire and appreciate appropriate adaptations in the science classroom (Miller, 2009). In fact, some researchers argue that explicit development of scientific argumentation structures is a necessary scaffold for all ELs (Swanson, Kang & Bauler, 2016).

In an action research article examining the impact of instruction on classification discourse for ELs in an elementary school, Huang and Morgan (2003) describe how, post-treatment, students’ classifications became more sophisticated. Said classifications include an increase in definitions and elaborative examples. For instance, in one student’s
first draft of a paper, they classify matter as organic or inorganic, whereas in their third
draft, they provide multiple examples of organisms to further expound on their
knowledge. Interestingly, Huang and Morgan find that at the sentential level, there are
more grammatical errors, which they attribute in part to the increase in use of relative
clauses.

An Australian study of SLIFE in a science classroom also examines the perceived
effects of EL supports (Miller, 2009). According to Miller, the inclusion of a simplified
glossary is well received by the SLIFE in an Australian classroom. The mainstream
classroom teacher expresses reservations about its effectiveness, but concedes that the
project opens his eyes to the degree of assumptions he made about his students’
background knowledge.

Another study explores the incorporation of Sheltered Instruction Observation
Protocol (SIOP) with the 5E Scientific Pedagogical Model developed by the Biological
Sciences Curriculum Study (Nargund-Joshi & Bautista, 2016). In the 5E model, a lesson
sequence begins with the Engage phase, in which the teacher accesses and assesses
students’ prior knowledge and inculcates student curiosity (Bybee, Taylor, Gardner, Van
Scotter, Powell, Westbrook & Landes, 2006). The teacher then provides students with
experiences so they may identify their current understandings in the Exploration phase.
During the Explanation phase, the teacher clarifies misconceptions and introduces
concepts unfamiliar to the students. Students have opportunities to extend and deepen
their understanding through experiences in the Elaboration phase of 5E. In the final phase
of the sequence, Evaluation, students assess and demonstrate their new understanding in ways that teachers may evaluate in terms of achieving educational objectives.

The unit in question focuses on a three-lesson sequence on land pollution. The authors merge the Engage Phase of the 5E model with the SIOP components of building background and tapping into students’ previous experiences. During the Explore phase, students must examine objects to determine their impact on landfills. This phase is infused with the comprehensible input, strategies, interaction, and practice components of SIOP. Finally, students are asked to analyze waste usage around the school and to design a recycling plan as an Elaborate portion of 5E. This is synchronous with the application/practice and review/assess SIOP categories. While the study does not reach specific conclusions regarding impact on student learning, it does offer a demonstration of how both science and EL pedagogical best practices can have a congruent relationship.

Earnest attempts have been made to adapt and incorporate EL best practices into science instruction, including for SLIFE (Miller, 2009; Nargund-Joshi & Bautista, 2016; Swanson et al., 2016). However, little research has been done on the effectiveness of specific classroom techniques, particularly in regard to the use of academic conversations. Consequently, this research is well-situated to contribute to the field with its analysis of RISA oral interactions.

**Academic Conversations and Speaking Tasks**

Academic conversations are a crucial component of school success (Zwiers & Crawford, 2011). In fact, some leading teachers believe “it is the thread that is woven throughout the comprehension quilt. It is the tie that binds” (Ketch, 2005, p. 9).
Unfortunately, teachers tend to give students from lower socioeconomic backgrounds fewer opportunities to talk than in affluent schools (Zwiers & Crawford, 2011). Zweirs and Crawford add that the discrepancy is compounded for ELs, who spend less than 5 percent of their school day engaged in academic talk.

Academic conversations have been shown to contribute to the development of a variety of scholastic knowledge and skills (Zwiers & Crawford, 2011). These include, but are not limited to, academic language and vocabulary, literacy skills, critical thinking skills, and understanding of content. Zwiers and Crawford also set out core conversation skills that can be developed. The skill of supporting an idea with examples is particularly pertinent to this research. Among the strategies Zwiers and Crawford suggest is the explicit instruction of terms that necessitate examples. As will be further elaborated upon in the methods chapter, the series of oral interactions being studied in this research are developed with the intent of fostering acquisition of key linguistic structures used for classifying.

In one notable study, researchers examined the impact of explicit academic conversations on the development of arguments (Reznitskaya, Anderson, & Kuo, 2007) among mainstream students. In the quasi-experimental study of 4th grade students, one treatment group engaged in topical discussions of moral and ethical issues while another treatment group had both discussions and explicit instruction on argumentation methods. A third control group participated in reading classes per normal. The study found that the conversations made a difference in post-treatment interviews about the elements of argumentation. However, explicit instruction in argumentation did not make a statistically
significant difference on the effectiveness of reflective essays about the argumentation topic. In fact, students with only conversational treatment gave more evidence in their essays to support their argument. The authors offer two possible explanations for this. First, they hypothesized that the while the conversations-and-instruction group could articulate the points of an argument more successfully these schemas had not been fully synthesized within writing style. Secondly, they theorized that the traditional classroom aspect of direct instruction may not have inculcated motivation for the students. Regardless, the study demonstrates that academic conversations can improve outcomes on argumentation tasks for students.

One technique considered best practice for developing the academic conversational language of ELs involves the scaffolding of learning material. Bruner (1978), one of the pioneers of the term, defines scaffolding as “the steps taken to reduce the degrees of freedom in carrying out some tasks so that the child can concentrate on the difficult skill she is in the process of acquiring” (p. 19). In other words, scaffolding is the intentional use of academic structures within a classroom to bridge a learner’s current knowledge and the knowledge to be learned (Gibbons, 2015).

One major advantage of scaffolding resides in its ability to increase context (Gibbons, 2015). Halliday (1975) postulates that all forms of communication occur within context. This context can further be differentiated into the context of culture and the context of situation. Context of culture, refers to the cultural knowledge necessary to engage in a task, such as how to write a business letter or how to participate in a class. Correspondingly, the context of situation, or register, denotes the particular occurrence in
which the language is being used. This includes the ideational metafunction (Halliday & Matthiesen, 2004). Register varies according to the subject being talked about, the relationship of the communicants, and mode of communication (whether spoken or written). ELs often struggle with effective academic conversation due to gaps in knowledge about appropriate register (Gibbons, 2015). Hence, Gibbons contends that ELs need models of academic registers, which RISA oral interactions are created to explicitly provide.

Walqui (2006) argues that while scaffolding begins with planned curriculum, it changes as it is implemented due to its interactive nature. A common form of scaffolding occurs between an expert and novice, and is sometimes referred to as vertical construction. Walqui holds that scaffolding differs from an initiation-response-feedback pattern prevalent in teacher-centered classrooms. IRF has learners demonstrate knowledge rather than co-construct understanding with the teacher. By contrast, in RISA dialogues, both participants are engaging in a vertically constructed script intended to co-construct understanding.

According to van Lier (2004), effective scaffolding is composed of six features. Scaffolded tasks: should be repeated (although they may include variation); must occur in a supportive environment; involve the development and exercising of rapport; are contingent on the actions of participants; shift responsibility for the task from teacher to learner; and attenuate challenge and mastery at a pace that sustains engagement.

Scaffolding can be collective, as when individuals of similar knowledge levels learn together. Scaffolding also occurs when a learner with more developed knowledge
explains and clarifies with an individual with less knowledge. Finally, scaffolding can take place in instances where individuals draw upon previous models of scaffolded learning to engage in self-talk to enrich and further develop current understandings. RISA dialogues fuse together many of van Lier’s elements (2004). RISA tasks (including their introductions) are ritualized, allowing students to build on prior experience using dialogs. They take place in a culturally-responsive classroom environment where students’ cultures are validated. The dialogues encourage rapport-building through collaborative problem-solving scripts and allow for the gradual release of responsibility for the academic task to students. Dialogues can even be written to differentiate for language proficiency, allowing students to participate in more challenging and meaningful ways within the RISA oral interaction. Most importantly, RISA oral interactions give SLIFE and other ELs meaningful models for self-talk as they transition into academic tasks.

Effective scaffolding for ELs involves specialized features, including metacognitive learning dialogues (Walqui, 2006). Walqui contends that dialogues of “learning how to learn” are especially important for ELs as they require normalization of confusion as a prerequisite for knowledge. One intended benefit of RISA oral interactions is the provision of such metacognitive dialogues in a scaffolded manner.

RISA oral interactions also conform to several other tenets of effective scaffolding for language learners as set forth by Gibbons (2015). RISA dialogues provide multiple opportunities for students to practice the language they are learning, including models in an academic register. Since RISA oral interactions are integrated with content objectives,
students are also practicing discussion of actual lesson content, a key component of academic language (Gibbons, 2015).

While studies on academic conversations have shown an abundance of benefits, little attention has been given in studies to structured academic conversations as a scaffold for the development of academic skills. Hence, this study aims to examine the effects of RISA as an academic conversational technique. After looking at SLIFE and effective pedagogical strategies for them, the elements of science pedagogy for ELs and classification language, and academic conversations, it is clear that there is a research space to fill. This study will attempt to do so by examining the impact of use of RISA oral interactions on the use and development of academic classifying language for SLIFE. In other words, this research aims to answer the question: “How does the use of RISA oral interactions as a technique for academic conversations impact the use and development of scientific classification language features and oral fluency for SLIFE in a high school setting?”

**Conclusion**

As detailed in the first section, SLIFE have characteristics that present unique challenges in their secondary education. Many have experienced trauma or deprivations as a result of conflict before coming to the US. SLIFE often have limited exposure to concepts of Western-style education, including literacy and numeracy skills. These factors denote serious implications for their educational outcomes. Through culturally-responsive instructional design such as MALP©, educators can begin to address and bridge these needs. This is facilitated through: the acceptance of immediate relevance and
interconnectedness as priorities for lesson design; transitioning students from shared responsibility to individual responsibility and from oral transmission to the written word; and through additional practice of abstract tasks. Abstracted language tasks in the science classroom, such as classification, require higher degrees of cognition and complexity in ideational meaning than those of tasks such as summary. The classification language for such tasks rely on specific linguistic features, specifically, generic referents, transitive and intensive relational process structures, technical classification words, causal conjunctions and nominal groupings. This language can be developed with scaffolding, such as the intentional implementation of academic conversations. However, little research exists on the impact of lessons incorporating techniques that apply the MALP© curricular model, such as RISA oral interactions, on the acquisition of scientific classification language for SLIFE. This study will attempt to address that gap. The next chapter gives a detailed description of the participants, setting, and methodology of the study.
CHAPTER THREE

Methodology

This chapter begins with a rationale for the research methods chosen to answer the research question: “How does the use of RISA oral interactions as a technique for scaffolding academic conversations impact the use of scientific classification language features, development of scientific classification language, and ability to engage in more cognitively complex forms of academic tasks for SLIFE in a high school setting?” Afterwards, it describes the participants and setting of the research. Next, it outlines the implementation of the instructional process used over the course of the data collection period with examples of elicitation questions and materials used during the study. The remainder of the chapter focuses on data collection and analysis, including ethical considerations and verification of data.

Research Methods

The study employs a quasi-experimental action research model to analyze pre-treatment and post-treatment data centering on classification language. I chose this approach since the scope of the study precluded the number of students necessary to have a control group or to have an acceptable size for statistically significant results. Additionally, the nature of the setting does not allow for the ability to control variables that would be possible in a language lab. Nevertheless, as the purpose of this study is to
draw insights as to whether RISA is a beneficial classroom practice, the quasi-experimental method of action research is an appropriate type of research for this study. Action research is “a disciplined process of inquiry conducted by and for those taking the action. The primary reason for engaging in action research is to assist the ‘actor’ in improving and/or refining his or her actions” (Sagor, 2000, p. 3).

In action research, the researcher is reflecting on a question stemming from their current practice, whether at a business or in a classroom (Sagor, 2011). Action research can either be quasi-experimental or descriptive. In quasi-experimental action research, the researcher is attempting to study and describe the effects of a new technique within a classroom. Descriptive action research is focused on understanding a situation or problem that is occurring within the researcher’s teaching practice. Both types can occur within a cycle of action research, and may incorporate aspects of both qualitative and quantitative research as it seeks to answer the researcher’s question (Sagor, 2011).

According to Sagor (2011), action research is comprised of four stages. In the first stage of action research, the researcher chooses a topic considered worthwhile for study as it relates to their practice. In this instance, I have chosen the broad topic of how to improve academic outcomes for SLIFE. Then, the researcher examines the beliefs and theories underlying said focus. The previous chapter lays out the theoretical framework underpinning this study, including a research-based understanding of SLIFE, classroom best practices for improving their outcomes, features of scientific classification language, and general benefits of academic conversations as a methodology for pedagogy. In the next phase, the researcher defines a question for study. In this case, the research attempts
to answer the question of the effectiveness of RISA oral interactions as a technique for academic conversations in developing the usage, accuracy, and fluency of scientific classification language for SLIFE. Then the researcher collects data for analysis, paying special attention to its validity, reliability, and suitability for the context of their specific school and classroom. A detailed explanation of the research’s setting, participants and collection methods follows below. Afterwards, the researcher analyzes the data. While some studies rely on complex statistical methodologies, action research focuses on how the data can be used to answer two questions: “What is the story told by the data?” and “Why did the story play itself out this way?” (Sagor, 2000) To this end, this research will analyze the changes found in oral language samples captured pre-treatment and post-treatment, as well as anecdotal evidence recorded from classroom practice and lesson planning. Finally, action researchers report the results and take informed actions based on the analysis.

**Participants and Setting**

There were seven participants in this study. All participants meet the Minnesota statutory classification as an English Learner with Interrupted Formal Education, otherwise known as SLIFE (Minn. Stat. § 124D.59, Subd. 2a). Requirements for qualification under Minnesota statute include: English is not the home language and/or the primary language used for communication; entrance into US schools after grade 6; at least a two-year deficit in schooling compared with peers at the same grade level; and at least a two-year gap in proficiency skills of math and reading. Students must meet all
criteria listed above to be considered SLIFE, and may also be pre-literate in their home language.

Six of the seven participants are East African. Five participants identify as Somali. These participants emigrated mainly from rural parts of Somalia and refugee camps in Kenya and Ethiopia. Three of the five Somali participants have refugee status. The other East African participant identifies as Oromo, an ethnic group from Ethiopia. While larger in number than Ethiopia’s Amharic ethnic group, the Oromo people are currently not in power in Ethiopia. Consequently, this participant is a refugee seeking asylum due to persecution by the Ethiopian government. All East African participants in the study identify as Muslim. Common schooling experiences for East African SLIFE include religious schooling, known as dugsi, and refugee camp schools (Bangura, 2012).

The remaining participant identifies as Honduran. Based on anecdotal conversations with students, one common reason for Hondurans and other Latin American immigrants qualifying as SLIFE includes being from a rural part of the country. Often, these students leave school at an early age to assume agrarian work responsibilities. Similarly, Honduran SLIFE from urban areas leave school to support their families by working. Commonly, these students immigrate to the US for economic opportunities. Some attend school and work simultaneously.

The participants range in age from 15 to 19. Four of the six East African participants are female. Gender discrepancies in education can exist in part due to the cultural tendency in African countries for families of low socioeconomic status to prioritize education of males (Bangura, 2012). Bangura found East African women
typically receive fewer years of education and are more likely to attend less prestigious schools. Therefore, female East African students are more likely to be designated as SLIFE.

One participant, referred to as Bishaaro in the study, has a documented and untreated hearing loss. Hearing and vision impairment is common among refugees, who often lack access to appropriate medical treatment both in refugee camps and in their resettled countries (Mirza, et. al., 2014). According to Mirza et al., refugees have difficulty obtaining medical treatment in the US due to language and communication barriers, confusion when navigating service systems, and lack of health insurance. An untreated hearing impairment can hamper development of language acquisition.

The participants were members in a newcomer science class. There were nine total students in the class at the time of the study. One student did not meet the criteria for a SLIFE designation and thus was not included within the results. Another left school during the testing process and did not take the post-treatment oral assessment. Thus, he was excluded from the data analysis set. The classroom unit was designed and taught by the author of this study, a licensed ESL teacher.

The science class is taught at Hamilton High School (not its real name), a small charter school in Minneapolis. Many students live in apartment complexes and houses nearby, although the school attracts students from throughout the Twin Cities. Hamilton is a school focused on the needs of ELs, both those who arrived recently in the US, and those who have not been successful in larger metropolitan schools. Over 90 percent of students at Hamilton are classified as ELs, and nearly 100 percent of students speak a
language other than English at home. There are three dominant language groups at Hamilton. Approximately 60 percent of students speak Somali as their home language. About 20 percent of students speak Oromo at home. Additionally, approximately 15 to 20 percent of students speak Spanish as their home language and immigrated largely from Ecuador and Mexico. The school draws students from 12 countries who speak more than eight different primary languages at home. The staff includes four licensed EL teachers, and almost all staff have either spent extended amounts of time in other countries or immigrated to the US themselves.

As part of the intake process at Hamilton, the parents of students fill out a home language survey. Students who use languages other than English are screened with the WIDA Screener to determine their English Language Proficiency. Students who test at an overall WIDA level less than 2.0 are placed in an intensive Newcomer program. Students remain in the program until they either test at a level of 2.0 or higher on the WIDA ACCESS, demonstrate an equivalent proficiency with their student work portfolio, or have taken six quarters of newcomer classes.

**Procedure**

The science class where research was conducted is part of an intensive English language acquisition program for newcomers at Hamilton. The intervention took place over 30 hours of instructional periods during a nine-week unit on vertebrates.

The unit planning was done in accordance with tenets of MALP© design. The unit occurred during 30 lesson periods in a nine-week period running from December 2017 to February 2018. In addition to learning basic animal and body part vocabulary,
lessons targeted classification and explanatory language, specifically, “(is a) feature (of),” “(is a) kind (of),” “because,” and “since.” Lessons included explicit modeling of the classification process and large-group work as explicit scaffolding of academic tasks. In this way, the unit supports the transition from pragmatic to academic tasks advocated by the MALP© model. The practice of classification was reinforced through three gallery walk classification activities with groups of two to four students classifying animals based on posters with pictures and text of animals and their traits. Students rehearsed RISA oral interactions in pairs and were given feedback during practice time as well as rated on speaking quizzes before producing the post-assessment language sample used for this study. This sequencing allows for the gradual release of responsibility from groups to individual accountability, another key feature of the MALP© model.

The unit began with a pre-assessment of students’ English classification skills. Students referred to an illustrated animal fact sheet with an animal trait classification chart and subsequently recorded a video response to the prompt “What kind of animal is this? How do you know?”

The first five lessons focused on a general discussion of the characteristics of vertebrates, including the purpose of a skeletal structure and the identification of major bones. Then, students successively studied each of the five classes of vertebrates (mammals, birds, fish, reptiles and amphibians). Each sub-section of the unit began with introduction of key vocabulary. Students then read a selection in the Science A-Z book *Vertebrates* with the teacher and summarized the main ideas. In the following lesson, students partnered together to read the section again and answer comprehension
questions. Students individually read through the section a third time to chart the characteristics of the vertebrate class. They then checked their answers as a class with the assistance of the teacher. In the last phase of the mammal, reptile, and amphibian subsections, students were asked to classify individual animals based on their traits. To accomplish this, students participated in group gallery walks in which they discussed animal traits and individually made written classifications based on animal posters. These animal posters included pictures and simple descriptions of the animal’s traits. Gallery walks took place on days 11 through 12, 20 through 21, and 24 through 25 of the intervention. The animal posters and a sample gallery walk response sheet are included in Appendixes A and B, respectively.

During the sections on mammals and reptiles, students engaged in two cycles of RISA dialogues focused on explanatory classification language involving animal classification over a five-week period. The content of the RISA dialogues (found in Appendix C) were designed and sequenced to move from simpler to more complex forms of classifying. The first RISA dialogue occurs after presentation of the features of mammals. Participants use the RISA dialogue to determine whether a mammal can be classified as such by discussing multiple mammalian traits. In the second RISA dialogue, students debate whether an animal is a reptile by discussing reptilian traits and comparing them to traits of birds, fish and mammals. The second RISA dialogue also makes use of classification key lexis, elevating it to a higher linguistic complexity than the first dialogue.
The RISA dialogue cycles occurred on days 9 through 15 and days 17 through 22 of the intervention. During each initial presentation, the teacher modeled the pronunciation and prosody several times with the class using choral repetition. Afterwards, the teacher had two to three students practice the conversation with the teacher in front of the class. All students then practiced with a self-selected student partner. Students practiced each dialog initially for 15 minutes. At the beginning of each subsequent class, students were shown a new animal to discuss and a pair was selected to perform in front of the class. All students were then given 5 to 10 minutes of practice time to rehearse the dialog with a partner. Cycles of RISA practice culminated with the pairs performing the RISA in front of the teacher as an oral assessment.

On day 24, students submitted a post-intervention video sample about how they classified an animal. Students were provided a copy of the animal classification chart they had constructed and were asked to classify five animals, one from each class of vertebrates. A blank chart is provided in Appendix D. Students then recorded a video response to the prompt, “What animal is this? How do you know?” Pre- and post-intervention samples were then analyzed to measure differences in features of classification language, specifically generic reference, transitive relational processes, and occurrences of syntactically correct classification key words. The samples were also coded for overall length of utterances and video time elapsed to provide a measurement of relative oral fluency.

As a separate summative unit assessment on days 26 through 30, each individual was responsible for designing a zoo with examples from each class of vertebrate and for
writing a scientific rationale of their classifications using animal traits. Students were allowed to compile charts of animal traits used for identification together and as a class, but were responsible for finding their own animals to classify. In these ways, the lessons incorporated both group and individual accountability.

Sample animal data and a RISA dialogue are included below.

**Reptile classifying RISA**

A: I have a problem with classifying. Can you help me?

B: I will do my best to assist.

A: What kind of animal is a ________________?

B: I classified ________________ as a reptile.

A: What features make ________________ a reptile?
B: Reptiles lay eggs, and ____________ lays eggs also.

A: That’s true, but so do birds and fish. What other features does a _____________ have?

B: A _______________________ has scales. Scales are a feature of reptiles.

A: That’s right. However, reptiles and fish both have scales. Are there any other features?

B: Reptiles have lungs. A _______________ has lungs too.

A: I understand. Only reptiles have lungs, scales and lay eggs. You are great at classifying!

B: It’s easy when you know how.

Data Collection

The study collected oral samples using the Flipgrid iPad app. Flipgrid is a classroom assessment app that allows students to record a video response to a prompt. Responses may be up to 90 seconds long. Participants recorded video samples about classifying in class on their individual iPads. Samples were collected both before and after the animal classification instructional unit. These oral samples also functioned as a unit pretest and quiz, respectively, in an effort to minimize disruption to class time. Participants were given an animal picture and fact sheet similar to the posters seen during the gallery walk. The Flipgrid functionality allowing participants to view each others’ responses was disabled in an effort to obtain a more authentic language sample. The prompts used were:

- What kind of animal is this?

- How do you know?
Data Analysis

Video samples of all participants were transcribed. See Appendix F for complete transcriptions. Then, specific features of scientific classification language pre- and post-treatment were tabulated and mapped conceptually in order to look for patterns of growth. Elements analyzed included occurrences of intensive and possessive transitive relational processes between taxonomic concepts of class, species, and/or trait (e.g. “feathers are a feature of birds”); the correct semantic usage of classification lexis words taught (“kind of, “feature of”, and “example of”); the use of causative conjunctions to establish inferential links and the instances of generic referent used to justify their answer. Additionally, the words in the samples were counted and compared with the overall length of the sample to obtain a general measure of fluency in words per minute (WPM).

Participant samples were analyzed qualitatively to illustrate the development of schemas in ideational meaning and the transitive processes characteristic of increased understanding of the taxonomic relationships between the pre-assessment and post-assessment classification tasks. As a method for qualitative coding, participant samples were diagrammed into classification concept maps adapted from the mapping method used by Huang and Morgan (2003) and Mohan (2001). Concept maps constitute a valid assessment of cognitive structures and prior learning (Novak 1984; Popova-Gonci & Lamb 2012). In particular, the classification concept maps indicate grammatical structures in the sample drawn from systemic functional linguistics.
To create the classification concept maps, taxonomic concepts of class, species, and trait, (both accurate and inaccurate) within each sample were first denoted. Then, transcripts of oral samples were analyzed to find explicit and inferential transitive relational processes between class, species and/or traits.

Concepts of classes were placed above concepts of species, which in turn were placed above concepts of traits. Concepts which were determined to be invalid for the purposes of the specific classification task were marked with an exclamation mark before the word. Concepts that were later corrected are struck through.

When diagramming samples, transitive processes between taxonomic concepts are marked according to the semantic choices used to indicate them. In these concept maps, explicit transitive processes between taxonomic concepts are shown as solid lines. These are further broken down into four separate symbols. Intensive relational processes are symbolized by outlined arrows. Intensive relationships with semantically correct classification lexis (i.e. “kind of,” “feature of,” “example of,” etc.) are shaded; those without are merely outlined. Transitive relational processes are marked with solid arrows. Circumstantial relational processes or other transitive processes that are shown through active verbs, which are typically regarded as a lower register of scientific speech, are given straight lines instead of arrows.

In some samples, classes are linked inferentially to traits through the use of causative conjunctions, such as “because,” “so,” and “that is why.” When these words are found in utterances linking classes and species, a dotted line is connected between the class and traits that are found to belong to the species.
For the purposes of simplifying this analysis, which is intended to be mainly linguistic in nature, the animal’s colloquial name was considered its species. However, I acknowledge that colloquial names are also commonly associated with genus or family in formal taxonomic ranking.

Quantitative tabulations of key linguistic features were also compiled. This was done in order to identify patterns of change in linguistic features. The differences in the number of linguistic features corroborate the concept maps by supporting inferential insights about discourse development and participant thinking processes. Additionally, patterns of change allow triangulation with research notes taken during the implementation of the vertebrates unit intervention, strengthening tentative assertions found in the data implications section of Chapter Five. Tabulations include occurrences of generic referents, usage of key classification lexis, instances of intensive and possessive transitive relations, and speed fluency expressed as words per minute (WPM).

Although it was not explicitly taught as vocabulary within this unit, instances of “(is an) example of” within samples were included when tracking classification key lexis. The rationale for this was twofold: “(is an) example of” was explicitly taught in a unit earlier in the year, and the phrase is a common word used when engaging in classification tasks.

When tracking generic referents, the pronoun “it” was included when morphosyntactic analysis clearly showed the participant was referring to a type of animal and not an individual instance. For example, when a participant said, “It has milk” as a justifications as to why armadillos are mammals, “It” was counted as a generic referent if
the meaning was definitively talking about the type of all armadillos and not a specific instance of an armadillo. In one instance each, “that” and “he,” though not semantically correct choices, were also counted as generic referents.

Additionally, when tabulating intensive and possessive transitive relational processes, care was given to note only semantically correct uses of the structures. For instance, during the pre-assessment, Omar uttered, “It have big.” This was not counted toward the total number of possessive relational processes, since he was using “have” instead of “is.” Had he said, “It is big,” it would have been counted as a correct usage on an intensive relational process.

In instances where a complex sentence listed several relational processes, they were counted as separate instances if they included multiple semantically correct verb phrases. For example, in the post-assessment video, Ubah said “it have a hair and have a babies.” This utterance was counted as two separate occurrences of a possessive transitive relational process. Note also that classification justifications including active verbs such as, “it makes milk” or “it breathes with lungs,” while valid for classification reasoning, were not tabulated as relational processes, since they fit neither intensive nor possessive transitive relational patterns. Circumstantial transitive relational processes were also not counted.

The last way the data was analyzed quantitatively was by examining the oral samples for fluency. Samples were transcribed and counted for overall length in meaning-bearing words (vocal interjections and word fragments were not included within the count). The word count was then compared with the length of the video to determine an
individual’s Words Per Minute (WPM). In consideration of the small sample size, both in terms of word count and overall time speaking, video times were truncated to the beginning and ending of a speaker’s utterances, in order to obtain a higher degree of accuracy,

When examining the data set, it was discovered that one participant, Aden, recorded two responses during the post-assessment. In an effort to preserve the integrity of the data set, I conferred with the speaker and played both videos for them to determine which video was his intended submission. The unintended sample, hereafter referred to as the post-assessment draft, was kept for use as anecdotal evidence during qualitative semantic analysis of sample structures, but was not tabulated for the quantitative analysis.

**Verification of Data**

To support participant success in an effort to obtain authentic data, the following measures were taken. First, all participants were members of the same newcomer program. All students participated in identical activities throughout the course of the unit, regardless of inclusion in the study. Second, participants were allowed to confer about the animals with a partner during the pre-intervention assessment to minimize conflation of gaps in scientific knowledge and classification linguistic structures. Third, participants were allowed to view their initial samples via Flipgrid and to resubmit videos until they were satisfied, in order to reduce anxiety and obtain an optimal sample of their capabilities. Lastly, participants did not have access to each others’ videos, to ensure samples were an authentic example of each participants’ capabilities.
Ethical Issues

Before conducting research or collecting any participant data, I obtained approval from the Hamline University’s Human Research Committee. I also received advance permission to conduct the study from the Executive Director of Hamilton High School. Prior to participation in the study, participants received an informational consent form translated both in English and in their home language. All participants of a legal age to give consent willingly signed the consent form. In the case of minors, the consent form was sent home with the student to obtain permission from the parents. Participants were informed beforehand that their privacy would be protected by the use of pseudonyms in the study. Participants were also informed that the study was not a component of the class, and that their choice of whether or not to participate would have no impact on their course grade.

An encrypted computer was used to store all research documents and digital recordings. All Flipgrid response grids were deleted after participants’ video samples were downloaded.

Conclusion

This chapter laid out the rationale for the action research model chosen in the study, and why it is an appropriate choice for action research. After a thorough description of the participants and setting, it elucidated the elements of the animals unit in the newcomer classroom used to develop classification language. Then, it laid out the specific analytic components of the research, namely: tabulation of specific features of scientific classification language; calculation of fluency in WPM; and the construction
and explication of transitive relational processes through classifying concept maps. The chapter finishes with efforts used to verify the validity of data and ethical considerations of the study. Results and findings of the data are discussed in the following chapter.
CHAPTER FOUR

Results

This chapter presents and describes data resulting from the pre-intervention and post-intervention tasks. The first sub-section analyzes findings resulting from qualitative concept mapping, while the second sub-section conveys the tabulations and linguistic patterns found in participant samples in an attempt to answer the research question: “How does the use of RISA oral interactions as a technique for scaffolding academic conversations impact the use of scientific classification language features, development of scientific classification language, and ability to engage in more cognitively complex forms of academic tasks for SLIFE in a high school setting?”

Data Findings and Analysis

Classification Concept Map Results

Overall, the concept maps indicated development of a higher complexity of relationship between class, species and trait between pre-assessment and post-assessment. A detailed explanation of the concept map diagrams, inspired by Huang and Morgan (2003) and Mohan (2001) was given in Chapter Three. See Figure 2 below for a summary of concept map demarcations.

Most notably, four of the seven speakers did not establish a relationship between class and species in their pre-assessment oral samples. In fact, the animal’s class was not
mentioned in these samples. This lack of relationship implied their pre-assessment samples might be more accurately characterized as a listing of descriptive traits than a classification. (Krathwohl, 2002) Explanations of classification concepts were what is required by the speaking prompts, “What kind of animal is this?” and, “How do you know?” In two other pre-assessment samples, the species was transitively related to animals, which was an incorrect taxonomic order for the speaking task.

By contrast, all participants in the post-assessment mention and related class to species. Furthermore, they all established a causal link between class and species, resulting in an inferential relationship between a class and its traits. The interlinkage between class, species, and traits was a necessary element for creating classification discourse.

In Hawani’s pre-assessment oral sample, shown in Figure 3, one species was discussed, twice by name (armadillo) and three times with the pronoun “it.” The species was linked through relational processes to two traits in the sample with the utterance, “Armadillo it is has baby. It is has a milk.” Since she consistently preceded simple

**Figure 2.** Classifying Concept Map Legend. Symbols used in concept maps are shown with their demarcation labels.
present tense verbs in both oral samples with “is”, it was surmised that she was incorrectly using the copula “be” as a verb-case marker. Consequently, both relational processes between species and trait were categorized as instances of possessive transitive relational processes. Two instances of intensive transitive relational process were used to link the species, “mouse,” with “animal.” However, as was previously discussed above,

**Figure 3.** Hawani’s Classifying Concept Map. Concept maps of the Pre-Assessment and Post-Assessment are shown with relationships between class, species and traits.
“animal” belongs to kingdom and not class in the taxonomic ordering system. Therefore, “animal” was considered an invalid concept for the purposes of this classification task.

Hawani’s post-assessment oral sample had one species (“mice”), one class, and two traits. In the utterance, “Mice is a kind of mammals because it is has milk it is give for baby,” she used classification lexis in an intensive relational process to link class to species and to infer a relational link between class and trait of producing milk. The subsequent utterance, “Is a future (feature) black,” was an intensive relational process, although color was not a correct classifying trait for mammals.

Aden’s pre-assessment oral sample contained one species and two traits, as shown in Figure 4. Armadillo was referenced once by name and twice pronominally. The sample’s utterance, “He lived Latin America. He has, uh, a fur body,” had one possessive transitive relational process and one non-transitive relational process. His post-assessment sample contained one species, mentioned once specifically and twice pronominally, one class, and two traits. His utterance, “Ostrich is a kind of bird because it come from eggs, but it cannot fly,” used an intensive transitive relational process with additional classification lexis to link species and class. The use of the conjunction “because” established an inferential relationship between the class and traits. Two non-transitive relational processes were found in “it come from eggs, but it cannot fly.” Inability to fly, while a trait of ostriches, was not a trait of the class of birds. Therefore, it was marked as incorrect.

Aden was the only participant to submit multiple samples during the post-assessment. While the sample discussed above was confirmed as his intended
submission, the post-assessment draft was significant in how it differed from the final sample. The utterance in the first submission was, “Ostrich is a kind of bird. It has wings, but it cannot fly.” “It has wings, but it cannot fly” was a verbatim recitation of the illustrated animal data sheet that is used for the prompt. The substitution of “it has wings” for “it come from eggs” showed that Aden was able to move from a re-reading of the

![Aden’s Classifying Concept Map](image)

*Figure 4. Aden’s Classifying Concept Map. Concept maps of the pre-assessment and post-assessment draft and submission are shown with relationships between class, species and trait.*
traits found on the data sheet to a more extemporaneous sample. In other words, it was evidence of his ability to generalize application of scientific classification language.

As additional evidence of extemporaneousness, the final sample contained the explanatory conjunction “because,” whereas the draft submission did not. This is significant as the use of “because” created a linkage between class and traits, an essential component in an explanation or classification. Without “because,” the draft post-assessment sample could be more accurately labeled as a form of listing such as a description, rather than a classification. In short, between the draft and final sample, Aden’s increased extemporaneousness has increased the quality of his discourse to enable him to correctly answer the second prompt, “How do you know?”

Nasteho’s pre-assessment oral sample, shown in Figure 5, was the shortest in length. The only utterance differing from a verbatim reading of the prompt was, “I know it is crocodile (sic).” This concept was coded as “crocodile,” and is deemed an incorrect concept is it is not the animal on the data poster.

The post-assessment oral sample that Nasteho produced had a class, a species, and three traits. Her sample in its entirety was, “It I think barraca- barracuda is a kind of fish because it have scales and gills, are cold-blooded.” “I think barraca- barracuda is a kind of fish” connected species to class with an intensive transitive relational process and included the target vocabulary “kind of.” Traits were inferentially linked to the class by the conjunction “because.” “It have scales and gills, are cold-blooded” used a possessive transitive relational process to link “scales” and “gills,” and a non-transitive relational process connected the “cold-blooded” with the species.
Omar discussed eight traits for one species in his pre-assessment oral sample, the highest number of any sample, as seen in Figure 6. However, four of the eight traits that are described are invalid for the purpose of classifying the animal. In part of the sample, Omar said, “It is small. Mmm It can stay, like 34 degrees for outside the cold. It doesn’t matter, you know. it have big, no they have like, sma- , yeah, it is strong. It can, it alive, it can make milk, it can eat the fruit, something like root.” The traits “small,” “strong,” “big,” and “eat the fruit,” were not valid for classifying a species. The trait “alive” may apply to the species, but was actually a determinant in whether something is an organism.

*Figure 5. Nasteho’s Classifying Concept Map. Concept maps of the Pre-Assessment and Post-Assessment are shown with relationships between class, species and traits.*
and not used to specify class. Thus, it was also considered invalid. “Big” was corrected by the next phrase, “No, they have like sma-“ “Can stay like 34 degrees for outside the cold. It doesn’t matter, you know.” was coded as “warm-blooded” This coding was due in part to Omar’s prior participation in the vertebrates unit in the previous academic school year, when ability to stay in varying temperatures was used as a descriptive component of warm-bloodedness.

In comparison, Omar’s post-assessment contained fewer animal traits; however, they were all accurate for usage in species classification. The utterance, “Okay, mouse is

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Figure 6. Omar’s Classifying Concept Map. Concept maps of Omar’s pre-assessment and post-assessment are shown with relationships between class, species and trait.
a kind of mammals” correctly classified a mouse as a mammal using an intensive transitive relational process with additional classification lexis. He then said, “You know why it’s ki- it’s kind of a mammals? Because it can make milk, it was born live, it have hair.” An inferential link was created between the class and its traits by the causative conjunction “because.” “It can make milk” was a transitive process, but due to its active verb, was neither an intensive nor possessive transitive relational process.

Mateo’s oral samples were mapped in Figure 7. His pre-assessment oral sample correctly identified the species with its corresponding class using an intensive transitive

![Figure 7. Mateo's Classifying Concept Map. Pre-assessment and post assessment concept maps are shown with relationships between class, species, and trait.](image-url)
relational process in the utterance, “I think an armadillo is a, uh, is a mammal animal.” While it did not explicitly mention the trait diagrammed, the utterance, “And I think it can live in a place cold, warm, uh, cooler” was tentatively inferred as meaning “is warm-blooded,” since warm-bloodedness was not explicitly stated in the data poster.

Mateo’s post-assessment oral sample contained two more attributive concepts than the pre-assessment sample. An intensive transitive relational process with additional syntactically correct lexis connected the species to the class. Non-transitive relational processes were used to link two traits to the species, while the third trait was connected via a possessive transitive relational process.

Mateo’s post-assessment oral sample was notable as the only documented occasion of explicit relational processes connecting the attributive concepts to the concept of class. The ending of the sample contained the utterance, “An American caiman alligator have scales. Scales are a kind of reptile.” This intensive transitive relational process had an incorrect usage of classification lexis, and one of two instances of incorrect usage in the sample; the other occurred when he uttered, “Ah, American alligator breathe with lungs. That is an example of a kind of reptile.” It was possible (and tentatively deemed likely, given the repeated occurrence) that the speaker has temporarily conflated “kind of” with “feature of,” as both are target vocabulary featured within the RISA. This was corroborated by “that is an example of a kind of reptile,” which would be considered syntactically correct if “feature of” was substituted for “kind of” in the utterance. The linkage of trait to class following its linkage to species indicates that the
speaker was recalling and using structures found in the RISA dialogues to create an argumentative structure for classification.

There was additional evidence supporting the conclusion that Mateo had successfully internalized the argumentative structure and other elements of academic language found in the RISA oral interaction. One such reason was the sentence patterning of his oral sample. The oral sample alternated between statements relating species to a trait and statements describing said trait and its relationship to the chosen class. This patterning exactly matched the argumentation structure found in both RISA dialogues. This assertion was further supported by the utterance “only reptiles lay eggs.” This phrase, which was factually incorrect, closely resembled a logical conclusion in the second RISA oral interaction: “Only reptiles have lungs, scales and lay eggs.” Note also that the three concepts of trait chosen, eggs, lungs, and scales, were the three traits which appear in the second RISA dialogue concerning classification of reptiles.

Both of Bishaaro’s oral samples had significant grammatical, semantic, and pronunciation errors, which impeded comprehensibility. Her samples are mapped in Figure 8. This perhaps was due in part to her untreated hearing impairment. However, careful analysis still revealed increased complexity in classification discourse structures between the pre-assessment and post-assessment samples. The pre-assessment sample contained one species concept, armadillo, referred to once by name, once pronominally, and twice with the substitution “the animal.” There were two discernible trait concepts. The concepts “eats roots” and “milk” were discerned from the utterance, “The animal is uh, lives off roots of the s, mm. The animal is my bodies of the brown life is milk of the
“tradition.” In this utterance, “eats roots” was related in a non-transitive process with the species concept “the animal” (an armadillo). However, the oral sample failed to establish a link between species and “milk”

The post-assessment sample of Bishaaro, while still possessing comprehensibility issues, included a class concept and three discernible concepts of trait, namely breathing with lungs, being born live, and producing milk. The sample, shown in its entirety with parenthetical suppositions of intended words, was, “Hello, my name is [Bishaaro]. The talking about is the mam- mammals of mouth, mouse. The mouse of, the mouth of the

![Figure 8. Bishaaro’s Classifying Concept Map. The pre-assessment and post-assessment oral samples are shown with established relationships between class, species, and trait.](image)
lives in the breathe leave (lungs?) the post (both?) from the babies and the milk the body.
Because, the mammals!” “Breathe” was taken to mean “breathes with lungs,” which was
found in the post-assessment’s illustrated animal data. Similarly, “both from the babies”
and “the milk the body” were interpreted as traits of being born live and milk,
respectively. The sample also managed to infer connections between the class and traits
in the utterance, “Because, the mammals!” immediately preceding the listing of traits.
One additional noteworthy insight was that, despite their impaired comprehensibility,
Bishaaro is engaging in extemporaneous speech and not merely reading from the
illustrated animal data.

The most complex pre-assessment oral language sample is produced by Ubah and
illustrated in Figure 9. The complexity of the sample was likely due, in part, to her
previous participation in the vertebrates unit during the prior school year. The concept of
class and concept of species were indicated correctly in the pre-assessment oral sample.
This indication was accomplished through the use of an intensive transitive relational
process. Furthermore, the concept of class and its two related attributive concepts, “live
babies” and “milk,” were inferentially linked with the causative conjunction “because.”
These traits were in turn connected to the species by the phrase, “it have a babies and
make milk.” “It have a babies” was a possessive transitive relational process. “Make
milk” was a non-transitive relational process.

The relationships between class, species, and trait were nevertheless intensified in
Ubah’s post-assessment oral sample. The concept of class within the utterance, “A mouse
is a kind of animal because it have a, it breathe with a lungs, it have hair and have a
babies” was initially misidentified as an animal and was connected to “mouse” with the use of a classification lexis-enhanced intensive transitive relational process. This was corrected to “mammal” in the concluding utterance, “It make milk, so that make him a animal - mammals so thanks for listen.” In this utterance, the trait, “milk,” was connected through a non-transitive relational process to species. Three additional conceptions of trait were given: “breathe with a lungs,” “hair,” “babies,” and “make milk.” Ubah connected three traits to the species with possessive transitive relational processes, and one trait with a non-transitive process. The class was related inferentially to the traits twice, with “because” and “so,” although it was denoted with one set of dotted lines.

*Figure 9. Ubah’s Concept Map. Pre-assessment and post-assessment oral samples are shown with relationships between class, species, and trait.*
Classification Language Features and Fluency Data Sets

Quantitative Analysis revealed general improvement in the accuracy of samples. Overall, Post-assessment samples showed increased usage of generic referents (e.g. “A lion has hair” referring to all lions), intensive and possessive relational processes (i.e. “is” and “have” connecting a part-whole relationship), and semantically correct classification key lexis. As a whole, word speed fluency declined. Fluctuations in fluency will be addressed in further detail in Chapter Five.

General Accuracy of Samples. Five of the seven participants failed to correctly classify the animal (an armadillo) as a mammal during the pre-assessment before the unit begins. Ubah correctly classified the armadillo as a mammal. It was postulated that she was able to do so as she was one of three participants (along with Omar and Bishaaro) who participated in this unit during the prior school year.

In the post-assessment, all seven participants correctly classified the animal they choose with its correct class of vertebrate. The animal each participant classified differs, as they have chosen from a listing of five different vertebrates. The variance in the number of animals to classify between the pre-assessment and post-assessment was due to the necessity and constraints of the assessments also functioning as unit assignments as described in the research proposal and research consent forms. A more detailed accounting of this decision and its possible implications follows in Chapter 5.

Occurrences of Generic Referent and Transitive Relational Processes. During the pre-assessment, a total of 20 generic referents were found in the recorded samples as shown below in Table 1. This averaged to a statistical mean of 2.9 referents per speaker,
with the median sample generating two generic referents. The number of generic referents increased to 26 in the post-assessment. This reflected an average mean increase of 0.8 referent per participant. The median number of generic referents in the post-assessment samples increased by one to a total of three.

Six correct instances of intensive transitive relational processes \((X \text{ is a } Y)\) were found in the pre-assessment samples. Twelve accurate intensive relations were found in the post-assessment participant samples. Four of the seven participants increased their

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Generic Referents (Use of Individual as Type)</th>
<th>Correct Intensive Process Instances ((X \text{ is } Y))</th>
<th>Correct Possessive Process Instances ((X \text{ has } Y))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre- Post-</td>
<td>Pre- Post-</td>
<td>Pre- Post-</td>
</tr>
<tr>
<td>Hawani</td>
<td>4 3</td>
<td>2 1</td>
<td>2 1</td>
</tr>
<tr>
<td>Aden</td>
<td>0 3</td>
<td>0 1</td>
<td>1 0</td>
</tr>
<tr>
<td>Nasteho</td>
<td>0 2</td>
<td>0 2</td>
<td>0 2</td>
</tr>
<tr>
<td>Omar</td>
<td>10 7</td>
<td>2 4</td>
<td>1 1</td>
</tr>
<tr>
<td>Mateo</td>
<td>2 6</td>
<td>1 3</td>
<td>0 1</td>
</tr>
<tr>
<td>Bishaaro</td>
<td>2 1</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Ubah</td>
<td>2 4</td>
<td>1 1</td>
<td>1 1</td>
</tr>
<tr>
<td>Totals</td>
<td>20 26</td>
<td>6 12</td>
<td>5 8</td>
</tr>
<tr>
<td>Median sample</td>
<td>2 3</td>
<td>0 1</td>
<td>1 1</td>
</tr>
<tr>
<td>Average per participant (mean)</td>
<td>2.9 3.7</td>
<td>0.9 1.7</td>
<td>0.7 1.1</td>
</tr>
</tbody>
</table>

Table 1. Occurrences of Generic Referents and Transitive Relational Processes. This table displays the count of generic referents, intensive transitive relationships, and possessive transitive relationships. Totals and averages are highlighted at the bottom.
use of intensive transitive relational processes. One more use of intensive relations was found for the median, while a mean increase of 0.8 instances was found in the post-assessment data.

Similarly, the use of possessive transitive relational sentence structures (X has Y) also increased modestly between the pre-assessment and post-assessment data sets. In the pre-assessment data set, there were five syntactically correct possessive relational processes. The post-assessment data contained eight accurate possessive transitive relational processes for a mean of 1.1 per participant. Thus, there was a mean increase of 0.5 possessive transitive relational processes. However the median occurrence of possessive relational processes remained constant at one instance.

**Usage of Classification Key Lexis.** Another scientific classification language factor which was measured was the use of classification lexis. An overview of results can be found in Table 2. The three phrasal structures, “(is a) kind of,” “(is a) feature of,” and “(is an) example of” were used throughout the unit as vocabulary in an attempt to develop specificity in student samples. During the pre-assessment, no participants were able to articulate a sample that includes these structures. However, during the post-assessment, most participants were able to accurately use one or more of these phrasal structures in their extemporaneous verbal samples. The most commonly-used phrase was “(is a) kind of.” Six of the seven participants gave samples which included an accurate usage of “(is a) kind of.” This phrase was attempted nine times in answers, with seven accurate instances of usage. The two incorrect usages of “(is a) kid of” found in Mateo's oral sample were discussed in the qualitative findings above. Notably, no students were
able to correctly use “(is a) feature of” in their post-assessment samples. The failure to produce extemporaneous constructions of “(is a) feature of” will be elaborated upon in the data patterns and themes section in chapter five.

Participants appeared to struggle more with producing the other two phrases; “(is a) feature of” was attempted once but used incorrectly. One participant, Mateo, correctly used “(is an) example of.” Overall, there were eight correct uses of target vocabulary in the seven samples.

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Correct Uses of “Kind of”</th>
<th>Correct Uses of “Feature of”</th>
<th>Correct Uses of “Example of”</th>
<th>Total Correct Uses of Target Lexis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-</td>
<td>Post-</td>
<td>Pre-</td>
<td>Post-</td>
</tr>
<tr>
<td>Hawani</td>
<td>0</td>
<td>1/1</td>
<td>0</td>
<td>0/1</td>
</tr>
<tr>
<td>Aden</td>
<td>0</td>
<td>1/1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nasteho</td>
<td>0</td>
<td>1/1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Omar</td>
<td>0</td>
<td>2/2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mateo</td>
<td>0</td>
<td>1/3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bishaaro</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ubah</td>
<td>0</td>
<td>1/1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>0</td>
<td>7/9</td>
<td>0</td>
<td>0/1</td>
</tr>
<tr>
<td>Average per participant (mean)</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2. Occurrences of Targeted Classification Lexis in Speaker Utterances. This table displays counts of key vocabulary terms in participant oral language samples. Totals and averages highlighted at the bottom.
Fluency. Finally, samples were examined quantitatively for total length in words and length of time in seconds. The former set was divided by the latter to determine word speed fluency in words per minute (WPM). Results can be found below in Table 3. In the pre-assessment, participants recorded a mean sample of 38 meaning-bearing words. The shortest sample was 17 words; the longest is 97 words.

Samples in the post-assessment were similar in terms of word count to the pre-assessment. Four participants recorded longer samples than their previous oral sample, although in three of those four utterances, by only one word. Three participants had

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Word Count</th>
<th>Total Video Length in Seconds (s)</th>
<th>Fluency in Words Per Minute (WPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-</td>
<td>Post-</td>
<td>Pre-</td>
</tr>
<tr>
<td>Hawani</td>
<td>35</td>
<td>28</td>
<td>20s</td>
</tr>
<tr>
<td>Aden*</td>
<td>17</td>
<td>18</td>
<td>14s</td>
</tr>
<tr>
<td>Nasteho</td>
<td>18</td>
<td>19</td>
<td>7s</td>
</tr>
<tr>
<td>Omar</td>
<td>99</td>
<td>71</td>
<td>47s</td>
</tr>
<tr>
<td>Mateo</td>
<td>36</td>
<td>46</td>
<td>26s</td>
</tr>
<tr>
<td>Bishaaro</td>
<td>41</td>
<td>40</td>
<td>39s</td>
</tr>
<tr>
<td>Ubah</td>
<td>22</td>
<td>45</td>
<td>8s</td>
</tr>
<tr>
<td>Totals</td>
<td>268</td>
<td>269</td>
<td>161s</td>
</tr>
<tr>
<td>Median Score</td>
<td>35</td>
<td>45</td>
<td>20s</td>
</tr>
<tr>
<td>Average per participant (mean)</td>
<td>38.3</td>
<td>38.4</td>
<td>23s</td>
</tr>
</tbody>
</table>

Table 3. Measurements of Fluency in Response to the Classification Task. This table displays total word counts, length of recorded samples, and fluency in Words Per Minute, rounded to the nearest whole number. Totals of each category and averages per participant are shown at the bottom.
shorter samples, and one participant, Bishaaro, had a post-assessment sample the same lexical length as her first sample. The shortest post-assessment sample was 18 words, which was one word more than the minimum pre-assessment sample. Conversely, the maximum length sample was shorter; it fell by 28 words from 97 to 69. Overall, the mean sample was 38.4 words, nearly identical in total length to the pre-assessment mean of 38.3 words.

In terms of the length of sample as measured by time, three participants recorded shorter samples, while three participants had longer samples. The statistical mean of the samples was slightly shorter in the post-assessment than the pre-assessment. The mean was reduced by 1.5 seconds, from 23 to 21.5 seconds. The median post-assessment sample was approximately three seconds shorter than the pre-assessment.

Regarding overall word speed fluency, two participants in the post-assessment had higher WPM than in their pre-assessment. Five participants saw a reduction in their overall WPM. As a class average, the mean WPM rose from 99.8 to 107, or an increase of approximately 7 percent. The median measure of fluency decreased from 105 WPM to 100, a difference of about 5 percent in WPM.

**Conclusion**

This chapter describes the findings of ways in which participant oral samples are able to answer the research question: “How does the use of RISA oral interactions as a technique for scaffolding academic conversations impact the use of scientific classification language features, development of scientific classification language, and ability to engage in more cognitively complex forms of academic tasks for SLIFE in a
The chapter discusses both qualitative and quantitative findings of the data. Qualitatively, participants showed significant improvements in complexity of discourse, including increased ability to classify, use and accuracy of concepts, and stronger argumentation structures. Quantitatively, differences between pre-assessment and post-assessment data included increased occurrences of generic referents, possessive and intensive relational processes, and key classification lexis. Fluency rates declined somewhat overall. A summary of important aspects of the literature review, discussion of patterns and themes of the data, implications of the data, limitations of the study, and suggestions for further research follows in the concluding chapter below.
CHAPTER FIVE

Conclusion

This chapter draws conclusions from the study and provides key findings and extrapolations based on the research question: “How does the use of RISA oral interactions as a technique for scaffolding academic conversations impact the use of scientific classification language features, development of scientific classification language, and ability to engage in more cognitively complex forms of academic tasks for SLIFE in a high school setting?” The first section provides context from the summaries of key elements from the literature review. It moves in the next section to corresponding patterns and themes of the data. Then, the chapter expounds on implications of the study. The following section discusses limitations of the study. Afterwards, possible implications for SLIFE educators are addressed and suggestions are given for future research. The chapter culminates with a final summation including some personal concluding remarks.

Summary of Major Elements in Literature Review

In order to properly contextualize patterns and themes from the data and their implications regarding the research question, it is necessary to revisit key understandings about relevant research. Salient topics include: characteristics of SLIFE; Components of the MALP© instructional design used to develop the unit and RISA oral interactions that
were developed; the language of scientific classification; Pedagogical best practices for developing scientific language of ELs; and speaking tasks such as academic conversations.

Researchers have found successful ways to adapt curriculum for ELs, including in science classrooms such as the one where this study occurs (Miller, 2009; Nargund-Joshi & Bautista, 2016). One relevant finding for this study involves the effectiveness of focusing on the explicit forms of academic language to develop classification discourse writing (Huang & Morgan, 2003). By analyzing elements of scientific language including generic referent and transitive relational processes through tabulations and concept maps, Huang and Morgan were able to show significant gains for ELs in classifying (2011). However, specialized curriculum that is needed for SLIFE differs even from the proven effective pedagogical adaptations for formally educated ELs such as SIOP.

SLIFE have different backgrounds and different needs from mainstream students and other ELs due to a difference in levels of formal education (Porter, 2014; Zacarian & Haynes, 2012). They have high at-risk tendencies for failure and dropping out (Bangura, 2012). Success for SLIFE depends on the construction of highly specialized lessons (Marshall & DeCapua, 2011).

According to Marshall and DeCapua (2011), the MALP© instructional design process incorporates necessary elements for success of SLIFE in schools. These elements include: immediate relevance and interpersonal interconnectedness as classroom conditions; a blending of both individual and shared responsibility; tasks involving both the written word and oral transmission; and the implementation of decontextualized tasks
found in formal education. RISA oral interactions are designed as a technique that is compatible with classrooms implementing MALP© (Watson 2012). Said interactions are routinely practiced, integrated with content, structured to serve as a scaffold, and academic in tone.

RISA oral interactions may therefore serve as an effective scaffold for academic conversations which are an important method for ELs, and especially SLIFE, to access higher registers of academic content that demand specialized language and higher cognitive functioning (Zwiers & Crawford, 2011). RISA’s potential effectiveness as an academic scaffold lies in the explicit discussion of academic content, multiple occasions of usage, and the ability to address academic registers.

**Data Patterns and Themes**

Several important patterns and themes emerged from the data as a response to the research question: “How does the use of RISA oral interactions as a technique for scaffolding academic conversations impact the use of scientific classification language features, development of scientific classification language, and ability to engage in more cognitively complex forms of academic tasks for SLIFE in a high school setting?” To obtain them, this study used transitivity process analysis from Systemic Functional Linguistics with a quasi-experimental oriented action research model to analyze oral language samples before and after a unit on animal classification in a newcomer classroom with seven SLIFE learners. Linguistic elements studied included generic referent, possessive and intensive relational processes, use of targeted classification lexis, and fluency. These elements were examined for structure with the aid of concept maps.
and tabulated to deduce patterns and support insights in changes of scientific language and ability to engage in abstracted cognitive tasks.

The results have provided many indications of growth in participants’ ability to respond orally to a classification task. The qualitative analysis especially has elucidated multiple areas of growth in the development of scientific classification language for speakers in the study. After completion of the unit and use of RISA oral interactions, four of the seven participants have been able to articulate more traits when responding to the classification prompts, “What kind of animal is this? How do you know?” The production of lengthier and more specific scientific discourses for participants shows increased linguistic complexity (Robinson, 2001), and results from an increase in traits between pre-assessment and post-assessment samples.

Only one participant, Omar, has used fewer traits. However, examination of Omar’s sample reveals another important insight. His initial sample lists eight traits, but five of the eight traits are invalid for classifying animals into taxonomic classes. In contrast, the three traits that he has discussed in the post-assessment are all valid traits of mammals. This demonstrates a dramatic increase in the quality and preciseness of Omar’s ability to give an oral explanation of his classification. Additionally, although Bishaaro has struggled to make syntactic connections between species and trait, she also has reduced the number of invalid traits. This may mean that the use of RISA gives speakers greater accuracy when discerning and orally expressing valid traits for classification, which is another element of increased overall linguistic performance (Robinson, 2001).
Another, arguably even more important, pattern emerges from the qualitative research. In the pre-assessment, five of the seven participants have failed to correctly classify the species, and four of the participants have not related the species to any higher taxonomic order. In other words, they are unable to respond to the first prompt, “What kind of animal is this?” Yet after participation in the vertebrates unit with accompanying use of the two RISA dialogues, all participants are able to give the correct taxonomic classification for their chosen animal. The change in the ability to give the correct class in a classification task is a clear indication of the ability to use scientific classification language and in an appropriate register for a classification task (Schleppegrell 1998).

Additionally, there are no connections given between class and classification traits in six of the seven pre-assessment samples. Without linkages, respondents cannot adequately answer the second prompt, “How do you know?” However, all post-assessment samples have given either an explicit or inferential link between class and traits. The addition of linkage between class and trait, which causative structures commonly create, is fundamental for an appropriate classification (Huang & Morgan, 2003). Cogent animal classifications require links connecting all three concepts of class, species and trait. Samples lacking any of these three kinds of links are more accurately labeled as a form of listing in the new Bloom’s Taxonomy (Krathwohl, 2002). Hence, this change marks the transition of the communication to a more cognitively complex form of academic task by increasing from a factual to conceptual knowledge dimension and from remembering to understanding in the cognitive process dimension. (Krathwohl, 2002; Mayer, 2002).
The fact that Ubah has submitted a pre-assessment sample with appropriate linkages between class, species and trait does not diminish this; as noted before, she has used RISA dialogues in the vertebrates unit during the prior academic year. Therefore, RISA may have also aided in her ability to give an oral sample for classification.

Quantitatively, the number of generic referents, intensive and possessive transitive relational processes, and targeted classification vocabulary all increased in overall frequency in the data set between the pre-assessment and post-assessment.

Growth in all of the scientific language features above is a positive trend. The usage of generic referents and intensive and possessive relational transitive processes correlates generally to development of scientific language (Huang & Morgan, 2003).

As generic referents are crucial elements of classification discourse (Christie & Unsworth, 1989), the subsequent tracking of generic referents serves as a rudimentary method for discerning which elements in oral samples are “on task” in terms of classifying. Thus, the increased use of generic referents points toward a greater ability to sustain classification discourse on the whole.

Intensive and possessive relational structures are important elements in the formation of scientific discourse (Huang & Moran, 2003). The function of possessiveness is important for forming the basic structure of scientific descriptions (Schleppegrell, 1998). Intensive and possessive relational structures also form many of the postulates in scientific argumentation (Halliday & Webster, 2002). Therefore, the increased occurrence of possessive and intensive relational structures therefore shows an increase in the length and precision of participants’ classification language.
Similarly, the use of specific classification lexis is an integral component in higher registers of scientific discourse (Huang & Morgan, 2003). Hence, the increase of the frequency of unit classification vocabulary between pre-assessment and post-assessment samples corroborates movement toward a more sophisticated form of productive scientific language among the participants.

It is worth noting that students failed to successfully use “is a feature of” in their post-assessment samples. As stated in the lit review, the shift in theme from subject to adjunct is the same as passive tense constructions. Passive tense is more linguistically complex than active tense (Wright, 1969).

**Implications of Findings**

The crux of the research question hinges on the effectiveness of RISA as a scaffolding technique for the use and development of scientific classification language and its ability to enable students to engage in more cognitively complex academic tasks. As shown above, there have been notable improvements in the usage of generic referents, intensive and possessive transitive relational processes, and specific classification lexis. Changes in these linguistic features are indicative of increased linguistic performance. There are also documented shifts in the samples to more cognitively complex forms of academic tasks. If a technique such as RISA is determined to be an effective scaffold for scientific language tasks, then its inclusion on a regular basis in science classes with SLIFE is warranted. RISA may even be possibly be deemed useful on a broader scale for scaffolding other forms of language and cognitive tasks.
Single causative factors of language development are impossible to pinpoint within the social sciences, even in large scale experimental studies (Sagor, 2011). Fortunately, action research provides a way to make tentative assertions regarding conclusions occurring in a research context in which the subjects and researcher are active participants (Sagor, 2000). According to Sagor (2011), tentative assertions emerge from analysis of the relationship between actions and documented changes through the triangulation of multiple forms of data. In this study, the variables are use and development of scientific language tasks and the effectiveness of RISA oral interactions as a scaffolding technique for SLIFE. Put in simpler terms, although the findings have shown improvements in classification language, the degree to which the RISA dialogues may be responsible needs to be intuited from multiple data sources. One such key piece of evidence for this study lies in the narrative of the procedure described in Chapter Three.

Perhaps the most important piece of evidence for corroborating a relationship between the use of RISA dialogues in the vertebrates unit and changes in oral scientific language tasks is found in the teacher notes on lesson plans and recollections about the use of spoken scientific language during activities. This crucial piece of evidence is the amount of time spent engaging various academic tasks and the nature of their implementation in the vertebrates unit.

While there were other opportunities to engage orally with the content and academic language in the unit, the largest portion of time students spent speaking about classification explicitly in English was during RISA practice. In other activities, such as
the gallery walks and completion of the classification chart, students were allowed to use native languages to clarify uncertainties. Students often took advantage of this consideration, and as frequently occurs in newcomer classrooms, did not practice English when talking to each other to the extent the teacher had hoped. Additionally, the teacher would often clarify how to classify during the gallery walks and modify student responses when constructing the classifying features chart in a whole-group setting. This did not always afford students the opportunity to process semantically correct academic content via peer-to-peer academic conversations. RISA dialogue practice time served as the lengthiest and most accessible form of oral classification practice for students.

As described above, the findings showed notable improvements in the quality of students’ classifications. Since the majority of oral language practice specifically relating to English classification tasks occurred during RISA practice and assessments, the narrative of timing and implementation of the unit suggests RISA dialogues were effective in the development of the English scientific language on display in the oral samples.

Intriguingly, the data found a slight decline in oral fluency. Fluency is not an intended outcome of the research question. However, given that there were patterns of improvements in linguistic performance areas of accuracy and linguistic complexity, one might expect to see corresponding gains in fluency, which is another measure of linguistic performance. However, increased levels of linguistic complexity and accuracy have been tied to declines in fluency by both Robinson’s Cognition Hypothesis (2001) and Skehan and Foster’s Limited Attentional Capacity model (2001).
The connection between decreased fluency and improved linguistic performances can be corroborated by several other data points. As discussed in the findings chapter, the post-assessment oral samples share a trait that is not found in all but one pre-assessment oral sample did not possess: they were true classifications. Engaging in a classification instead of a description requires higher cognitive complexity (Bloom, 1956). This is especially true as the SLIFE newcomers are unused to engaging in this type of task extemporaneously. The change in academic task to a more cognitively complex form would consequently be marked by a corresponding decrease in fluency (Robinson, 2001; Skehan & Foster, 2001). This assertion can be further corroborated by examining individual student performance on pre-assessment and post-assessment samples. The strongest anecdotal example is Aden, due to his inclusion of a draft post-assessment.

While it was not included in the quantitative data set to preserve the validity of averages, Aden’s draft had a WPM of 103, a gain of nearly 30 points from the pre-assessment. However, as was discussed in the findings, the draft was not a classification but a form of summary, perhaps most accurately described as an elaboration (Mayer, 2002). When Aden provided his final submission, a true classification, fluency dropped from 102 to 68. This strongly corroborates the implication that the drop in fluency is due to increased cognitive demands.

Consider also the high fluency rate of Omar, who used a significant amount of off-task interpersonal conversational language in his oral samples. This interpersonal conversational language is easier to produce than academic language (Cummins 1980), and therefore trends toward a higher rate of fluency. Omar’s post-assessment oral sample
is more focused on actual classification features, which is reflected in a reduction in WPM. Similar results suggesting a relationship between decreases in WPM and corresponding movement to a cognitively more demanding task are found for Hawani, Naseho, Aden, Mateo, and Bishaaro.

Similar difficulties in productive language of higher cognitive tasks are also suggested by Huang and Morgan’s (2003) transitivity analysis, wherein they find that written samples of higher cognitive complexity contained more grammatical errors. Huang and Morgan’s study also conforms to the Robinson’s Cognition Hypothesis (2001). It is therefore not unreasonable to assume that extemporaneous oral expressions of more complex cognitive tasks may similarly impact fluency rates, since speakers may need to pause in order to process their thoughts.

Another possible implication from the findings are that units which are designed with RISA oral interactions in conjunction with culturally responsive best practices may impact the level of a student’s comfort with scholarly text. The qualitative analysis revealed an interesting anecdotal insight from Nasteho’s pre-assessment and post-assessment oral samples regarding comfort with printed text. Aside from merely repeating the question, the extent of their first sample was, “This animal is crocodile.” It is clear from the fact that Nasteho repeats the question that she is able to read, but she is unwilling to engage with any text in the illustrated animal fact sheet. Instead, she prefers to refer solely to the picture and infer (incorrectly) that an armadillo is a crocodile. However in the post-assessment utterance, “It I think barraca-barracuda is a kind of fish because it have scales and gills, are cold-blooded,” she demonstrates both the willingness
and ability to engage with the text to construct a semantically correct animal extemporaneous classification.

The use of sequential RISA dialogues may also increase the ability to automatize and generalize scientific discourse features such as lexis and discourse structure. Subsequent improvements in extemporaneous expression through the use of RISA dialogues may serve as an indicator of more meaningful learning (Mayer 2002).

Examination of Mateo's oral samples show an ability to generalize and automatize the discourse structures from the RISA, such as when he says in his post-assessment oral sample, “American alligator breathe with lungs. That is an example of a kind of reptile. An American caiman lay eggs. Ehh, only reptile lay eggs. An American caiman - alligator - have scales. Ehh, scales are a kind of reptile.” The oral sample alternates between statements relating trait and species and relating trait and class. The patterning of his post-assessment mirrors the patterns RISA oral interaction. The oral sample also produces the strongest argumentation form of all the post-assessment oral samples by establishing explicit rather than inferential relationships between class and trait. The use of explicit links may be construed as further evidence of an improved ability to engage in cognitively complex tasks in L2.

The frequency of different classification vocabulary in student oral samples also strengthens the tentative assertion of increased automaticity via RISA dialogues. Both “(is a) kind of” and “(is an) example of” were explicitly taught during the general science course and used during the vertebrates unit. However, “(is a) kind of” appeared six times times in the RISA dialogues, as opposed to one instance of “(is an) example of.” Both
phrases situate theme and subject in the sentence’s theme, indicating a similar level of linguistic complexity. Yet, students used “(is a) kind of” nine times in post assessment samples, compared to one instance of “(is an) example of.” The discrepancy between the frequency of these vocabulary phrases suggests that students have more effectively automatized “(is a) kind of” through the use of RISA dialogues.

In summation, examination of corroborating evidence from the animal classification unit and oral samples leads me to the following tentative assertions. First and foremost, the use of RISA as a scaffold seems to correspond to positive outcomes in the use and development of scientific language for SLIFE. This includes gains for students in both grammatical structure (relational processes/generic referent) and target vocabulary, which can be interpreted as increased linguistic complexity. The increase in the number and accuracy of classifying traits in the post-assessment samples also consequently support the assertion of improved linguistic performance in the areas of linguistic complexity and accuracy in linguistic performance. Furthermore, as the inclusion of causative language between pre- and post-assessment samples show, RISA may correlate to improved ability to engage in more cognitively complex academic tasks. Finally, the perceived increased automaticity derived from RISA dialogue practice may correlate with student ability to both generalize and engage more effectively in cognitively demanding tasks. All of these tentative assertions support the claim RISA is an effective practice may lead to more meaningful learning for SLIFE in the science classroom.
Limitations of the Study

While, in general, the results of the data lead to positive conclusions, there are some noteworthy considerations requiring acknowledgement. This includes necessary qualifiers on findings due to sample size and scope of the research question. The medium, method and timing of collected oral samples may also have impacted the strength of the findings.

As noted above and in the findings chapter, the results of the study were complicated by the small sample size of participants. When the study was originally designed, there were enough EL newcomers at Hamilton to field two science classes of 15-20 students. Having a larger sample size would have allowed for stronger correlations and possible statistical significance of average measures. Studying multiple classes would also have opened up additional possibilities for research, such as the differences found between those who engaged in RISA oral interactions and those who did not. The size of the newcomer class was beyond my control, and possibly that of the school, given recent geopolitical events. These findings can stand on their own. However, a larger sample size would make the argument for RISA even stronger.

Findings in the study would have been similarly strengthened through the use of member checking. As described by Sagor (2011), member checking is a technique in action research used to improve the confidence of findings. To engage in member checking, a researcher confers with the participants of the study about tentative assertions to ascertain whether they agree or disagree with the findings. Agreement can strengthen findings, while disagreement can add nuance to the tentative assertions. Unfortunately,
several participants have left the class, and in one case, the school between implementation of the intervention and formulation of findings. This precluded the use of member checking for this study.

While the study can tentatively answer in the affirmative as to RISA’s effectiveness for scientific classification language, the validity of the broader application of the findings is limited by the scope of the language studied. It would be interesting to know and further corroborate similar findings for other forms of communication and in other content areas.

While I did my best to ensure the validity of individual samples, I was unable to keep participants from listening to each other’s responses during the recording process. This limits the confidence that can be given to certain aspects of samples, such as the quantity of traits given by speakers. For instance, in the pre-assessment, Omar gives the trait of “eats fruit.” It is likely that Bishaaro heard the sample and attempted to incorporate it by answering “leaves off roots.” Nevertheless, the robustness of corroborative effects still indicate significant language gains for SLIFE in the science classroom studied.

Video responses are an effective tool for collecting oral samples. However, the speech for video differs from interpersonal speech. This may impact the degree of certainty on the effectiveness of RISA results for spontaneous oral production, or the ability to converse.

The timing and manner in which the post-assessment data was collected also may be a limiting factor in the strength of the results. While the pre-assessment data was
collected prior to the unit’s commencement, the post-assessment data was collected on the last day the second quarter of the school year. This was necessary as three of the participants, Omar, Bishaaro, and Ubah, were scheduled to leave the newcomer cohort and begin content classes as specified in the newcomer programming guidelines at Hamilton High School. At the end of the quarter, students (and teachers!) are also preoccupied with many other considerations not related to the study. Therefore, collection of the data may have been impacted by both the disposition of the participants giving oral samples, and time given to complete the classification task.

**Possible Implications for SLIFE educators**

The effectiveness of RISA oral interactions as a scaffold for the use and development of scientific classification language and for the ability to engage in cognitively complex tasks seemingly implies some useful benefits for SLIFE teachers. These include the addition of an effective culturally responsive pedagogical technique, its suitability in engaging newcomers, and improved outcomes for academic tasks.

Teaching SLIFE can be equally as challenging as it is rewarding. One common frustration many teachers at Hamilton voice is the difficulty SLIFE have in generalizing learned knowledge. For instance, the simple act of changing the letter of a variable from \( x \) to \( y \) in an equation has been known to flummox students who have already demonstrated the ability to manipulate equations with the former variable. As this study has shown, the repeated application of a RISA classification dialogue with different animals has allowed participants to generalize to different animals and even classes not
discussed explicitly during RISA practice. The results of this study may give hope for teachers looking to improve generalization capabilities for SLIFE in their classroom.

Speaking from personal experience, it can be difficult at times to produce cognitively challenging materials at a beginning level of English proficiency. However, the careful crafting of RISA dialogues has afforded an avenue to accessing more cognitively complex academic tasks. Through the use of dialogues, participants in this study were able to move from descriptive to classification tasks, even at a beginning level of English. Other teachers of SLIFE who employ RISA dialogues may reap similar benefits for their students.

RISA dialogues can also serve as a useful way for non-literate students and students from oral cultures to access academic content. The ritualistic choral repetition beginning each practice session gives non-literate students a chance to hear and practice forms of academic language otherwise relegated into writing. While it is absent from this research, there has been success at my school in making video recordings of RISA scripts as a study tool. Such video practice aid allows non-literate students to practice dialogue independently with a similar degree of effectiveness as students who study from the scripts. It also taps into the funds of knowledge for students from oral cultures, who have particular strengths in memorization.

**Suggestions for Further Research**

Since, as of this writing, the academic study of RISA oral interactions and other forms of structured conversational scaffolding are limited, there are many research opportunities waiting to be explored. The limitations above suggest several fruitful areas
for further research. Studies on impacts of RISA oral interactions with a larger number of participants would strengthen findings tentatively asserted by this study. A larger number of participants would allow researchers to draw correlations and formulate other statistically significant findings. Longer longitudinal studies could also afford the opportunity to measure the effects of RISA oral interactions have on the language development of SLIFE over time, including timing in patterns of growth and ability to retain improved linguistic performance in cognitively complex academic tasks.

While this study focuses on spoken classification data, researchers could draw insights on how the use of RISA oral interactions impact other modalities of language. In particular, Nasteho’s perceived increased comfort with accessing the text could be further explored to measure impacts on reading. Another study might be able to make conclusions on RISA’s ability to impact listening comprehension. The impact of RISA on the effect of academic writing affords another opportunity for study.

As the scope of this study was limited to scientific classification language, further conclusions are waiting to be drawn regarding other academic subjects and accompanying academic tasks. For example, future studies may determine the impact of RISA oral interactions on the ability to make analytical inferences in language arts. Based on anecdotal evidence outside the purview of the current study, increased performance in mathematics following cycles of procedural RISA dialogues could be researched. A future study may find the impact of RISA dialogues on comparing and contrasting multiple perspectives in Language Arts.
This study was limited to the effects of RISA oral interactions on newcomer SLIFE. It would be interesting to study the effects on SLIFE at higher levels of language proficiency. Evidence from a participant not included in this study hinted at possibilities for growth of other ELs. The effect of RISA oral interactions could even be examined for native speakers. In summation, myriad opportunities await future researchers of RISA dialogues.

**Conclusion**

In summary, this research has shed some academic light onto the effectiveness of RISA dialogues as a scaffolding technique for scientific classification language. RISA has been shown to contribute to gains in linguistic complexity and accuracy in extemporaneous oral linguistic performance. It also has contributed to an increased ability to use more cognitively demanding forms of language by helping to transition newcomer SLIFE from simple descriptive oral responses to true classifications. The evidence suggests RISA is a valuable pedagogical tool within a newcomer science classroom. Its flexibility implies it would be useful in other settings as well.

On a personal note, the completion of this Masters research project has been simultaneously one of the most challenging and empowering events of my life. It has been extremely rewarding to document in a thorough and objective manner the benefits of a technique which at the beginning of this project was merely an intuition. This project has greatly increased my confidence as an educator by confirming and enhancing my ability to discern what is effective in my classroom. At the very least, the use of RISA and other culturally responsive instruction within my school should help to shield
Hamilton High School in the future from any negligence lawsuits! It has been a true privilege to contribute to the field of effective pedagogical practices for SLIFE, and to add support to Watson’s Law with the Bordewick Contrapositive Corollary: “For SLIFE to have a chance to succeed in learning, they must have instruction with meaningful speaking components.”
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Appendix A: Illustrated Animal Data

What kind of animal is this? How do you know?

- I am an armadillo.
- My body stays at 34 degrees.
- I have bony plates on top of my body. I have hair on the bottom.
- My babies are born live
- I make milk.

Am I a mammal? 1

- I am a salamander.
- My young come from eggs.
- I have smooth skin but no hair.
- I live in rivers.
Am I a mammal? 2

- I am a blue whale.
- I live in the ocean.
- I have one live baby.
- There are small hairs on my body.
- I breathe with lungs.

Am I a mammal? 3

I am a desert tortoise.
I breathe with lungs.
My babies come from eggs.
My body changes temperature.
Am I a mammal? 4

I am a porcupine.
My hair can hurt other animals.
I make milk for my babies.
My body stays at 99 degrees Fahrenheit.

Am I a mammal? 5

I am a kangaroo.
My baby stays in my pouch and drinks milk.
I am warm-blooded.
I breathe with lungs.
Am I a mammal? 6

I am a platypus.
I am different from many types of animals in my group because I lay eggs.
I make milk for my babies.
I have hair on my body.

Classify - what is it?

- This is a pangolin
- It has scales, but the scales are made from hair material.
- It makes milk for its live babies.
- It doesn’t have teeth. It uses its tongue and rocks in its stomach.
What kind of animal is it? example

- This is a caiman.
- Most of its time is in water, but it breathes with lungs.
- It eats fish, mammals, birds and reptiles.
- Its young hatch from eggs.
- Its skin is covered with scales.

Classify it! 1. - emu

This is an emu.
Emus live in Australia.
They have wings, but they don’t fly.
Their young hatch from eggs.
Long thin feathers cover their body.
Classify it! 2 - orca

This is an orca.
It lives in the ocean its whole life.
Its babies are born live.
It breathes with lungs.

Classify it! 3 - komodo dragon

This is a komodo dragon.
It can grow very large.
It hatches from eggs.
Its body is covered with scales.
Classify it! 4 - flying fox

This is a flying fox.
It flies in the air with wings.
It is warm-blooded.
Its body has fur and its babies are born live.

Classify it! 5 - emperor penguin

This is an emperor penguin.
It lives in the water most of the year.
It uses wings to swim.
It breathes with lungs.
It is warm-blooded.
Classify it! 6 - snakehead

This is a snakehead.
It lives in water, but it can move on land.
Its gills are different. The gills can get oxygen from water and air.
It lays eggs.
It swims with fins.

Classify me! - harbor seal

I am a harbor seal.
I live in the ocean.
My fur keeps me warm in cold water.
I am warm-blooded.
My babies are born live.
Classify me! - manta ray

This is a manta ray.
It lives in the ocean.
It breathes with gills.
The mother keeps eggs inside her. Then it hatches and comes out live.

Classify me! - spadefoot toad

This is a spadefoot toad.
It lives in a desert. It lays eggs if it rains.
The tadpoles grow very fast. They lose their gills and grow lungs.
It has smooth skin on its body.
Classify me! tawny frogmouth

This is a tawny frogmouth.
It lives in Australia.
It is warm-blooded.
It has a very large beak to catch food.
It is born from eggs.

Classify me! - ringed caecilian

This is a ringed caecilian
It lives in South America.
It is born live. Some caecilians are born from eggs.
Its babies have gills. It has lungs.
It is cold-blooded.
Classify me! blue-tongued skink

This is a blue-tongued skink.
I live in Australia.
There are scales on my body.
I breathe with lungs.
I am cold-blooded.

Classify me! - kiwi

I am a kiwi.
I live in New Zealand.
I have two legs and a long beak.
My babies come from eggs.
I don’t fly, but I have feathers.
This is an ostrich. An ostrich is very large. Ostrich chicks come from very large eggs. Ostriches have tiny feathers on their head and huge feathers on their body. They can’t fly.

A mouse is very small. Mice can live in many places. Mice breathe with their lungs. A mother mouse makes milk for her babies. They have hair on their body.

Barracuda live in the ocean. They use gills to breathe. Barracuda are good hunters. They eat smaller fish. A Barracuda is covered with scales.
This is an American alligator. Alligators live in swamps. Alligators come from eggs. Alligators swim in the water. They breathe with lungs.

This is a newt. Newts babies have gills. Then they grow lungs. Newts live on water and on land. They have wet smooth skin.
Appendix B: Gallery Walk Response Sheet Example

Classifying Gallery Walk 2
Directions: Work by yourself or with your group.

• Read about the animal’s features.
• Decide if the animal is a mammal, bird, fish or reptile. DO NOT COPY THE PAGE.

“I think _____ is a kind of _______ because _______ is a feature of _______.”

1. Emu - what kind of animal is it?

2. Orca - what kind of animal is it?

3. Komodo Dragon - what kind of animal is it?
4. Flying Fox - what kind of animal is it?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

5. Emperor Penguin - what kind of animal is it?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

6. Snakehead - what kind of animal is it?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Appendix C: Student Handouts of RISA Dialogues

Mammal Classifying RISA

A: Hello. Can you tell me something?

B: I am happy to help. What is it?

A: What kind of animal is a ________________?

B: I think ________________ is a kind of mammal.

A: What features make you say that?

B: Well, mammals have fur for body covering. A ________________ does also.

A: Why else is ________________ an example of a mammal?

B: Mammals breathe with lungs. A ________________ has lungs also.

A: Very interesting. Does it have any other mammal features?

B: Mammals are born live, not from eggs. A ________________ is born live.

A: I see. So ________________s have fur, lungs and are born live. That makes them a kind of mammal. Thanks!

B: You’re welcome.
Reptile classifying RISA

A: I have a problem with classifying. Can you help me?

B: I will do my best to assist.

A: What kind of animal is a ________________?

B: I classified ________________ as a kind of reptile.

A: What features make ________________ a reptile?

B: ________________ lay eggs. Eggs are a feature of reptiles.

A: That’s true, but birds and fish lay eggs. Why else is ________________ a kind of reptile?

B: A ________________ has scales. Scales are a feature of reptiles.

A: That’s right. However, reptiles and fish both have scales. Are there any other features?

B: ________________ breathe with lungs, and lungs are a feature of reptiles.

A: Now I understand why ________________ is an example of a reptile. Only reptiles have lungs, scales and lay eggs. You are great at classifying!

B: It’s easy when you know how.
Appendix D: Animal Classifying Chart

<table>
<thead>
<tr>
<th>Vertebrate group</th>
<th>Body covering</th>
<th>How do they breathe?</th>
<th>Warm-blooded or cold-blooded?</th>
<th>How are the young born?</th>
<th>Do they make milk?</th>
<th>Important body parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds</td>
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<tr>
<td>Fish</td>
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<tr>
<td>Reptiles</td>
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<td></td>
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<tr>
<td>Amphibians</td>
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</tr>
</tbody>
</table>
Appendix E: Transcriptions of Participant Oral Language Samples

_Hawani, pre-assessment (0:21)_

What kind of animal is this? How do you know? I know it is animals. It is a name is armadollo. Armadollo it is has baby. It is has a milk. Armi-armadollo it is, uhm, animals.

_Hawani, post-assessment (0:17)_

My choose is mice. I think mice. Mice is a kind of mammals because it is has milk it is give for baby. Is a future (feature) black.

_Aden, pre-assessment (0:16)_

My name is [Aden]. This animal is, uh, armadillo? He lived Latin America. Yeah, is uh, a fur body.

_Aden, post-assessment [draft] (0:10)_

My name is [Aden]. Ostrich is a kind of bird. It has wings, but it cannot fly.

_Aden, post-assessment [final submission] (0:16)_

My name is [Aden]. Ostrich is a kind of bird because it come from eggs, but cannot fly.
Nasteho, pre-assessment (0:09)

What kind of, what kind of animal is this? How do you know? I know it is crocodole.

Nasteho, post-assessment (0:10)

It I think barraca-barracuda is a kind of fish because it have scales and gills, are cold-blooded.

Omar, pre-assessment (0:49)

Hi. My name is [Omar]. Today, I’m talking about animal. But the question is, what animal is it? The animal is armeddle. Armeddle can make milk. It have hair. It is small. Mmm It can stay, like 34 degrees for outside the cold. It doesn’t matter, you know. it have big, no they have like, sma- , yeah, it is strong. It can, it alive, it can make milk, it can eat the fruit, something like root. Thank you for watching my video. The last, I show you the picture for the what animal is it. Woo! See you.

Omar, post-assessment (0:21)

Hi. My name is [Omar]. Today I’m talking about animal. Do you asking me what animals? Guess! I’ll tell you what animals. Okay, there is mouse. Okay, mouse is kind of a mammals. You know why it’s ki- it’s kind of a mammals? Because it can make milk, it, it was born live it have hair. That is why I’m tell I’m saying like it is a mammal.

Goodnight.
**Mateo, pre-assessment (0:27)**

Hello, my name is [Mateo], and I think an armadillo is a, uh, is a mammal animal. And I think it can live in a place cold, warm, uh cooler, ehh, that it. I think. I don’t know.

**Mateo, post-assessment (0:40)**

I think american alligator is a kind of reptile. Ah, American alligator breathe with lungs. That is an example of a kind of reptile. An American caiman lay eggs. Ehh, only reptile lay eggs. An American caiman - alligator - have scales. Ehh, scales are a kind of reptile.

**Bishaaro, pre-assessment (0:42)**

Okay. Hi, my name is [Bishaaro]. And this about the animals. Its name is the armadile. The animal is, is uh, lives of roots of the, the s, mm, the animal is my babies of the brown life is milk of the tradition.

**Bishaaro, post-assessment (0:25)**

Hello, my name is [Bishaaro]. The talking about is the mam- mammals of mouth mouse. the Mouse of, the mouth of the lives in the breathe leave (lungs?) the post (both?) from the babies and the milk the body. Because, the mammals!

**Ubah, pre-assessment (0:08)**

Hi. My name is [Ubah], and the armadillo is a mammal because it have a babies and make milk. Thanks for watching.


Ubah, post-assessment (0:19)

Hi my name is [Ubah] and mouse, a mouse is a kind of animals because it have a, it breathe with a lungs, it have a hair and have a babies, it make milk, so that make him a animal- mammals so thanks for listen.
Appendix F: Informed Consent Forms

November 6, 2017

Dear [Teacher's Name] students and parents:

I am studying at Hamline University. To get my Master’s degree, I need to do research. I want to do research in our classroom. I want to study how our RISA speaking practice helps students learn English in science class. Hamline University gave permission for this research. [High School Name] gave permission for this research. I also need your permission.

In class, we will study animals. Our unit will last 30 days. In our unit, we will practice RISA speaking exercises about how to classify animals into groups. We will use an iPad to record videos of students speaking English about animals before and after our unit. I think the videos will show that students can learn a lot from our speaking practice. All students will do the same thing, even if they are not in the study. Being in my study will not change the grade of the student. I will report the students’ results, but I will not use any names. No one will know who is a part of the research.

The research will be published in a book and online. If students or families do not want to be in the research, that is ok. If students or families want to leave the research later, that is ok. You just need to tell me.

If you have questions, contact me at [Teacher's Email] or [Teacher's Phone]. You can also contact my Hamline Professor, Julia Reimer at [Professor's Email] or [Professor's Phone].

If you (or your child) will participate in the research, please sign this letter. Return it to me by November 27, 2017. I will make a copy for you to keep.

Thank you!

Mr. James Bordewick

Signature: ____________________________
Date: ______________
Ardeeya iyo waliidinta sharafka leh.
Waxaan wax ka bartaa jaamacada Hamline. Si aan u helo, ihaaada maasterka, waxaan rabaab si aan sameeyo baarista. Waxaay doonayaa in aan ku sameeyo baaristaa fasliyadaana. 


Cilmi baarista waxay lagu dashicu doona buug iyo internetka. Haddii ardeyda ama qoyska eeyaan rabin in ey ka mid neqdaan cilmi baarista, waa caadi. Haddii ardeyda ama qoyska rabaan in ay ka tagaan cilmi baarista ka dib, waa caadi. Wixaa loo baahanyahay kaliya ti aad i sheegtin.

Haddii aad wax oo aad hoesatthin, ila soo xiriiraa ama waana la soo xiriiree kartii macalinkayga jaamacada Hamline, Julia Reimer, haddii aad ama. waana kastaagaaga ama.

Haddii aad oo (cumugaaga) ca qeyb qaadan doona, faadda saxiib waraaqaadan. Isuuxu celi Bisha November 27, 2017. Waxaana ku u sameen doonaa koopi aad aad si heesatid.

Mahadkanid!
Mr. James Bordewick

Saxiibda
Taariikhda
Baratoota fi ahbeotii jaalatamtaa,
Annalilee hayyamaa keessan barbaada.


Qorannoqoonaan ni maxaar fatti kitaaba keessatti fii oonlinii. Yoo baratootootti fii maatiin qooda qorannoo fudhachuu hin faane, rakkoo hin qabu. Yoo baratootootti fii maatiin dhisiisu barbadaan qorannoo booda, rakkoo hin qabu. Anuumaatti hinu barbaacheesa.

Yoo gaarii qabaataan, itti na qunnamuun ni dandaaysan. Yoo akkasumante baristaai fiiyees qunnamuun ni dandaaysan, Julia Reimer.


Galetoomaal
Mr. James Bordewich

Mallatoo
Guuyyaa mallatoo
Noviembre 6, 2017

Estimados estudiantes y padres de [nombre]


En clase, estudiaremos a los animales. Nuestra unidad durará 30 días. En nuestra unidad, practicaremos los ejercicios orales del programa RISA acerca de cómo clasificar animales en grupos. Usaremos un Mac para grabar videos de los estudiantes hablando inglés acerca de los animales antes y después de terminar nuestra unidad. Creo que los videos mostrarán que los estudiantes pueden aprender mucho de nuestra práctica oral. Todos los estudiantes harán lo mismo, aunque algunos no estén participando en mi estudio. El participar en mi estudio no cambiará la calificación del estudiante. Repartiré los resultados de los estudiantes, pero no usaré ningún nombre. Nacé sabrá quién es parte de la investigación.

La investigación será publicada en un libro y en línea. Si los estudiantes o sus familias no quieren ser parte de la investigación, está bien. Si los estudiantes o sus familias quieren quedar fuera de la investigación en algún momento, está bien. Solo necesitan decírmelo.

Si tienen alguna pregunta, pueden comunicarse conmigo al [nombre] o [nombre] también pueden comunicarse con mi profesor en Hamline, Julia Reimer a [nombre] [nombre].


Muchas gracias!

Mr. James Bordewick

Firma:_____________________________________
Fecha:_____________________________________