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Content Area Teaching in Linguistically Diverse Classrooms

Meghan Odsliv Bratkovich
Montclair State University

CONTENT AREA TEACHING IN LINGUISTICALLY DIVERSE CLASSROOMS

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MEGHAN ODSLIV BRATKOVICH

Montclair State University

Upper Montclair, NJ

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Dissertation Chair: Dr. Tamara Lucas

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We hereby approve the Dissertation

CONTENT AREA TEACHING IN LINGUISTICALLY DIVERSE CLASSROOMS

of

Meghan Odsliv Bratkovich

Candidate for the Degree:

Doctor of Philosophy

Department of
Teacher Education and
Teacher Development

Certified by:

[redacted]

Dr. M. Scott Herness
Vice Provost for Research and
Dean of the Graduate School

4-17-19

Date

Dissertation Committee:

[redacted]

Dr. Tamara Lucas
Dissertation Chair

[redacted]

Dr. Ana María Villegas

[redacted]

Dr. Michele Knobel

ABSTRACT

CONTENT AREA TEACHING IN LINGUISTICALLY DIVERSE CLASSROOMS

By Meghan Odsliv Bratkovich

Educators and teacher educators in the United States have worked for decades to provide English language learners (ELLs) and other linguistically diverse students access to education. While ELLs' rising high school graduation rates suggest that efforts have helped ELLs access schools, classrooms, and scholastic tasks, more steps need to be taken toward ensuring that linguistically diverse students can also meaningfully access college or 21st century careers.

This qualitative study is at the nexus of language, culture, academic content, literacy, teaching, and teacher education and uses a bricolage approach to examine the teaching of four secondary science and mathematics teachers recognized as "successful" teachers of ELLs. The results show that the content constructed in the teaching went beyond the teaching of the facts, topics, and concepts of the school curriculum to also include the accepted and expected ways of thinking and communicating used in the discipline. This suggests that the teaching was preparing all students to access both the school curriculum as well as disciplinary spaces such as college or careers.

Findings are presented in two chapters. The first findings chapter offers a complex and multifaceted way to view *content*, including the facets of academics, logos, and expectations. The second findings chapter focuses on teaching and documents how the teaching observed deconstructed disciplinary knowledge to teach students to notice and use content as a language. Together, these two chapters outline what I call PARALEXICAL teaching, or teaching that pays purposeful attention to realizing academics, logos, and expectations integral to content as a language. I argue that PARALEXICAL teaching, through its explicit attention to disciplinary

language, can unveil aspects of the hidden curriculum in ways that more equitably prepare all students, especially ELLs, to graduate from high school and enter disciplinary spaces like college or careers.

Keywords: content area teaching, responsive teaching, English language learners, teacher education, bricolage, content knowledge for teaching, academic language

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DEDICATION

To The Booper. Because you're my favorite.

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CHAPTER 1: INTRODUCTION

While some of my classmates grew up jetting off to spend Christmases in sunny Florida or the Caribbean to escape the Chicago cold, my family would often fly across the Atlantic to spend *jul* in Norway with our extended family. One year, when I was about seven, a busy and festive Christmas Eve full of presents, tree decorating, and church services gave way to a sleepy and relaxed Christmas Day. That Arctic winter day in which dawn immediately transitioned to dusk found napping and newspaper reading interrupted only by the clatter of pots as my grandmother and I made almond rice porridge. The fireplace crackled and light snow fell as my uncle, sipping coffee and nibbling on freshly baked pastries, commented "this is really *koselig.*" I nudged my older cousin and asked, "What does *koselig* mean?" "Cozy," she replied. "It's more like what makes you happy," said my sister sitting nearby. "*Nei,"* my aunt chimed in, "those are too small. *Koselig* is bigger than both of those."

At the time, I knew *cozy.* I liked *cozy.* *Cozy* was comfortable. That Christmas Day felt cozy and made me happy, and therefore it was *koselig*. However, it would be years before I would come to understand what my aunt meant when she said *koselig* was "bigger." *Koselig* does involve coziness, comfort, and happiness, but also encompasses a sense of peacefulness, appreciation, and quietude. *Koselig* can be a wool sweater and a warm cup of cocoa, but its essence speaks to the inner joy and contentedness found in something as simple as a sweater or a cup of cocoa. Looking back, my idea of *cozy* began to broaden that Christmas and as I gradually recognized all that *koselig* entailed, *cozy* felt small in a way it never had; it became insufficient, diluted, and partial, and I was no longer content with my previous understanding of *cozy*.

Nothing about *cozy* had changed; rather, my understanding had changed as I had negotiated multiple understandings of *koselig* with my cousin, sister, and aunt, and had come

into new knowledge and perspective of *cozy*. I had always associated *cozy* with warmth, such as sitting by a glowing hearth on a winter night, but *koselig* goes beyond physical warmth. *Koselig* does include physical warmth—a welcome element to heat bodies in the cold, Norwegian winter—but also emotional, relational, and restorative warmth to sustain the soul as well. I understood and recognized that *cozy* had always felt warm, but I hadn't noticed or thought through the more nuanced and complex ways that warmth shapes *cozy* until I encountered and came to know *koselig*. Once I encountered *koselig*, previous definitions of *cozy* seemed too small to contain all that *koselig* entails.

Koselig provided me with a lens that helped me to see *cozy* in a way that brought into focus what cozy had always been, but I had not been able to see; it gave me a way not only to recognize what I understood *cozy* to include, but also to re-cognize, or re-think and know anew, something with which I thought I was already familiar. The explanations and negotiations of what my cousin, sister, and aunt understood *koselig* to be provided me with an opportunity to know *cozy* more deeply by asking me to uncover, notice, and communicate aspects that I had always felt, but never seen. In the same way, this study asks readers from content area teaching and from second language teaching to approach language and content from a *koselig* perspective and not just a *cozy* one—to recognize what they understand the relationship between content and language in teaching to be, and to question and re-cognize another, more integrative way of knowing and teaching content.

As I ask readers to question what it means to know and understand *content*, in this dissertation I also attempt to document my own re-cognizing about language itself. My own understanding of what language is deepened over the course of this study, and throughout this

document I share how I was able to see language in new ways and acknowledge the linguistic expertise held by four content area teachers.

I also came to re-cognize integrative teaching—the construct I lay out in the next two chapters and use to frame this study. While my study is broadly about integrative teaching, it specifically examines one way this idea is enacted in practice—what I call PARALEXICAL teaching. To preview a metaphor I use later on, I came to think about integrative teaching as a choir with many voices singing different parts, but all singing together in harmony. There are many ways in which integrative teaching could be realized in practice; it seems that PARALEXICAL teaching, described in chapters 4 and 5, represents one previously unheard part of that choir. My initial theoretical construct of integrative teaching and the knowledge I argue that is required for it may still hold now that my study has concluded, but in my re-cognizing of integrative teaching, I acknowledge and make space for the multiplicity of its possible enactments in practice.

Re-cognizing Content

In the example above, *koselig* let me see from a new perspective by allowing me to notice features of *cozy* that I had previously overlooked. Etymology, or the study of word origins, provides a different lens for noticing a word's features by tracking its historical development and linguistic evolution to its modern meaning and usage. This brings a word's linguistic roots, traces of other languages, and connections to other words to light and can provide a way in which to think anew about words that feel very familiar. While etymology is not intended to determine a word's 'correct' or 'true' meaning, it can provide a vantage point from which to view a familiar word as foreign. Though the *koselig* example used English and a foreign word, in the next example I am not asking readers to learn a new word, but rather to look within the

development of a single English word to carefully re-examine and re-cognize a word that is already known and familiar. In this way, I am asking readers to broaden and deepen their existing knowledge, not to re-learn or add new words to their current understanding. This questioning deepens what was previously understood, providing—I argue—a better and more complete picture of what was likely already known, and allowing to view what is known in a new and multi-faceted way. In this example, I focus on the word *content* to begin and expand pre-existing ideas of what content comprises. I do not seek to define content in its entirety; I only offer a different way of approaching or looking at it, which may help readers to begin to see content in new and more integrative ways.

In school contexts, *content* often refers to subject matter or main topics, but its etymology reveals an additional facet that helps in understanding integrative teaching. Content derives from the Latin word *continere* meaning "that which is contained" ("Content," 2018). *Continere* is formulated from two Latin parts—*com*, meaning "together" and *tenere*, "to hold." At its root, content comes from a word that refers to that which is contained as well as that which holds it together, or the container itself. Consider someone asking if you'd like a soda—*soda* is not just referring to a potable liquid, but also the can, bottle, or glass which holds it. Similarly, content can be understood not only as the set of things held together, but also the ways in which the set is held together and bounded (Bratkovich, 2018). Content, without the container, is merely contents (note the *s*). In education, for instance, a science textbook has a table of contents that lists the items (contents) that collectively create the content for that science textbook. However, a science textbook and the curricular contents within it are not the content of science. The concept of speed and objects moving at different rates, for instance, also involves the concepts of force, acceleration, and velocity. These concepts might be understood, but cannot be explained,

negotiated, or communicated to others without language. This language might involve an image of a vector, which communicates meaning through its length and directional position, or words in which an object's speed and location in space are described. In either case, language is used to both express these curricular contents and to hold them together to create meaning and form part of the content of science.

In a similar way, academic content in school contexts is more than a collection of curricular contents; it includes the language, history, practices, and mindsets that bind them together. This exaggerated, but illustrative, distinction between content and curricular contents is more easily understood within a given content area example. For example, mathematics content comprises the processes and practices through which mathematical understandings are derived, (e.g., trigonometric calculation), represented and communicated in an accepted way (e.g., formatted as a mathematical proof), and accepted as valid knowledge (e.g., proven) by individuals in the discipline. In contrast, mathematics curricular contents are the products and understandings generated by these processes, which represent previously validated and accepted knowledge.

Ignoring the teaching of content, or inadvertently seeing the teaching of curricular contents as the teaching of content itself, fails to make explicit the language-based processes by which new knowledge is created, making it appear as though a discipline's knowledge is fixed, complete, and limited to that which is taught in the classroom. As a result, teaching content in school contexts can be seen as preparing students for the production, use, and contestation of knowledge, whereas focusing on teaching curricular contents only prepares students to possess existing understandings. While this teaching may have been sufficient in a world that saw education as the aggregate of how much individuals knew, what books they had read, or what

they had learned, it may fall short of preparing students with the language-based skills and knowhow needed to contribute to the social production of knowledge valued in today's (and tomorrow's) societies.

The distinction between content and curricular contents, although not presently conceptualized in this way within classrooms, may help to illustrate what ideological stances and forms of teaching provide students with opportunities both to learn and to participate in the construction of knowledge that is central to success in a knowledge-based economy. Therefore, I am using *content* metonymously to include not only the curricular contents traditionally associated with content, but also the language that connects, binds, and contains them. I expand on these concepts in later chapters, but this preliminary distinction is intended to serve two purposes. First, it is intended to draw the reader's attention to ways in which I am both recognizing and re-cognizing concepts and language within my own writing, and second, to provide a lens through which content and curricular contents can be made less familiar to knowledgeable readers, so that they may begin the process of seeing them anew.

Unfortunately, this view of content and curricular contents may be difficult to take up because language is often perceived as operating outside the domain of content and has been hidden within curricula; indeed, much content area instruction in schools has ignored language both as a container of contents and the means through which contents are connected and held together. Thus, instruction has mistakenly overlooked content and has instead favored curricular contents. In omitting language from content, content area instruction tends to be reduced to instruction of discrete academic contents and is disconnected from a broader and deeper understanding of content.

In short, language cannot be separated or parsed out from content. Content area teachers, then, must be aware of the curricular contents they teach as well as the language that holds, contains, or binds those contents together. Therefore, content area teaching that addresses academic content through both its curricular contents as well as its language is *integrative*—that is, it is complete and whole. *Integrative* derives from the Latin *integer*, meaning intact, whole, or complete ("Integrate," 2018); *integer* is still used today as a mathematical term to refer to a "whole number."

As I use it here, *integrative teaching* reflects this wholeness and refers to the teaching of language as an intrinsic part of content area instruction rather than a separate topic to be added into content area instruction. Metaphorically, language and curricular contents can be seen as two facets of the same crystal, or prism, of content. One of these facets may be more visible at any given time based on how the crystal is turned or positioned, but both are always present. Integrative teaching means teaching these multiple facets of the crystal of content and being able to rotate it to both see and see through each different facet, and not just through the facets most visible—in this case, curricular contents. Building on the definition of teaching as everything teachers do both inside and outside their classrooms to support instruction (Ball, Hill, & Bass, 2005), I consider integrative teaching to be everything teachers do to support the teaching of content as a holistic entity, which comprises both language and academic contents.

Teaching of traditional content area curricula may be sufficient to learn curricular contents, but it may not be sufficient to learn the whole of content, inclusive of the language of a given content area and the language of the "hidden curriculum" (Schleppegrell, 2004; cf. Anyon, 1980; Apple, 1971; Giroux & Purpel, 1983; Jackson, 1968). In contrast, integrative teaching involves revealing, uncovering, or un-hiding the language that is already present in content, yet

has too often remained hidden within curricula. Integrative teaching occurs when teachers make visible the connections between language and curricular contents in teaching, thereby showing students how meaning is built and ideas are communicated within disciplinary contexts.

Importantly, integrative teaching does not refer to a process of 'integrating' language and content, as if they were distinct, separate constructs that need to be combined; indeed, language already conveys, defines, and contextualizes the academic content. Instead of treating language as an 'extracurricular' aspect of expressed curricula, such as adding the expectation of teaching the English language in a mathematics classroom, integrative teaching recognizes the teaching of the language of mathematics as a 'curricular' concern, and works to 'uncover' the content area language that promotes access to college and careers for all students, rather than leaving students to 'discover' this language independently.

Integrative teaching helps to reveal the language of content areas to students; like seeing both the soda and the can, integrative teaching helps students the curricular contents of the content area as well as the nature and shape of the language that contains it. Teachers engaging in integrative teaching will likely need to understand and know not just the curricular contents of the content, but also the language that contains them. This means that content area teachers need to understand how their content area uses and is shaped by language, along with tools and strategies to help students learn and use this language. The view of integrative teaching, as I propose it, does not ask teachers to learn new content or to re-learn familiar content, but to know their content anew—in effect, to engage in a process of recognition as well as re-cognition and begin to see the teaching of content as a language-informed practice. This view simultaneously acknowledges and builds on the extant knowledge bases of content area teaching and language

teaching (recognition) while questioning how these knowledge bases can be reimagined to be less compartmentalized and more integrated (re-cognition).

So far, this first chapter has been intended to guide readers through the re-cognition of some key influences and background related to integrative teaching. Although I set out to empirically identify, observe, and document integrative teaching by means of this study, my journey led me to one particular way in which this broad concept takes shape in practice—through a version of responsive teaching (cf. Bowers & Flinders, 1990; Gay, 2010; Lucas, Villegas, & Freedson-Gonzalez, 2008; Villegas & Lucas, 2002a), or what I call PARALEXICAL teaching. In the remainder of this chapter I discuss key issues that frame discussions of responsive teaching, particularly culturally and linguistically responsive teaching, paying special attention to concerns about educational equity and access as they relate to issues of language in content area teaching. These sections that follow speak to education and schooling within a knowledge-based society before transitioning more directly to issues of language, including the language needed to access college study or a 21st century career.

Education in a Knowledge-Based Society

The shift to a global society coincides with the shift from an industry- to a knowledge-based economy that began over 50 years ago in the United States and other developed nations (Cochran-Smith & Villegas, 2015). Industry-based economies of the past were built around the production and distribution of manufactured goods and depended largely on manual labor and technical knowledge and skills. In contrast, today's knowledge-based economies call for the production and distribution of knowledge and information, which increasingly require workers to possess productive and collaborative skills in problem-solving, effective communication, and critical evaluation of information (Leu et al., 2013). Societal trends, such as the shift to

knowledge-based economies, often precipitate educational trends, as students must now be prepared for "global competitiveness" (United States Department of Education, 2017b, para. 1) and "the unique demands of a 21st century world" (National Education Association, 2012, p. 2).

One of these educational trends has been the development of new academic standards, namely the Common Core State Standards (2010) and the Next Generation Science Standards (2013a)—two initiatives designed to specify what students should know and be able to do at each grade level in order to complete high school ready to "succeed in entry-level careers, introductory academic college courses, and workforce training programs" (Common Core State Standards Initiative, 2017a, para. 5) and be prepared "for all careers in the modern workforce" (NGSS Lead States, 2013b, para. 4). The goals of the Common Core State Standards, adopted in 41 states, the District of Columbia, and four U.S. territories as of 2019, mirror those of the U.S. Department of Education in that the stated purpose of education is to prepare students to be ready for "the real world of college and careers" (United States Department of Education, 2017a, para. 1).

These overt economic goals of American education are not new developments. Over three decades ago, the authors of *A Nation at Risk* (National Commission on Excellence in Education, 1983) expressed the goals and purposes of U.S. public education in terms of economic preeminence in the world. Others have argued that the purposes of schooling should be in service to democratic equality or social mobility (e.g., Cochran-Smith, 2010; Dewey, 1916; Goodlad, 1994; Labaree, 1997)—purposes that are present, though downplayed, in current standards and professional viewpoints today, as seen through the focus on preparing students for "active and engaged citizenship" (National Council for the Social Studies, 2013) in the "hopes of preserving a vibrant democracy and the promise of social mobility that lie at the heart of the

American dream" (NGSS Lead States, 2013b para. 1). Despite these democracy and citizenship goals, preparing students for economic participation in a knowledge-based society remains the primary and prevailing goal of American education (Spring, 2016).

Building on this dominant economic goal, this study focuses on efforts to prepare all students "to graduate from high school as college and career ready" (Council of Chief State School Officers, 2012, p. ii). To meet these objectives, education must equip students with the skills needed both to enter and to succeed in college or a career. Whereas students in previous generations might have been prepared to be reproducers of known solutions, students for today's knowledge-based societies must now learn to be problematizers and problem solvers—to be innovators who can build, question, and negotiate knowledge, not just doers able to enact a previously understood and prescribed process.

Legacies of the Industrial Age

One of the most recognized symbols of an industry-based society is the assembly line, which the Ford Motor Company began using in 1913 to mass produce its Model T cars. Assembly lines are designed for individual and standardized parts to be added systematically to produce a collective whole; it is, by definition, compartmentalized in that it is a system with tangible parts. Workers on an assembly line must have knowledge of their respective parts and how those parts fit into the whole product (e.g., knowledge of wheels and how they connect to a chassis of a car), but they do not necessarily need knowledge of the whole product or the entire production process. In a knowledge-based society, since the end product is knowledge and information, which is dynamic and abstract rather than a fixed, tangible, manufactured item, students need to learn more about the whole product and understand how parts are connected.

Essentially, students must go beyond knowledge of the relationships of the parts 'of' the whole to knowledge of parts 'to' the whole.

As Marshall (1988) commented over thirty years ago, the goals of education and classrooms should not be to prepare students to produce a product, but to prepare them to produce knowledge. Continuing the Model T analogy, today's students are not responsible for producing or reproducing a Model T at the end of their education, but they are responsible for understanding how cars are made and how that understanding could apply to the building of other things. Marshall therefore advocated that schools and classrooms should treat knowledge as something to be developed and shared, rather than solely acquired—an idea that has since manifested itself in new standards.

The development and sharing of knowledge, as seen in the Common Core State Standards (2010) and Next Generation Science Standards (2013a), require skills that rely on communicating, expressing ideas, and problem solving. These skills are deeply rooted in language. The "Three Rs" of reading, writing, and arithmetic that were satisfactory educational outcomes for industry-based societies are no longer enough for gainful employment in a knowledge-based society, as these understandings do not necessarily lead to participation in the production of knowledge. Understanding and proficiency in the Three Rs simply is "not sufficient if employees are unable to think critically, solve problems, collaborate, or communicate effectively" (National Education Association, 2012, p. 6). This knowledge requires that students go beyond technical skills to advanced communication skills toward the creation and production of knowledge, which have been articulated in new academic standards.

To be prepared to enter and succeed in college or a career, students must be prepared to use language—specifically academic language—to produce knowledge, solve problems,

collaborate, and communicate. While scholars have yet to agree on a precise definition of academic language, a concept I discuss further in the next chapter, they generally do agree that skills in academic language are "needed by all students for long-term academic success" (Scarcella, 2003, p. 6). The need for all students to develop academic language skills in response to a knowledge-based society is explicit, as three "key shifts" in the transition to the Common Core State Standards include a) exposure to and practice with academic language, b) reading, writing, and speaking in both literary and informational contexts, and c) knowledge building through informational texts (Common Core State Standards Initiative, 2017a, 2017c).

The Common Core State Standards have been set for two main content areas, mathematics and English Language Arts (ELA), but also include standards for grades 6-12 in history/social studies, science and technical subjects, and writing. Not surprisingly, the ELA standards require students to use language in a variety of ways for academic purposes. For example, students are asked to "describe" the connection between events in second grade (CCSS.ELA-LITERACY.RI.2.3), "support claims" with logical reasoning and relevant evidence in seventh grade (CCSS.ELA-LITERACY.W.7.1.B), and "synthesize" comments, claims, and evidence on all sides of an issue in eleventh grade (CCSS.ELA-LITERACY.SL.11-12.1.D).

Perhaps unexpectedly, academic language demands also appear throughout the mathematics standards. For instance, second grade students must "explain" why addition and subtraction strategies work (CCSS.MATH.CONTENT.2.NBT.B.9) and eighth graders must "compare" properties of two functions that are represented differently (algebraically, graphically, numerically in tables, or by verbal descriptions; CCSS.MATH.CONTENT.8.F.A.2). Along related lines, the Next Generation Science Standards center on eight scientific practices, half of which have overtly linguistic demands: asking questions; constructing explanations; developing

an argument from evidence; and obtaining, evaluating, and communicating information. Although these scientific practices promoted in the Next Generation Science Standards may be consistent with the practices promoted in the Common Core State Standards, they are not the same. Developing and supporting an argument in a science context can be very different from developing and supporting an argument in an ELA context. The underlying skills for argumentation in each content area (e.g., science, literature) surely overlap, but are not identical, revealing two distinct sets of academic language demands—one set that is common across content areas (e.g., general support of an argument), and another that is content-specific (e.g., supporting a scientific argument). This means that students must learn language for a variety of contexts and purposes and that 'academic language' instruction is an essential aspect of all content areas, not just ELA.

New academic standards seem to be moving away from the compartmentalized knowledge required in industry-based societies, instead requiring broader, deeper, and more dynamic types of knowledge. Returning to the assembly line analogy, workers within industry-based societies were responsible for knowing their station on the line and how to assemble their part into the whole. Workers today, by contrast, must be more knowledgeable about the entire metaphorical production line. Education, then, instead of seeking to add more information to students' body of knowledge over time, as an engine, wheels, and a steering column are added to a chassis on a Model T, might better serve students by walking them down the production line, critically examining each station's role in contributing to the production of a Model T and analyzing the production process. Instead of the students completing their education as a finished product, full of information, the graduates are potential future producers who can leverage their understanding of building and constructing and use that to build something else.

The purpose of education, then, is not to create students who are finished products with identical and interchangeable understandings, but to provide students with the knowledge and skills needed to engage in the ongoing process of learning. This new direction changes the role of the teacher from someone who equips students with understandings to someone who models the learning process and the negotiation of knowledge by fostering the critical thinking, creative problem solving, communication, and collaboration that students need for full participation in a global society (National Education Association, 2012).

Disciplines and Compartmentalization

Though today's global society seems to value a decompartmentalized type of knowledge, compartmentalization remains ingrained in the education system. Schools have been compared to egg crates (Steel & Craig, 2006) where content areas (and content area teachers) share physical proximity, but remain distinct, separated, and independent from each other. This compartmentalization functions in contrast to the collaboration and synthesis needed for participation in the production of knowledge in a knowledge-based society. Common Core State Standards that encourage "reading, writing, speaking, listening, and language across the curriculum" (Common Core State Standards Initiative, 2017b, para. 5) push back against this compartmentalization. Consistent with these new standards, schools need to prepare students for a society in which knowledge has become increasingly decompartmentalized—a shift that is difficult within a highly compartmentalized institution like schools. The school curriculum, especially at the middle and secondary levels, is compartmentalized into content area departments (e.g., biology, math, English), each with a specialized teaching force (biology teachers, geometry teachers, English teachers). Those content areas are further divided into classes, which are taught to a specific group of students (e.g., remedial, honors, Advanced

Placement). In brief, content areas, teachers, and students all remain compartmentalized within education. While this compartmentalization might be effective in building student understandings, it might not be conducive to preparing students to produce knowledge in a global, knowledge-based society.

These compartmentalized content areas are slightly different from what I consider to be a *discipline*. In this study, and building on my earlier discussion concerning content and curricular contents, I use the term *content area* to refer to a subset of a *discipline*. Drawing from Schwab (1964), Kuhn (1996), and Shulman (2002), I define discipline as a broad category that includes shared knowledge and understandings, including social and cognitive knowledge-building practices as well as the ways of knowing consistent with those who have socially accepted understandings. Participating in a discipline requires understanding and using the specific ways of and rules for organizing information, gaining knowledge, communicating, theorizing, and doing the work associated with the discipline. These often-implicit rules are not just used by participants to communicate ideas within a disciplinary space, but they allow participants to be recognized as fellow members of the discipline, thereby allowing members of the discipline to functionally determine who is and is not included as a member.

In the discipline of mathematics, for example, knowledge is constructed and membership is determined by the use of mathematical reasoning through proofs, among other disciplinary considerations, in which understandings can be represented and communicated in ways that negotiate and build knowledge. Each discipline has "a specialised language and strong boundaries that insulates it from other disciplines" (Wheelahan, 2012, p. 155), so induction into a discipline is induction not only into a system of knowledge, but also into a system of specific

language use. Knowledge, language, and discipline, then, are co-requisites for each other, and language—not just knowledge—is a key factor in both creating and sustaining disciplines.

A *content area* is grounded in a discipline, is smaller in scope, and is bounded by a school context and curriculum that sequences the tasks and activities intended to convey content area knowledge. Like a discipline, a content area has its own knowledge base and language that makes it distinct from other content areas that students study in schools. *Content area teachers*, then, are those teachers associated with a given content area and teach the academic and curricular contents specific to that area (e.g., mathematics, science, language arts, social studies, etc.) to P-12 students in a school context. The knowledge, language, and practices of sixth grade students conducting a science experiment in their content area science class, for example, are different from those of a working chemist conducting an experiment, but the students' activity can still likely be identified as related to the discipline of science, although in a modified form. Furthermore, while a content area is not a precise microcosm of a discipline, proficiency in a content area in a school context is a somewhat expected precursor for later participation and proficiency in a discipline.

In the United States, content area teachers—sometimes referred to in the literature as mainstream teachers or subject-area teachers—use the English language as the medium of instruction. Consequently, in this study, terms such as *language* and *academic language* are situated in the English language unless otherwise specified. Therefore, as it is used here, integrative teaching specifically focuses on content area divisions within English academic language (e.g., the language of math/biology/history classrooms), not on the divisions between English and other modern languages (e.g., Spanish, French, Mandarin).

Compartmentalization, perhaps as a vestige of an industry-based model of education organization, separated content areas from each other and language from content, but also separated various groups of people. Content areas were separated and departmentalized (e.g., science from mathematics, biology from chemistry, organic chemistry from inorganic chemistry), which further divided knowledge of language from knowledge of content and located language knowledge within a particular role, a particular department, and a particular instructional period. Teachers, especially those at the middle and secondary levels, were organized into specializations and designated as separate from other content area teachers. Students were similarly compartmentalized into groups; English language learners (ELLs) were one such group. ELLs represent a growing portion of the "new mainstream" (Enright, 2011), but the extent to which they have been included as a part of (and not apart from) the preparation of *all* students for society has not always been clear. This mirrors the experience of other suspect classes who have been discriminated against based on particular characteristics (e.g., race, gender, socioeconomic status), and who have had to fight to be recognized as part of the *all*.

English Language Learners

The number of English language learners in the United States has been steadily increasing for the past several decades. The population of ELLs in U.S. elementary and secondary public schools has climbed rapidly, more than doubling between 1994 and 2014 to nearly 10 percent of total enrollments nationwide (Kena et al., 2016; Meyer, Madden, & McGrath, 2004). States such as California and Texas have historically led the nation in ELL enrollment and together accounted for nearly half of the 4.4 million enrolled ELLs in 2013-2014. That academic year, however, the percentage of ELLs increased in 30 states, including those states with historically low ELL populations, such as South Carolina, where the ELL population

has tripled in recent years (Kena et al., 2016; National Center for Education Statistics, 2017a). Historically, the majority of ELLs have attended city schools, but their numbers have also grown in suburban and rural settings in recent years. In 2013-14, ELLs made up 14.1 percent of total urban school enrollments, but also accounted for 8.7 percent and 3.5 percent of enrollments in suburban and rural school settings, respectively, attesting to the rapid expansion of this student population throughout the United States (Kena et al., 2016). The No Child Left Behind Act of 2001 (2002) focused attention on identifying and monitoring the academic performance of ELLs enrolled in public schools. Yet, despite legal decisions and policy initiatives, ELLs continue to underachieve academically compared to their non-ELL counterparts (Abedi & Dietel, 2004; Alim, 2007; Aud et al., 2013; August & Hakuta, 1997; August & Shanahan, 2006; Hemphill, Vanneman, & Rahman, 2010; Kena et al., 2016; Nord et al., 2011; Samson & Lesaux, 2015).

Given the more rigorous language requirements in the new academic standards, ELLs seem likely to remain academically vulnerable. In both the Common Core State Standards and the Next Generation Science Standards, students must perform language-based tasks such as describing, supporting, synthesizing, explaining, comparing, asking, arguing, and communicating in an array of content areas, not just ELA. As previously discussed, all students under the new Standards must meet two distinct sets of academic language demands: a general set of demands that cuts across content areas, and a content-specific set of demands. In addition to these demands, ELLs must meet a third type of language demand: proficiency in the English language itself. New standards specify skill-based language demands, such as describing, supporting, or synthesizing; however, the standards do not specify the specific language students need to effectively enact each of those skills. For example, second grade students are required to explain why a certain mathematics strategy works (CCSS.MATH.CONTENT.2.NBT.B.9), so

teachers might need to understand which specific language students need to use to show that they meet the standard. It is likely students would need some cause and effect language, such as *because* or *so*; the students might also meet this standard by describing steps in their thinking, using time-oriented connectives (e.g., *first*, *then*, or *next*) while using simple past tense verbs. Perhaps the students would need facility with more complex grammar such as past participles used as adjectives, as in *a given number*, or specific mathematical vocabulary such as *greater than* and *subtract* instead of words like *more* or *take away*. The students also might need to effectively introduce their explanation with language such as *carrying the one works because*, which utilizes the gerund *carrying* to nominalize the strategy, and the definite article *the* to signal specificity of the precise one to be carried, as opposed to carrying *a* or *any* one. Given the language complexity involved in performing this second-grade mathematics standard, it would not be entirely surprising that an ELL might struggle to meet the academic language demands of the standard more than a non-ELL peer with similar mathematical understanding.

Schleppegrell and Achugar (2003) have aptly pointed out that "[c]ontent is not separate from the language through which it is presented" (p. 21), as language is intrinsically tied to learning and to demonstrating mastery of academic standards. This inseparability is particularly clear in the Common Core and Next Generation Science Standards, as students are required to use language to demonstrate content area mastery. Unfortunately, despite the role language plays in defining disciplines and content areas and the importance of language in demonstrating content area understandings, the language demands embedded in academic tasks that work toward both understanding and future knowledge production are rarely made explicit in teaching either ELLs or non-ELLs. Instead, teachers tend to convey mostly vague language expectations such as "be clear" or "use your own words" (Schleppegrell, 2004, p. 2). Building on work by

Christie (1985), Schleppegrell (2004) referred to this implicitness and lack of attention to language as schooling's "hidden curriculum." While other scholars have used the term *hidden curriculum* to describe social class differences, covert norms, or power (cf. Anyon, 1980; Apple, 1971; Giroux & Purpel, 1983; Jackson, 1968), Christie and Schleppegrell used it to describe language and claimed that language is hidden within curricula. The language used in the preferred patterns of expression in schools is not explicitly taught (Heath, 1983), leaving some students—particularly ELLs—unfamiliar with, unaware of, and unprepared to produce the expected language used in school, college, or careers. Consequently, students who have never been explicitly taught how to write 'clearly,' for example, may produce written language perceived to be disorganized, incoherent, or incomplete. Those students who do not express their knowledge in expected ways may be subsequently judged as learning disabled or low achieving simply based on the ways they use language, not their understanding of concepts or contents (Schleppegrell, 2004).

Education of ELLs for a Knowledge-Based Society

The skills for demonstrating content area understanding and producing knowledge require more than understanding itself. Whereas producers of Model Ts connect wheels and axles by using bolts and rivets, producers of knowledge connect ideas and concepts using language. The skills to assemble or produce knowledge require an understanding of the ideas and concepts as well as of the skills to use the linguistic bolts and rivets for its connection, construction, and communication. In school contexts, although ELLs might be able to speak with peers, read magazines, or understand a teacher's verbal directions, they may not have the language skills—the linguistic bolts and rivets—needed for content-area tasks such as explaining a scientific process, structuring a narrative essay, or providing an evidence-based mathematical

argument. To address this need, teaching language, specifically the content area language needed for knowledge production seems essential for the education of ELLs.

Teaching language and the education of ELLs in public schools has been a focus of legislation for decades. The *Lau v. Nichols* (1974) court case mandated that school districts provide instructional accommodations for ELLs, but districts across the United States were given considerable flexibility in what these accommodations might be and how they were to be implemented in their schools—often based on the size and linguistic composition of the local ELL population. Scholars (Brisk, 2005, 2006; Cummins, 1979b, 1999; Hakuta, 1987; Krashen, 1996; Thomas & Collier, 2002) have advocated for decades for the development of academic and literacy skills in students' first languages in addition to English, but many districts have lacked the resources, student population, and/or political will to provide bilingual instruction. Instead, most school districts offer some sort of English as a Second Language (ESL) program wherein ELLs are instructed separately by an ESL specialist for a portion of the day, but spend the majority of the school day in mainstream classrooms alongside non-ELLs (de Jong, 2013; Lacina, Levine, & Sowa, 2010; Lucas & Grinberg, 2008).

This separate language instruction illustrates the industry-era compartmentalization that both students and teachers face in schools today; ELLs separated from their non-ELL peers, and teachers are separated by what and who they teach. These delineations may be considered a functional necessity, but they have contributed to the perception that language and academic content can be taught separately. In fact, Hamann (2008) noted that the presence of specialized staff to address the needs of ELLs has promoted the view among many classroom teachers that meeting the needs of ELLs is the sole responsibility of language specialists and teaching language is beyond the scope of their content area or general education classrooms (see also

Harper & de Jong, 2009). Although schools remain compartmentalized, and will likely stay so, educating ELLs in content area contexts, language and curricular contents might be better seen and taught more 'integratively' and less 'compartmentally.'

Language is not only well within the scope of content area instruction, but, as previously indicated, defines the content area itself; to teach content, then, simultaneously requires the teaching the language of that content area. If the compartmentalization of language and content area remains and language is perceived to be 'apart from' and not 'a part of' content area instruction, ELLs may be inadvertently denied their right to fully and equally access the educational opportunities of schools.

Meaningful and Equitable Access

Numerous U.S. laws and court cases have focused on promoting equal educational opportunities, including those addressing issues of language in schools and classrooms. Indeed, the pursuit of equality of opportunity for all students "has been the subject of more influential litigation than any other educational issue. Even after all this time, the meaning of terms like *equity* and *equality of opportunity* have not been fully clarified" (Imber, van Geel, Blokhuis, & Feldman, 2014, p. 202). A detailed legal discussion of what defines or constitutes equal opportunity is largely outside the scope of this dissertation, but the idea of meaningful access is of particular salience to English language learners and to ideas of integrative teaching. This section is not an exhaustive historical analysis of legislation surrounding ELLs; instead, in this section I describe a few cases that have shaped what it means to have meaningful and equitable access to education. I argue that education needs to go beyond granting students meaningful and equitable access not just to schools and schooling, but also move toward granting students

meaningful and equitable access to the purpose of school, which includes accessing college or a 21st century career.

Landmark Cases

The landmark court case *Brown v. Board of Education* (1954) granted ELLs access to schools, classrooms and other physical spaces, but what it meant to have meaningful access to content and learning was debated 20 years later in *Lau v. Nichols* (1974). *Lau* argued that equal access to the same facilities, but without consideration of the language of those facilities, did not grant ELLs (referred to in the legislature as "students with limited English proficiency") equal opportunities to access education. Justice Douglas, issuing the opinion of the Court in the *Lau* decision, argued that "there is no equality of treatment merely by providing students with the same facilities, textbooks, teachers, and curriculum; for students who do not understand English are effectively foreclosed from any meaningful education" (*Lau v. Nichols*, 1974).

This ruling determined that providing access to the same schools and classrooms (i.e., facilities and materials) did not constitute equal access to schooling (i.e., the concepts and contents taught). Furthermore, according to the earlier dissent from the Ninth Circuit Court, "[a]ccess to education offered by the public schools is completely foreclosed to these children who cannot comprehend any of it. They are functionally deaf and mute" (*Lau v. Nichols,* 1974, section 805). This meant that without accommodations, ELLs were unable to comprehend and learn the curricular contents (i.e., functionally deaf), and precluded from being able to communicate the knowledge they possessed (i.e., functionally mute). In other words, the concept of meaningful and equitable access was extended to include the acknowledgement that access to the topics and contents of school curricula was inextricably linked with language.

Building on the *Lau* verdict, the Equal Educational Opportunities Act (1974) and the Lau Remedies (Office of Civil Rights, 1975) suggested ways that school districts could provide access to content area understanding, including offering remedial English instruction and bilingual instruction. This was an important step forward to better ensure that ELLs could more fully and meaningfully access the topics and concepts of the curriculum, but the *Lau* decision and subsequent Remedies were criticized as vague, as they "failed to provide specific curricular content or methodology" (Saracho & Spodek, 2004, p. 12) and did not require that ELLs also be able to fully communicate what they knew. The Lau Remedies essentially addressed metaphorical ELL "deafness" by ensuring that ELLs were able to "hear" and learn from the language of the contents and curricula; however, it tacitly permitted ELLs to remain "functionally… mute." That is, they were not given access to the accepted and expected ways of communicating within school or disciplinary contexts.

Access to College and Career

The Equal Educational Opportunities Act (1974) theoretically raised the standard for equal educational opportunities and many subsequent cases and acts through the years (e.g., the Bilingual Education of 1968, the Elementary and Secondary Education Act of 1965 and its many reauthorizations, including the No Child Left Behind Act of 2001) have also focused on equal education outcomes, but the Every Student Succeeds Act (2015) made this idea especially explicit. The Every Student Succeeds Act requires each state to ensure that "all students, including…English language learners,…graduate high school ready for college or a career" (United States Department of Education, 2016, p. 1). In other words, students should have access to the physical spaces, curricular contents, and learning afforded in P-12 education, but they should also have access to college study or a career as a result of that education. From this

legislation, the purpose of school extends beyond the completion of schooling (i.e., graduation); instead, the purpose of school is to lay the foundation for future endeavors and provide meaningful preparation for college or a career.

During the 2013-2014 school year (the most recent year for which all relevant data are available), 62.6 percent of all ELLs graduated from high school (National Center for Education Statistics, 2015); however, that same year, only 2.3 percent of ELLs took college entrance exams such as the SAT or ACT (Civil Rights Data Collection, 2017). High school graduation rates for ELLs are climbing, approaching 67 percent in 2015-2016 school year (National Center for Education Statistics, 2017b), and while this rise is encouraging, these statistics indicate that although education is making strides in providing ELLs access to schooling, much work remains to be done to ensure that ELLs can also meaningfully access college and career.

Access to Effective Communication

The Common Core State Standards (2010) and Next Generation Science Standards (2013a) call for all students—including ELLs—to both understand and communicate in ways befitting college and careers. Returning to the *Lau* dissent from the Ninth Circuit Court that claimed education left ELLs "functionally deaf and mute," these modern standards theoretically provide a framework within which ELLs can metaphorically both "hear" (i.e., understand) and "speak" (i.e., communicate) in ways consistent with college and careers.

If ELLs are to have equal opportunities to be ready to enter college or a career upon high school graduation, their preparation must include knowledge of content area concepts as well as skills for "effective communication" (United States Department of Education, 2016) of that knowledge. What constitutes "effective communication" obviously differs (and should differ) between students and working professionals. Similarly, the language used within a content area

classroom differs (and should differ) from the language found in that area's corresponding professional setting or discipline. Though language expectations differ between professional science laboratories and middle/high school science classrooms, for example, the established path to a successful career in science tends to follow success in those middle or high school science classrooms (Gee, 2013a). Meeting expectations of content-area classrooms at each educational level on that path toward college and career readiness then is treated as a proxy for meeting the expectations of professional science laboratories, though the validity of that proxy has been challenged (Chamizo, 2012; Duff, 2008; Hodson, 1985; Van Berkel, De Vos, Verdonk, & Pilot, 2000). To that end, meeting the legal requirements of providing "equal educational opportunities" (Equal Educational Opportunities Act of 1974, 1974) for every student to "graduate high school ready for college or a career" (Every Student Succeeds Act, 2015) means providing educational opportunities that allow ELLs to access that path toward college and career readiness.

New Solutions

Opportunities for ELLs to more meaningfully and equitably access education should include instruction in the effective communication that will eventually allow them to demonstrate their preparedness to enter college or a career. In other words, instruction should work toward ensuring that all students are taught and have access to the "literate discourses" (Delpit, 1992, 2006) used within schools and knowledge-building spaces.

To illustrate, a student in a chemistry class might be able to complete a titration lab by following the correct procedure to determine the concentration of an unknown solution. Within the context of chemistry, a solution is a stable mixture of two or more substances in which one (or more) substance is dissolved into another such that they are indistinguishable from one

another, such as mixing sugar and water to form sugar water. Titration is a way to learn about the dissolved substances of a given solution, which makes information about multiple (though potentially hidden) components of a given solution visible. In a lab experiment, the student might understand the chemical process of neutralization and the relationship between volume and concentration of the solutions, but when writing the lab report, the student might write a list of procedures followed by a narrative account of the results rather than a more standard account of what was done and what was found.

The teacher, upon reading this lab report, would likely notice that the format of the student's report differs from the accepted norm, even if it correctly documented procedures and communicated accurate representations of the principles inherent in the titration lab. The teacher might notice the student's demonstrated mastery of titration and feel secure that the student had been able to access the objectives of the titration lab; if so, then the teacher could assume that the student had been provided equal educational opportunities to access learning. Influenced by school compartmentalization, the teacher might assume the student's inappropriate communication of the titration process to be related to writing and thus outside the scope of the chemistry course. The teacher might therefore continue teaching as planned by focusing on scientific concepts while leaving the job of writing instruction to English teachers or other language or writing specialists. Any feedback to the student regarding the writing style could be vague comments to "write more scientifically" or individual edits such as "Don't use 'I' in lab reports," which do not provide the student with a holistic understanding of accepted and expected ways of communicating within the sciences.

At the conclusion of the chemistry course, the student might have much knowledge of chemical processes, which was interpreted by the teacher to be the goal of the course, but still

produce lab reports that do not conform to the accepted and expected scientific writing style. This student might have appropriate grade-level knowledge of chemistry, but not be able to demonstrate that knowledge in accepted and expected ways, as the student's nontraditional lab report is not likely to be accepted for entry into the discourse of chemistry, despite ample evidence of knowledge. Within the context of equal educational outcomes, the student's knowledge of the scientific concepts related to titration is important because it satisfies the first type of equal educational opportunities, that is, access to the understanding and curricular contents and objectives of the class. However, without complementary instruction in content area language that would allow the student to produce lab reports that adhere to the expected linguistic norms, this student cannot fully demonstrate the desired educational outcomes—and therefore may not have comparable opportunities to pursue further college-level education or a career in a chemistry discipline as a student who could meet the linguistic expectations of chemistry discourse. In this example, the goal of schooling was functionally reduced to course completion rather than preparation for college or a career. Therefore, even though the teaching met the first type of equal opportunity, alone it was insufficient to meaningfully provide the second type of access, which relates to the purpose—not just the practice—of school and schooling.

As indicated earlier, communicating and presenting knowledge in specific ways is fundamentally valued in academic disciplines. Each discipline has established ways of representing and communicating knowledge that function as gatekeepers, thereby controlling and defining the discipline. In the titration example described earlier, the student would not likely be able to pass into and access the discipline of chemistry by presenting lab results in a narrative style, despite acceptable knowledge of chemistry. While many native-English-speaking students

implicitly learn this expected disciplinary language of the hidden curriculum, ELLs do not tend to do so and therefore do not have equal opportunities to access disciplines even with equal knowledge. To better allow for equal opportunities to access the ideal outcomes and purposes of education (e.g., preparation to enter a discipline), students would likely benefit from teaching that provides access not only to content area knowledge, but also to the skills needed to present that knowledge both to their teachers and to others in the discipline.

The titration process can separate a given solution by causing a previously homogenous solution to precipitate, or "fall out" of a stable solution, thus revealing the components that were previously unseen. In a similar way, creation and implementation of new academic standards have metaphorically precipitated education and revealed components of inequality that were previously unrecognizable. In the past, meeting requirements to provide equal educational opportunities previously necessitated only racial non-discrimination and equity of instruction and access to curricular contents. Presently, the new academic standards, which reflect the communicative nature of a knowledge-based society, reveal current inequality in education. That is, some students are not guaranteed equal educational opportunities to benefit from schooling because the teaching they experienced has left them unprepared to demonstrate their knowledge in accepted and expected ways to the gatekeepers of college and careers. In titration, once a solution has precipitated, it requires an additional component (e.g., heat, time, pressure, additional solvent) to regain stability, becoming a new solution. Integrative teaching could be a new 'solution' through which these currently precipitated and unaddressed forms of equality are 'resolved' in content area teaching.

Disciplinary Shibboleths

Metaphorical ELL 'speaking,' as previously referenced in relation to *Lau v. Nichols* (1974), needs to include more than conveying content area knowledge as understandable by a teacher, as seen in the titration lab example. If the purpose of education in a knowledge-based society includes preparing students for college or career readiness, but does not prepare students for the language of college or careers, then it has not achieved this purpose. To be true to this goal, education needs to prepare students for entry into disciplines within which language is not just the primary tool for the construction, representation, and distribution of understandings, but the means of admittance to the discipline and to the knowledge creation and contestation practices therein.

Disciplinary language functions as a shibboleth for those seeking to enter a discipline. A shibboleth is a linguistic password to identify true members of a group from non-members. In ancient Hebrew *shibboleth* (*shibbólet*) likely referred to an ear of corn, but the modern term stems from a scriptural account chronicled in the Book of Judges. After the Gileadites defeated the Ephraimites in battle, they stationed guards at the Jordan River, where fleeing Ephraimites would need to cross in order to return to their homeland. Gileadite guards asked each person attempting to cross the Jordan to say "shibboleth," knowing that the /sh/ sound did not exist in the Ephraimite language. Consequently, the Hebrew word proved to be difficult for absconding Ephraimites to pronounce in an unmarked way, even if they knew the password. True Gileadites would be able to say *shibboleth* (with a /sh/) and be allowed to cross the river, while Ephraimites, pronouncing *sibboleth* (with a /s/), would be revealed as outsiders and killed (see Judges 12:4-6). This method of identification of outsiders has been used for thousands of years as a way to parse group members from outsiders in possession of insider understandings. By

using a shibboleth test, false insiders are revealed through their inability to convey those understandings in ways that are accepted by insiders. In modern times, American soldiers used the word *lollapalooza* as a shibboleth during World War II to identify Japanese soldiers and spies from Chinese allies and Asian-American soldiers by exploiting the allophonic variation of /l/ and /r/ sounds in Japanese (Watt, 2015).

The crucial point is that shibboleths depend on performing or representing ideas in a specific way, not just knowing the meaning of those ideas. For both the Ephraimites and Japanese, knowing the password itself or the meaning of the word *shibboleth* or *lollapalooza* was assumed or even irrelevant—what mattered was the presentation. In essence, for the purposes of passing a shibboleth test to achieve entry (i.e., to Gilead, to an American military base), the language used (i.e., /sh/ in *shibboleth*, /l/ in *lollapalooza*) was more important than possession of the content (i.e., having the passwords, or that a *shibboleth* is an ear of corn, that a lollapalooza is an unusual occurrence).

Language Games

Expected patterns of communication function as shibboleths for entering disciplinary fields, in which the person seeking entry must pass the "sniff test" by performing or representing ideas in specific ways, not just knowing the meaning of those ideas. The demonstrated ability to play by the 'rules of the game' serves as a proxy for the genuineness of experience and the expert judgment of knowledge because of the fallacious presumption that "only experienced people can apply [the rules] right" (Wittgenstein, 1953, p. 227). These patterns allow a message to be determined as 'scientific' or 'non-scientific' before association within a specific science subfield or the evaluation of the truthfulness of a statement.

In practice, the skill of playing the language game initially supersedes possessing relevant or factual information, as demonstrated by Devlin (1998) and Konicek-Moran and Keeley (2015). Devlin (1998), a mathematician, posed the following three sentences for judgment as to their legitimacy:

A. Biologists find *Spinelli morphenium* an interesting species to study.

B. Many mathematicians are fascinated by quadratic reciprocity.

C. Bananas pink because mathematics specify. (p. 86).

Sentences A and B tend to be judged as legitimate, but not C (Devlin, 1998). These two sentences were chosen despite the fact that they involve words that readers are unlikely to have previously encountered—*quadric reciprocity*, a concept and phrase rarely used outside professional mathematics, and *Spinelli morphenium*, words the author invented for the purpose of this exercise. The judgment of A and B as legitimate sentences, then, has little to do with conceptual understanding, knowledge of specific words themselves, or even whether or not the words involved are established words. What matters "is the overall structure of the sentence (or nonsentence, as the case may be). That is to say, the crucial feature is the way the words (or nonwords) are put together" (Devlin, 1998, p. 87). *Spinelli morphenium*, for instance, appropriately follows the accepted linguistic structure for representing the classification of genus and species (p. 86). The use of appropriate linguistic structures not only allows for something to be seen as 'scientific,' but also can construct 'scientific meaning,' even when there is no meaning to be made.

The first example above relies upon the accepted conventions for species classification as well as directly states that "Spinelli morphenium" is a species. The following sentence, "Marfolamine is a gadabolic cupertance essential for our jamination" (Konicek-Moran & Keeley,

2015, p. 3) provides less overt linguistic assistance in that it does not label what the words are supposed to represent, yet it sufficiently adheres to recognizable patterns used to communicate scientific concepts, such as its use of suffixes, which create meaning and allow for some interpretation despite being fictitious. The use of these structures allows for conjecture about the composition of marfolamine, seemingly an amine following the naming conventions of compounds as chloramine by adding the –amine suffix, its classification as a gadabolic cupertance, and necessary for a particular function (jamination). In addition to conveying information of an invented substance, this sentence could also serve as a platform for further scientific inquiries (e.g., Could other gadabolic cupertances be substituted for marfolamine in the process of jamination? Is marfolamine related to other gadabolites? Are non-gadabolic cupertances also necessary for jamination?). These two sentences illustrate that linguistic structures serve as a vehicle to accompany and present scientific meaning; additionally, they actively allow the reader to examine the text to create and convey scientific meaning, even in the absence of any grounding in reality or truth. For example, the *–amine* in the sentence about marfolamine constructed meaning and lent insight into a fictional compound in a distinctly different way than the same *–amine* in the word *examine* used in the sentence immediately preceding this one. As such, the language patterns in the marfolamine example cannot be considered as a reflection of either scientific understanding or of linguistic structures alone, but rather a feature of science language and of science itself.

In contrast, messages that do not adhere to accepted communicative conventions have traditionally been presumed to fall short of expectations of scientific credibility based solely on format, as Bohannon (2011) showed. Bohannon, an Oxford-educated molecular biologist, offered the "modest proposal" that scientific understanding could be more effectively conveyed

using interpretive dance than the traditional methods. Though partially presented as satire, the underlying idea drives The Dance Your PhD competition, wherein recent doctoral graduates in science-related fields convey their dissertation or thesis research using interpretive dance as the primary mode of communication. The notion that interpretive dance can meaningfully capture scientific complexity both questions and challenges traditional forms of communicating science.

Interpretative dance serves as a foil to the Spinelli morphenium and marfolamine examples in that it can easily be perceived to be 'unscientific,' 'disorganized,' or 'imprecise' based on the mode of communication used despite sound, rigorous, and potentially influential research. Whereas the face validity of the previous Spinelli morphenium example is high because it adheres to expected scientific formats (despite its verisimilitude, invented lexis, and lack of attempt to accurately represent any scientific truth), the face validity of interpretive dance is low. However, the Dance Your PhD competition attests to interpretive dance's ability to deepen scientific understanding and disseminate this understanding to a wide audience.

Knowing and using the patterns of communication deemed acceptable within a disciplinary community is essential to success (e.g., Cameron et al., 2013). In-group language patterns are inappropriate proxies for content mastery, yet nonetheless function as gatekeeping devices used to identify members, preserve the integrity of the community, and reinforce the shared meaning developed and used within the group. Initiatives like the Dance Your PhD competition push the limits and rigidity of accepted forms of communication, but do not supersede the expectations for perquisite mastery of those forms. Even the scientists who submit their research to the Dance Your PhD competition first write dissertations or theses using established forms of scientific communication, thereby demonstrating their fluency in the accepted and expected language of science.

These examples suggest that when making an initial determination as to the validity of a claim in a disciplinary context, the 'scientific,' 'mathematical,' or 'historical' format of the information, for example, precedes the evaluation of the extent to which it is 'factual' or 'truthful.' Unfortunately, many of the gates and disciplinary shibboleths that guard college or careers demand that one demonstrate ability to use these disciplinary languages. This is not at all to say that language replaces conceptual understanding or factual knowledge in value or importance; rather, judgment about linguistic presentation has historically preceded judgment of understanding. A holistic approach to content area teaching would take up parts of both these examples by equipping students to shift at will between the established and expected ways and what may be considered alternative ways of learning, knowing, and conveying curricular contents and content area understanding.

Since disciplines and content areas are defined by the specific ways in which words and sentences are put together to produce, reflect, and communicate knowledge, use of content area language acts as the shibboleth necessary for identification as a member of a given disciplinary community. Content area understandings (i.e., knowing what the password is) are enough to get students to the gates of a discipline and are absolutely essential to maintaining membership within the discipline once admitted, but correct presentation of those understandings (i.e., correct format) are necessary for entry.

Disciplinary Language and Social Justice

Preparing all students for disciplinary shibboleths is at the heart of better ensuring that all students, including ELLs, have meaningful access to college and careers. The purpose of education communicated in modern academic standards is to allow students equal opportunity to enter a discipline (either for additional post-secondary study or for a career), not just to succeed

in and complete public schooling. Giving students this opportunity, I argue, involves teaching the disciplinary and content area language that presently serve as shibboleths to college and careers.

On the surface, this may seem that I promote or condone the hegemony of academic discourse and look to linguistically colonize students. I do not. Although I do support teaching that includes instruction in the accepted and expected language used in disciplinary contexts, this must not be at the expense of other languages and dialects spoken by students. Just as English proficiency should never replace Spanish proficiency, academic varieties of language should never replace informal, colloquial, or other varieties of language. All languages are equally valuable, but not all languages are equally valued in a given context; my goal is to ensure that students are explicitly taught what makes a language valued in a given context and how to use that language in contextually appropriate ways.

The work of some scholars (Alim, 2005, 2007; Irby & Hall, 2011; B. L. Love, 2015) pushes against 'traditional' notions of school and disciplinary language, often combining home languages with different disciplinary languages to communicate within the discipline of education. Scholars such as these, as well as Bohannon (2011), are able to deliberately flow back and forth between different varieties of language including the accepted and expected languages of dance, hip hop, science, and education. These scholars have been able to infiltrate their given disciplines and, as established and recognized members of their disciplines, have worked to change them. This work promotes social justice because it contests established communicative norms, thereby making space within disciplines for different types of voices who can both speak with and speak to other members. However, such work is predicated on the idea that learning to communicate within disciplinary norms is prerequisite.

Teaching for a Knowledge-Based Society

The work of teaching is an essential part of the solution to ensuring that all students, including ELLs, have access to the understandings as well as the communicative norms that serve as the foundation for study and career success in a knowledge-based society. edTPA, a recently adopted performance assessment for preservice teachers, defines academic language as the "language of the discipline" (Stanford Center for Assessment, Learning, & Equity, 2016, p. 1). In addition to identifying teachers' attention to and use of disciplinary language as a crucial element of teaching, edTPA also recognizes that teacher modeling of academic language is insufficient, and that student awareness and use of this disciplinary language must be developed through teaching (Stanford Center for Assessment, Learning, & Equity, 2016).

The aforementioned legislation suggests that teaching plays a role in helping all students, including ELLs, reach new standards, be prepared to enter a knowledge-based society, and have equal opportunity to access the colleges and careers for which schooling serves as prerequisite. In keeping with this thinking, scholars have worked in recent years to articulate the knowledge, skills, and dispositions teachers need to successfully teach ELLs in general education and content area classes (Bunch, 2013; de Jong & Harper, 2005; Fillmore & Snow, 2003; Lucas et al., 2008; Turkan, de Oliveira, Lee, & Phelps, 2014).

This literature suggests that ELLs would likely benefit from content area teachers who are knowledgeable about the language demands inherent in the content areas they teach and adept at teaching the ways in which language is used within content areas. A teacher could, for example, help ELLs explain how they arrived at an answer to a mathematics problem by providing the commonly used content area structure *I know that…(fact about mathematics)… so I… (action performed)*. The teacher might grasp the value in mathematics of communicating

understanding of numbers or the results of a given computational process and then using that understanding as evidence justifying a corresponding action. The teacher also could create a linguistic scaffold to help the student successfully complete the computational task and effectively communicate their understandings. In this task, the mathematical computation of a 'correct' answer is not the focus of the learning; rather, it serves as an opportunity for students to communicate how they arrived at the answer using the accepted and expected content area language. In this way, teaching content means providing students with opportunities to practice the negotiation of knowledge that occurs when they describe and communicate their process and thinking, not just preparing the students to compute correctly and to offer their answers for judgment by the teacher as correct or incorrect.

Despite the need for all teachers to understand the language of their respective content areas in order to teach the communication needed for all students to be prepared for college or a career, many teachers leave their teacher education programs unprepared or unconfident in their ability to do so. In many ways, teacher education has preserved the hidden curriculum by not adequately preparing content area teachers to teach language and English language learners (Lucas, 2011; Lucas & Grinberg, 2008; Lucas et al., 2008). Many U.S. teachers were educated in U.S. schools that provided them with little English grammar study (Myhill, Jones, & Watson, 2013) and limited opportunities for foreign language learning (Pufahl & Rhodes, 2011)—experiences that can sensitize teachers to issues of language (Andrews, 2007), which could help them notice and convey aspects of content area and disciplinary language. These factors have contributed to generations of teachers who have relatively little experience with the explicit study of English or any other language, leaving most to rely only on their own implicit and intuitive sense of language in their teaching (N. Love & Ansaldo, 2010). Since the P-12

schooling and preservice preparation most content area teachers have and continue to receive leaves many of them unprepared to attend to language, let alone help ELLs reach new language-heavy content standards, the task of preparing teachers to teach content to the growing ELL student population is generally deferred to inservice professional learning. Although professional learning opportunities focused on ELLs are available once teachers enter the teaching force, these are often limited to a select few days and typically compete for time with more immediate priorities such as compliance with other reform initiatives and state mandates (Boston Consulting Group, 2014; Cisterna, Kintz, Gotwals, Lane, & Roeber, 2016; Kimball, Rainey, & Mueller, 2016).

Contextual restrictions notwithstanding, education for a knowledge-based society calls for content area teachers to attend to and teach language meaningfully and purposefully because the demands inherent in the new academic standards require students to become more meaningful and purposeful users of content area language. These standards reflect a changing society that places high value on communicating, creating, and questioning knowledge, not just possessing the understandings that inform that process. This societal shift has made previously effective methods of teaching incomplete as ways to prepare students for today's (and tomorrow's) society. Content area language is no longer positioned as the way students can demonstrate their acquisition of long fixed and forgone understandings derived in the past, but the way in which they can participate in knowledge communication, construction, and contestation in the present and future. Therefore, teaching that fulfills these standards now means requiring students to demonstrate academic skills by using language in different and more sophisticated ways than ever before. As this might suggest, teaching these skills to students in linguistically diverse content area classrooms has become vastly more complex.

Purpose of the Study and Research Questions

The overarching purpose of this research was to gain insight into the complexity of concurrently teaching language and academic contents within content area classes as a way to prepare students to meet new academic standards. ELLs are particularly salient in this work because they comprise a population for whom the teaching of language is an explicit and primary focus; however, for this group, teaching of and in the English language often eclipses overt teaching of content area language.

Although modern academic standards such as Common Core State Standards and Next Generation Science Standards hint at the necessity of concurrently teaching language and academic contents, they provide little guidance as to how this can (or should) look in practice, particularly in today's linguistically diverse classrooms. Similarly, they offer little direction to teacher educators and professional learning facilitators regarding communicating to preservice and inservice content area teachers the reasons and methods for teaching in ways that meaningfully account for students' home languages, communicative English language, general academic language, and specific content area language.

Specifically, my study's initial objective was to examine what integrative teaching (i.e., teaching that wholly addresses content) looked like in the practice of content area teachers considered to be successful teachers of ELLs, and to uncover what types of knowledge those teachers draw from as they enact integrative teaching. I approached and designed this study with the presumption that integrative teaching can work toward providing all students equal educational opportunities both to learn within school and to benefit from schooling, as well as the presumption that integrative teaching could occur in content area teaching in various forms, though perhaps not in explicit or recognized ways.

I took an ecological approach to this work and therefore studied teaching rather than teachers. In doing so, I followed in the tradition of Bowers and Flinders (1990), who studied responsive teaching by focusing on the "cultural patterns communicated through thought and behavior" (p. xi). This focus on patterns rather than individuals pushes against positivist assumptions that behavior of individuals "can be objectively observed and judged" (p. xi). I certainly acknowledge that teaching cannot occur without teachers and that individual teachers carry out cultural patterns of behavior as they teach, but my desire to take an ecological approach to this work led me to focus on broader patterns in order to better capture the subjectivity and multiplicity of the work of teaching as it occurs in content area contexts.

Following this logic, I also adopt Bowers and Flinders' (1990) definition of *responsiveness*. Being responsive, they argue, "means to be aware of and capable of responding in educationally constructive ways to the ways in which cultural patterns influence the behavioral and mental ecology of the classroom" (p. xi). Recognizing responsiveness to cultural patterns also pushes against traditional ideas of responsive teaching that tend to locate 'culture' within individuals, namely students. Consequently, I attempted to foreground the patterns of practice in the teaching I observed rather than the individuals-as-teachers themselves, and considered responsiveness to broader cultural patterns present in the work of teaching, not only responsiveness to students.

As the population of ELLs in content area classes continues to grow and the need for all students to develop facility with content area language continues to escalate, so too will the need for teaching to concurrently address language and curricular contents in an integrative way. I proposed integrative teaching as one of many ways to recognize and re-cognize good teaching, and as a stance that can bridge the extant, but largely disparate knowledge bases that draw from

and inform content area teaching and second language learning. In light of this, I utilized the concept of *bricolage* (Lévi-Strauss, 1966) in this exploratory study to signal that it is both contributing to and repurposing the extant literature to inquire into the following questions:

- In what ways is integrative teaching enacted in the work of four content area teachers who have been identified by their peers as "successful" teachers of ELLs?
- What types of knowledge do these teachers seem to draw on as they enact integrative teaching?

While these initial research questions guided the review of literature and methodological approach of this study, presented in the Chapters 2 and 3, my understanding of integrative teaching shifted over the course of the study. I now see integrative teaching as the ever-shifting high water mark of 'good teaching'; the elusive, uncatchable pedagogical standard consistently pursued by educators, but never reached. PARALEXICAL teaching, as I later discuss in Chapters 4 and 5, seems to be one of many ways of teaching that falls under a larger umbrella of integrative teaching. Although the focus of my study shifted away from integrative teaching and toward PARALEXICAL teaching, the initial premise that I was studying good content area teaching enacted by successful teachers of ELLs and the knowledge that supported it held throughout the duration of the study.

CHAPTER 2: REVIEW OF LITERATURE

In this chapter I present scholarly literature that framed and informed the study. I introduce what I originally named *integrative teaching*—an idea that continued to develop as the study progressed and findings emerged. In the same way that I recognized and re-cognized—or saw and re-thought—what I understood to be *cozy* in light of *koselig*, I also recognized and re-cognized integrative teaching in light of my findings and PARALEXICAL teaching. I now see integrative teaching as a broad, abstract concept describing the ever-shifting high water mark of 'good' teaching; the elusive, uncatchable pedagogical standard consistently pursued by educators, but never reached. PARALEXICAL teaching, as I discuss in Chapters 4 and 5, seems to be one possible enactment of integrative teaching. I constructed integrative teaching as an attempt to capture and organize the complexity surrounding teaching ELLs in content area contexts as represented in extant literature. Although I further developed the idea of integrative teaching, the conceptualization is useful in that it carefully details the literature base and accurately represents where I entered the study.

Bricolage

To conceptualize integrative teaching, I utilized *bricolage* (Lévi-Strauss, 1966), which is the combining and recombining of available and previously existing materials to construct something new. Based on the French verb *bricoler*, or "to tinker," bricolage in modern French refers to the construction of tangible objects, often in reference to art. However, bricolage can, and has been, extended to intellectual and theoretical pursuits such as nursing (e.g., Warne & McAndrew, 2009), business (e.g., Baker & Nelson, 2005; Sanchez-Burks, Karlesky, & Lee, 2015), and education (e.g., Hatton, 1988; Kincheloe, 2012). Bricolage is commonly referred to as an approach or process, but bricolage can also refer to the result, product, or solution of this

approach (Knepper, 2006); that is, the outcome of a bricolage approach can be described as a bricolage itself (Denzin & Lincoln, 2005; Weinstein & Weinstein, 1991). A bricoleur, or one who engages in bricolage, does not approach a task and then determine which tools to use, but surveys the available tools and then decides how to best complete the task, often adding different tools, techniques, or methods as the task progresses. In this way, bricolage can be thought of as devising unique solutions to problems using already available resources, rather than creating new resources to propose new solutions.

Bricolage is apropos for constructing a conceptualization integrative teaching because, like bricolage, integrative teaching—as conceptualized in this study—requires no new components, but instead it repurposes, reviews, and reimagines what is already available to meet new challenges. Integrative teaching, in short, is about recognizing and revealing the language already inherent within content area instruction, not adding the task of teaching language to the task of teaching content. Like a bricoleur gathering tools for a project, in this chapter I assembled literature relevant to integrative teaching using bricolage. To do this, I selected pieces of literature from multiple areas of study including second language acquisition, second language teaching, content area teaching, and teacher education for the purpose of addressing growing language expectations in new academic standards. These pieces collectively offer a foundation for understanding integrative teaching and give special emphasis to the importance of attending to language, the complexity of academic language, and the knowledge base needed for teaching ELLs in content area contexts.

In what follows, I also discuss several pedagogical models and approaches to teaching ELLs and conclude this chapter by presenting the conceptual framework developed for this study to explore how language and content are or could be taught integratively, and what knowledge

base this type of teaching might draw from. I consequently created an integrative teaching framework to launch my study of content area teaching. In this framework, which I call *content knowledge for integrative teaching*, I combine elements from an existing conceptualization of content knowledge for teaching proposed by Ball, Thames, and Phelps (2008) and perspectives gleaned from the literature concerning the 'ideal' knowledge base for teaching ELLs. Building from the domains of knowledge represented in the content knowledge for teaching framework (Ball et al., 2008), I propose domains of knowledge necessary for integrative teaching by emphasizing the role of content area language in meeting new academic standards for all students, especially ELLs.

Language and Academic Learning

A great deal of research has addressed teaching and learning of second language learners, both in academic and non-academic settings. In this section I discuss two specific themes from this scholarly literature with particular relevance to how the study progressed: one focused on the importance of attending to language in second language teaching and the other on the complexity of academic language. The literature reviewed here affords insight into what is entailed in concurrently teaching language and academic content to ELLs and informs my framework of content knowledge for integrative teaching, which I detail in the final section of this chapter.

Attending to Language in Second Language Teaching and Learning

The vast majority of children worldwide manage to acquire their first languages fairly easily and without much direct instruction (O'Grady, 2005; Saxton, 2017). Babies and young children acquire their first languages by hearing speech around them, interacting with their caregivers, and then eventually producing speech of their own. Babies are immersed in language from before the time they are born and spend years listening, imitating sounds, naming objects

around them, and discovering syntactic patterns as if guided by some innate system (Berwick & Chomsky, 2017; Gould & Marler, 2004). This process is still quite mysterious to researchers, but it appears that the communicative skills needed to develop mastery in one's first language are gained through immersion, exposure to, and engagement with a given language rather than exclusively explicit instruction (N. C. Ellis, 2016; O'Grady, 2005).

First languages are learned with nearly universal success, but second languages are not, as many children and adults struggle to learn additional languages (Bley-Vroman, 1990; Saville-Troike & Barto, 2016; Swain & Lapkin, 1989). In the 1970s and 1980s, second language acquisition scholars began to argue for the theoretical position that second languages should be learned in a similar way to first languages—that is, "naturally" and through "unconscious absorption" (Terrell, 1977, pp. 327, 328). However, this position assumes that the processes that allow for the development of a second language are identical, or at least similar to, the processes of learning a first language, and that a second language could be acquired with little more than comprehensible input and adequate motivation (Asher, 1969; Krashen, 1985). Furthermore, proponents of this position argued that formal instruction of grammar had no place in language learning classrooms (Krashen, 1993) and could actually restrict language growth (Krashen & Terrell, 1983; Newmark & Reibel, 1968). First and second languages are each learned in generally predictable patterns and in a somewhat consistent order (Bailey, Madden, & Krashen, 1974; Dulay & Burt, 1973, 1974; Jia & Fuse, 2007), but scholars have argued that evidence supporting a "natural sequence" (Dulay & Burt, 1974) of second language learning does not necessarily indicate learning processes similar to those of first languages. Instead, the processes by which a second language is learned might more closely resemble problem solving skills rather than first language development (Bley-Vroman, 1990; Clahsen & Muysken, 1986; N. C. Ellis,

2006; Felix, 1985). The extreme version of Krashen and Terrell's (1983) Natural Approach, which assumes that second languages should be learned similarly to first languages, has been critiqued (see Long, 1985; McLaughlin, 1987; Spolsky, 1985), but the idea that second language learners should learn to communicate competently (Canale & Swain, 1980) through meaningful interaction has endured.

Communication and interaction alone, however, are insufficient for reaching high levels of proficiency. Extensive research on student learning in Canadian immersion programs in the 1980s, for example, showed that long-term exposure to French alone was not enough to produce accuracy in certain aspects of syntactic form (Harley & Swain, 1984; Lapkin, Hart, & Swain, 1991; Swain, 1985). Indeed, other scholars later argued that second language learners who receive explicit instruction on grammatical form achieve higher levels of proficiency than learners who do not (DeKeyser, 2007; R. Ellis, 2008), especially with the provision of explicit corrective feedback (Lightbown & Spada, 1990; Nassaji & Swain, 2000; Russell & Spada, 2006).

Though there is still much to learn about the exact nature of language learning, it seems that the processes by which first and second languages are learned differ considerably. Most salient to integrative teaching is the idea that ELLs will not acquire the language they need to demonstrate knowledge in the new standards simply by sitting in English-speaking classrooms. Instead, ELLs need explicit and deliberate instruction in language, including instruction in both grammatical form (e.g., syntax) and meaning (e.g., semantics).

Attending to both language form and language meaning are needed to teach second language learners to communicate competently with others (Celce-Murcia, Dörnyei, & Thurrell, 1995; Nassaji & Fotos, 2011; Scarcella & Oxford, 1992). Drawing learners' attention to issues

of language form (e.g., word formation, syntax), therefore, is necessary in teaching; otherwise, as Nassaji and Fotos (2004) note, learners "process input for meaning only and do not attend to specific forms, and consequently fail to process and acquire them" (p. 128). In content area instruction, then, this means noticing both the contents (i.e., the meaning conveyed) as well as the container (i.e., the language itself).

Noticing, particularly noticing the gap between the input received in a language and one's own output, is thought to promote second language learning (Egi, 2010; P. Robinson, Mackey, Gass, & Schmidt, 2014; Swain, 1985, 1993; Swain & Lapkin, 1995). Producing language, Swain (1993) argued, provides the opportunity for learners to recognize the shortcomings in their own knowledge based on the difficulties they encounter while speaking or writing. This recognition, Swain continued, could then lead learners to ignore the gap in knowledge, generate new knowledge based on their existing knowledge, or identify and attend to relevant input. The learner's output, then, initiates noticing (of shortcomings, errors, forms, communicative difficulties, etc.), which leads to cognitive processes that can produce modified and more accurate output (Swain & Lapkin, 1995). Drawing on Swain (1993, 1995, 1998) and Swain and Lapkin (1995), but taking a slightly stronger position, Schmidt (2001) asserted that awareness of language is "necessary for understanding nearly every aspect of second and foreign language learning" (p. 6). Teachers of second language learners, then, it seems, should provide opportunities for learners to notice and attend to language. This includes general language as well as academic language, which I discuss next.

The Complexity of Academic Language

As discussed above, evidence shows that second language learners need to notice and pay attention to language rather than merely be exposed to it. Language, however, varies widely

depending on context. Academic language is fundamentally different from conversational language (Cummins, 1979a, 1981b; Lucas et al., 2008; Scarcella, 2003; Schleppegrell, 2004), since the language students need to play with friends on the playground is quite different from the language they need to understand a social studies textbook. To succeed in U.S. schools, students must be able to read academic texts, produce written academic documents (e.g., reports, essays), and understand their teachers' instructions—all in English. Making matters more complex, the language demands of school have intensified with the adoption of new academic standards such as the Common Core State Standards and the Next Generation Science Standards. As discussed in Chapter 1, students are now explicitly required to construct explanations, support claims with logical reasoning, synthesize relevant evidence, and develop arguments from evidence, among other overtly linguistic academic tasks. For ELLs, this means that they must simultaneously learn English for general communicative purposes and 'academic language' through which they display their knowledge and meet academic standards. The literature on academic language provides a window into the complex and inextricable link between general language learning, academic language, and academic content learning.

Ideas of what constitutes academic language are often contrasted with ideas of what constitutes oral language proficiency and general, everyday language. The distinction between academic language and general language received early attention from Skutnabb-Kangas and Toukomaa (1976) in their study of Finnish children in Sweden. Though the students in this study seemed to be fully bilingual in both Finnish, their first language, and Swedish, their second language, they were still underperforming academically compared to their Swedish peers—a trend that Cummins (1981a) also later found among immigrant students in Canada. Reflecting on Skutnabb-Kangas and Toukomaa's findings, Cummins (1979a) commented that although

Swedish fluency allowed the Finnish students to easily communicate with teachers and peers in everyday interactions, when students were required to perform cognitively demanding tasks in Swedish, "this surface fluency was [found to be], to a certain extent, a linguistic façade" (p. 199). The appearance of native-like language skills in some contexts but not others led Cummins to further explore the puzzling relationship between cognition and language.

Building on Skutnabb-Kangas and Toukomaa's (1976) study and Oller's (1979) work in cognition, Cummins (1979a, 1981b) distinguished between what he called *cognitive academic language proficiency* (CALP), defined as "the dimension of language proficiency which is strongly related to overall cognitive and academic skills" (Cummins, 1979a, p. 198), and *basic interpersonal communication skills* (BICS), which he viewed as general language skills for everyday social interactions. While BICS can often be mastered in a few years, Cummins (1979b) argued that CALP requires second language learners up to seven years to develop, showing both the multifaceted and often ongoing nature of language proficiency development.

Cummins (1981b) described BICS as the skills used for cognitively undemanding tasks—routine language use performed with a high degree of automaticity. When making small talk about the weather, for example, most of us are not addled by the general concept of weather and we do not specifically focus on our pronunciation of *cloudy* or the nuances between *chilly*, *nippy*, *freezing*, or *frigid*. Our execution of the small talk is largely smooth, automatic, and not particularly mentally taxing due to its familiarity and ubiquity. In contrast, he considered CALP to be proficiency needed for cognitively demanding tasks that require more thought processing and attention to language itself. For example, reading and understanding a mathematics word problem in which the outside temperature decreases exponentially over a three-day period requires different skills than making small talk on the same topic.

Cummins (1981b) also distinguished between BICS and CALP in terms of context. BICS, according to Cummins, is for context-embedded situations where meaning making is largely aided by contextual cues. For example, the statement "It made rings" is context-embedded. What *it* represents is not obvious outside the context the speaker and listener(s) share, as the topic itself could be about jewelry making, Saturn, water, skin conditions, or telephones. CALP, on the other hand, as Cummins argued, is used in context-reduced situations; that is, those in which a message must be fully understood from the language itself, rather than partially relying on context. For instance, the statement "When the stone was dropped into the pond, rings formed on the surface of the water" is context-reduced and does not depend on an in-person shared context to be understood. Though the two statements about rings could have been made in the same context, the latter statement uses language to provide information about the context in ways that the former does not.

The difference between BICS and CALP, Cummins (1981b) argued, creates problems for teachers and students, as many teachers assume that students who have difficulties with grade-level curricula, despite their ability to use English communicatively with their peers, are learning disabled, developmentally delayed, or lazy. Clearly, attaining high levels of oral language ability, as Galguera (2011) later noted, does not necessarily imply fluency in academic language since what it means to have English proficiency in an academic context is more complex than the ability to 'speak English.'

It is important to note that Cummins did not consider the BICS/CALP distinction to be a theory of academic language, language proficiency, or second language acquisition. Instead, his purpose in using those terms was to advocate for bilingual education policies and question assumptions of what it means to be proficient in English and the time required to develop the

proficiency needed for academic success. While the BICS/CALP distinction is conceptually helpful in recognizing that language used for academic purposes is not necessarily the same as language used for social purposes, it neither defines nor describes the nature and complexities of academic language.

Building on the academic/non-academic binary Cummins introduced, Schleppegrell (2004) sought to identify the salient features of academic language using a functional language approach (Halliday, 1985), which focuses particularly on clause structures and describes language through the functions it performs. Schleppegrell's work brought specific attention to the decontextualization, explicitness, complexity, and cognitive demand of academic language. Whereas language used in academic contexts had been previously described as an "unambiguous or autonomous representation of meaning" (Olson, 1977, p. 258), Schleppegrell rejected this description, arguing instead that all language (including academic language) is contextualized within social, cultural, and linguistic contexts, and asserting that academic language is deeply contextualized within the culture of school rather than embedded in cognition. Instead of viewing cognitive complexity as a key component of academic language, as Cummins (1979a, 1981b) had previously asserted, Schleppegrell emphasized differences in the relative frequency of lexical and syntactic complexity, and perceived the explicitness and complexity of academic language to be a matter of linguistic choices, which function to create appropriacy of language use within a given context.

For Schleppegrell (2004), to know academic language, or "the language of schooling," is to know the linguistic elements used to construct meaning and appropriacy in the given context and which linguistic choices would lead to that appropriacy. Returning to the above example of "When the stone was dropped into the pond, rings formed on the surface of the water,"

Schleppegrell would likely point to the need to understand how meaning is constructed in science, such as reducing agency and choosing to say "When the stone was dropped" rather than "I dropped the stone," and using the verb *formed* and how its meaning differs from other verbs such as *created* or *made*. Beginning the sentence with a subordinate clause that indicates the conditions under which an event happened (i.e., When the stone was dropped into the pond), but still places linguistic emphasis (i.e., the main clause) on the event itself (i.e., rings formed on the surface of the water) is also consistent with academic language in science. Skilled users of academic language, Schleppegrell would likely argue, have learned how language is used within a given content area and can appropriately match their own language to the language as it is used in that content area context.

Like Schleppegrell (2001, 2004), Scarcella (2003) also conceptualized academic language as always occurring within a social context, but whereas Schleppegrell rejected notions that cognition is central to the construct of academic language, Scarcella did not. Specifically, she conceptualized academic language along three dimensions: linguistic, cognitive, and sociocultural/psychological. She defined academic language as "a variety or register of English used in professional books and characterized by the specific linguistic features used in particular situational contexts" (Scarcella, 2003, p. 9). Drawing on Canale's (1983) and Canale and Swain's (1980) notions of communicative competence, Scarcella (2003) conceptualized the linguistic dimension of academic language as a set of discrete linguistic components—phonological, lexical, grammatical, sociolinguistic, and discourse—each of which entailed specific features. The phonological component included features related to sound and pronunciation, such as intonation and stress; the lexical component included features related to word choice in academic settings, parts of speech, and affixes; the grammatical component

included features of morphology, syntax, and punctuation; the sociolinguistic component included features of language functions and genres; and the discourse component included features such as cohesive devices used in academic genres. Each of the five components listed the features needed for "ordinary English" and "academic English," with academic English seemingly requiring the features of ordinary English, plus a set of features unique to academic contexts. For example, the sociolinguistic component for ordinary English requires knowledge of "frequently occurring functions and genres," (p. 12) while academic English requires knowledge of "an increased number of language functions. These functions include the general ones of ordinary English…as well as ones that are common to academic fields" (p. 12).

Providing more detail regarding the linguistic features of academic language than Cummins (1979a, 1979b, 1981b), Scarcella's (2003) conceptualization incorporates language resources from the subsentential (i.e., affixes and intonation) to the discourse level (i.e., organizational signals). Yet, within the linguistic dimension, Scarcella's description of grammar is largely limited to issues of morphology and syntactic form, seemingly emphasizing knowledge of rules of the grammar required for academic language, rather than knowledge of how language forms are used to create meaning and appropriacy in context, as Schleppegrell (2004) argued.

As the above discussion suggests, scholars have wrestled with defining and conceptualizing academic language, partly because the dynamic nature of language makes it difficult to distinguish academic from non-academic language. Academic language is often conceptualized in relationship to everyday language, which is well known to everyone through its use but is not well defined. This lack of specificity tends to reduce conceptualizations of academic language to a set of frequently occurring features to be added to the already undefined construct of everyday language, which has many of the same features as academic language. For

example, the passive voice is an important and commonly used component of academic language (Celce-Murcia, 2002; Scarcella, 2003), but it also occurs in everyday language, as do other features often associated with academic language, such as modal auxiliary verbs (i.e., might, may, would). Despite the challenges involved in defining academic language, the need to teach academic language is pressing. As previously discussed, the adoption of new academic standards requires all students—including ELLs—to perform many demanding language-related tasks (August et al., 2014; Bunch, Kibler, & Pimentel, 2012; van Lier & Walqui, 2012). Given the research indicating that second language learners need instruction and support in both language and academic content, there is a critical need to draw explicit attention to language in content area classes when teaching ELLs in today's linguistically diverse content area classrooms (Bunch, 2013).

The Knowledge Base for Teaching ELLs

The previous two sections emphasized that language, especially academic language, needs to be explicitly taught to ELLs. Building on the need to provide instruction in the types of language ELLs will be expected to use in college and careers, this section will focus on the teaching and teachers influencing this instruction. As previously mentioned, given the increased number of ELLs in content classes, new academic standards, and the continued obligation to provide meaningful and equitable educational opportunities for all students, teachers have needed to change and adjust accordingly to teach language as part of the overt curriculum of school, rather than relegate it to the hidden curriculum. To encourage this change, various scholars have proposed knowledge bases focused on what content area teachers should know and be able to do to successfully teach ELLs in linguistically diverse classrooms.

Basic Understanding of Language

Few scholars argue that content area teachers should be expected to have the same knowledge and skills as language specialists; however, there is growing agreement that content area teachers need a basic understanding of language and how it works. This understanding of language would include, as Fillmore and Snow (2003) first argued, knowing the basic units and structures of language such as phonemes and morphemes as well as how smaller units are used to create larger lexical-, sentential-, and discourse-level units. Fillmore and Snow boldly argued that "[a]ll of us should understand such matters [of grammar and rhetoric], and we will not learn them unless teachers understand them first" (p. 16). More to the point, they argued that teachers need to know aspects of grammatical form and possess the skills to teach vocabulary, but beyond that, they also need to understand how meaning is created through language and have the ability to draw attention to language in teaching.

De Jong and Harper (2005) likewise advocated that all teachers should have a basic understanding not only of language itself, including aspects of language structure, but also how language relates to the development of oral, reading, and writing skills. In their view, this basic understanding would allow teachers to make language visible in classrooms focused exclusively on academic content—classrooms in which issues of language are typically invisible. De Jong and Harper added that teachers need knowledge beyond the syntactic construction of forms. For example, knowing how to construct verb tenses such as *she walks* and *she is walking* (i.e., main verb—*s*; auxiliary be + main verb—*ing*) is necessary, but teachers also need to understand how sentences such as "She walks to the market" and "She is walking to the market" use these verb tenses to create different meanings. Such understanding involves not just knowing the definition of an academic word, like *digestion*, as Fillmore and Snow (2003) pointed out, but also knowing

how it relates to linguistically similar forms such as *ingest* and *digest*, its likely cognates in other Indo-European languages (e.g., digestión, digestione, digestão), its pronunciation structure as diGEStion and not DIgestion or digesTION, and how it is used with other concepts (e.g., food, nutrients, systems in the body) within academic discourse. Also implied for teachers in this basic understanding about language are the resources to know why students make the errors they make, how to utilize students' other languages in learning, and how and why academic language is used as it is.

Linguistically Responsive Teaching

Lucas, Villegas, and Freedson-Gonzalez (2008) added an explicit focus on second language learning and second language learners to the knowledge base they proposed for *linguistically responsive teaching*. In their framework for linguistically responsive teaching, the authors proposed six "essential understandings" that content area teachers need to know and then apply in their teaching. These essential understandings involve specific core knowledge of second language learning, learners, and teaching and "can serve as the linguistic foundation" (p. 361) for teaching ELLs in content area classes. These essential understandings, discussed below, include attention to linguistic form, the difference between conversational and academic language proficiency, the relationship between first and second language proficiency, the necessity of comprehensible input, the role of social interaction, and consideration for the affect involved in learning and performing a second language.

Essential understandings. Lucas and colleagues (2008) did not detail the aspects of language form needed to teach ELLs to the extent that Fillmore and Snow (2003) did, but they similarly emphasized that attending to language form promotes second language learning and is a key component of linguistically responsive teaching. All teachers, they argued, "can learn to

identify and articulate the special characteristics of the language of their disciplines and make these explicit to their ELLs" (Lucas et al., 2008, p. 365), thereby making language visible, as de Jong and Harper (2005) previously advocated. A teacher's understanding of English forms, they pointed out, is not for the purpose of emphasizing accuracy or reverting back to methods of grammar translation, but to draw students' attention to language and how different forms convey different meanings. In a World War II unit of a U.S. social studies textbook in which Americans are portrayed as heroes and Germans are portrayed as villains, for instance, it might be common to read sentences like "Nazi soldiers attacked American troops at the Battle of the Bulge" and "The Axis advance was halted by P-47 bombers." In the first case, the simple past tense is used (i.e., *attacked*) to portray German soldiers as dehumanized representatives of a political party that perpetrated violent action. In the second sentence, however, the verb *to halt* is used to indicate an action of response to violence, rather than using a verb that denotes aggressive action such as *to bomb* or *to strike*. The passive voice is also used (i.e., *were halted*) and a military vehicle (i.e., *a P-47 bomber*) acted as the agent. This allowed an advance to be stopped by an object rather than people to be stopped by other people, thus obscuring the fact that American soldiers acted as the perpetrators of the action and that, essentially, American airmen bombed German troops.

Attention to linguistic form can expand students' linguistic repertoires with a greater range of meanings, rather than simply a greater range of linguistically accurate forms. In the above example of World War II, simply understanding that the passive voice is constructed by using the *to be* verb plus the past participle would not likely have led to a substantive discussion about how meaning is created in history. Focusing on the meaning those specific forms convey,

such as how agency with active and passive voices are used, may have allowed students to better understand how language is used to construct historical meaning.

A second essential understanding in the framework for linguistically responsive teaching is that teachers also must know that academic language is distinct from conversational language. Based on Cummins' BICS/CALP distinction (1979a, 1981b), this understanding means that teachers know that the ways language is used in routine conversational tasks can be very different from the ways language is used in academic or classroom tasks, and that conversational language fluency does not necessarily presume academic language fluency. This knowledge, Lucas and colleagues (2008) asserted, could better allow teachers to provide linguistic support or scaffolding specific to academic tasks.

Also related to Cummins' research, linguistically responsive teachers need to understand that strong first language skills are associated with strong second language skills—a third essential understanding (Lucas et al., 2008). Students who are literate in their first languages, for example, likely have a wealth of literacy skills to draw on as they learn English. Therefore, the authors argue that teachers must learn about the first language skills of their ELLs to provide better linguistic supports and use students' first languages as valuable resources in second language learning.

A fourth essential understanding for linguistically responsive teachers is that the language used to present academic content to ELLs must be comprehensible to them. Language far beyond an ELL's proficiency is not meaningful and renders the content inaccessible. Teachers, then, must modify their own instructional language so that it can be understood by ELLs in the classroom. Because language and content are inextricably intertwined, ELLs need to understand the language used in classroom tasks to improve their knowledge of language as well as their

knowledge of academic contents. Furthermore, beyond comprehension of language, ELLs must also be given opportunities to use language to construct meaning.

Social interaction is one such way that ELLs can use language in meaningful ways in content area classrooms, another essential understanding within this framework. Based on Vygotskian theory (1978), ELLs' language learning can be broadened within the zone of proximal development and with the assistance of a more knowledgeable other, such as a teacher or a peer. In working with those with greater proficiency, ELLs have opportunities to further their own language skills by using language meaningfully and negotiating meaning, which "supports their academic development as well as their language development" (Lucas et al., 2008, p. 364).

The last essential understanding for linguistically responsive teachers is that the environment most conducive to learning a second language is safe, welcoming, and without undue stress. According to Krashen's (1982) affective filter hypothesis, language learning involves considerable affect and ELLs who are labeled, ignored, stigmatized, anxious, or embarrassed are not likely to maximize opportunities for language learning, especially academic language learning. ELLs who are forced to speak aloud in class, who don't understand school routines such as lining up, or who are harassed for the way they dress, for example, may have difficulty learning. Especially in the current U.S. political climate in which ELLs may be particularly vulnerable due to anti-immigration, anti-Muslim, and anti-Mexican rhetoric, teachers must be increasingly attentive to their classroom climate to ensure ELLs are 'included' and not 'othered.'

Orientations of linguistically responsive teachers. Lucas and Villegas (2011) later elaborated on this framework and described a set of three "orientations," or inclinations,

necessary for linguistically responsive teachers. Beyond the essential understandings of linguistically responsive teaching described above, linguistically responsive teachers also need a set of qualities for enacting linguistically responsive teaching in practice: sociolinguistic consciousness, value for linguistic diversity, and inclination to advocate for ELLs (Lucas & Villegas, 2011).

Linguistically responsive teaching begins with a sociolinguistic consciousness. This consciousness includes understanding the interconnectivity of language and culture and how language is a primary way in which cultural norms are conveyed and enforced. In U.S. school contexts, 'standard' English, which closely resembles the constructs of academic language discussed earlier, is the dominant language; teachers must be aware of how this dominant language of school is different from the languages and dialects their students speak. All languages and dialects reflect the values and expectations of a culture and teachers must develop a sociolinguistic conscious in order to take their students' linguistic backgrounds into account in teaching and learning, avoid cross-cultural miscommunication, and "help ELLs become confidently bilingual and bicultural, rather than silent and alienated" (Lucas & Villegas, 2011, p. 58).

Lucas and Villegas (2011) also asserted that linguistically responsive teachers must value linguistic diversity and advocate for ELLs. Responsive teachers who value linguistic diversity are able to respect all languages, not just the dominant language spoken in school. They also are able to recognize the linguistic assets that ELLs bring into the classroom and treat ELLs as capable and knowledgeable rather than linguistically deficient and in need of remediation. Lastly, Lucas and Villegas (2011) argued that linguistically responsive teachers need to be fundamentally oriented toward advocacy and work toward improving education for ELLs. This

includes developing empathy for ELLs and the desire to bring linguistic issues to the forefront of education. In this way, education can be more equitable for marginalized students such as ELLs, who often lie outside the linguistic and cultural mainstream of schools.

Knowledge and skills of linguistically responsive teachers. To apply the essential understandings and orientations outlined above in classroom contexts, linguistically responsive teachers also need pedagogical knowledge and skills (Lucas & Villegas, 2011; Lucas et al., 2008). Teachers need strategies for learning about ELLs in their classes, skills for identifying the language demands embedded in classroom tasks, and ability to scaffold learning for the particular ELLs they teach (Lucas et al., 2008). These practices, and the underlying knowledge that supports them, as described in the essential understandings, enable content area teachers to teach ELLs language as a core component of integrative teaching. Learning about ELLs means understanding their language and academic background as well as knowing their English proficiency levels. As with native-English-speaking students, ELLs are not a homogeneous group and have a differing array of language and schooling experience which needs to be accounted for in teaching.

Teachers also need to be able to identify the language demands of classroom tasks. Before teachers can modify instruction or provide scaffolding for language learners, they must first be able to 'see' the language of their content area themselves. This involves knowing the key syntax, semantics, and lexicon that ELLs will need in order to access academic content in any particular lesson. It also entails identifying the language ELLs are expected to read and comprehend, as well as the language they are expected to produce, both orally and in writing. With knowledge about their ELLs and an understanding of the language demands of planned classroom tasks, teachers can anticipate potential difficulties these students are likely to

encounter in any given lesson and begin to plan ways to appropriately scaffold the students' learning.

Based on the essential understanding that ELLs with strong literacy and academic skills in their first languages are more likely to develop English proficiency similar to that of native English speakers, for example, linguistically responsive teachers are encouraged to use and develop students' first languages as part of classroom practices, to the extent possible (Lucas et al., 2008). Similarly, based on the essential understandings that language learners need access to comprehensible input and social interaction to develop both conversational and academic language, linguistically responsive teachers need to provide support for ELLs to understand the instructional content itself and opportunities to practice using content area language in an authentic, communicative context.

Within the framework for linguistically responsive teaching, Lucas and her colleagues (2008) also specified a variety of scaffolding techniques, such as using visual tools and graphic organizers, developing study guides for texts, modifying or supplementing both written and spoken language, and using students' first languages as a valuable resource in making the content they teach comprehensible and accessible to ELLs. Such scaffolding might entail forming groups to allow students to speak in their first languages; drawing students' attention to potentially problematic words and structures that could impede their understanding; using models, visual aids, graphic organizers, or modified texts to present academic content; adapting the language used to present new information or ideas, such as using frequent repetition and pauses as well as giving instructions that are clear, comprehensible, and explicit; and making explicit to ELLs the particular language structures needed to participate in academic discourse

and offering them opportunities to practice using this language in authentic and meaningful contexts.

To sum up, the framework for linguistically responsive teaching (Lucas & Villegas, 2011; Lucas et al., 2008) provides a glimpse into the complexity of the knowledge base needed for teaching language and content concurrently. Beyond knowing some core features of language learning, content area teachers who seek to be linguistically responsive in their teaching must apply those features in ways that strategically attend to ELLs' developing language skills in the context of academic learning. This framework for linguistically responsive teaching provides a holistic structure for teaching and teacher education that considers teaching through a wide lens including language, learning, and learners.

Culturally Responsive Teaching

The framework for linguistically responsive teaching is an extension of Villegas and Lucas's earlier work in culturally responsive teaching (2002b, 2002a, 2007). Culturally responsive teaching, like culturally relevant teaching (Ladson-Billings, 1990, 1995), emerged in the literature as a call for teaching and teacher education to respond to the changing demographics of public school student population and the increased number of students from marginalized groups, including those from racial, ethnic, and linguistic minority groups and the socially and socioeconomically disadvantaged. More recently, scholars have proposed *culturally sustaining pedagogy* (Alim & Paris, 2017; Ladson-Billings, 2014; Paris, 2012; Paris & Alim, 2014). Culturally sustaining pedagogy describes teaching that supports students in "sustaining the cultural and linguistic competence of their communities while simultaneously offering access to dominant cultural competence" (Paris, 2012, p. 95), thus more explicitly promoting,

maintaining, and fostering the cultural and linguistic pluralism reflected in the public school student population.

Teacher education, Villegas and Lucas (Villegas & Lucas, 2002a) argued, needs to move "beyond the fragmented and superficial treatment of diversity…and reconceptualize our approach to educating teachers" (p. xiv); doing so requires preparing teachers to be culturally responsive. Although the characteristics of culturally responsive teaching do not directly correlate to the characteristics of linguistically responsive teaching, culturally and linguistically responsive teaching are highly consistent with each other and the influence of culturally responsive teaching on linguistically responsive teaching is apparent.

In the same way that linguistically responsive teaching begins with sociolinguistic consciousness, culturally responsive teaching begins with sociocultural consciousness, which involves an awareness of one's worldview and the cultural influences that shape it. Like linguistically responsive teachers, culturally responsive teachers similarly advocate for change and more equitable education for students from marginalized groups. Culturally responsive teachers also take an assets-based rather than a deficit-based approach to students and see students' cultural backgrounds as resources for learning, not simply as deviations from dominant group norms. These teachers engage in teaching that supports learners' construction of knowledge as they leverage students' assets and prior knowledge in their instructional approach. Even with the shift in focus from culture to language, the foundation for both culturally and linguistically responsive teaching remained consistent in the emphasis on responding to the culture and language of students from marginalized groups.

Pedagogical Language Knowledge and Disciplinary Linguistic Knowledge

Building on previous scholarship focused on a general knowledge base for all teachers of ELLs, Bunch (2013) notably included the dimension of academic content area. He argued that content area teachers need knowledge about language that is intrinsically tied to their content areas and called for the purposeful integration of language and literacy into content area instruction, which he argued depends on a teacher's *pedagogical language knowledge*. Borrowing from Shulman (1986, 1987) and Galguera (2011), Bunch described pedagogical language knowledge as distinct from the knowledge needed by language specialists and that needed by content specialists, explicitly defining it as the "knowledge of language directly related to disciplinary teaching and learning and situated in the particular (and multiple) contexts in which teaching takes place" (p. 307). Whereas language specialists need broad knowledge of language across several contexts and content areas (e.g., social language, science language, business language), and content specialists need to know and use specific language for a specific purpose (e.g., medicine, engineering), teachers need pedagogical language knowledge, which involves knowledge of the language specifically used in a teaching and learning context (e.g., high school biology classrooms). Pedagogical language knowledge certainly includes knowledge that both language specialists and content specialists would likely know, but seems to acknowledge that the language used by specialists—historians, for example—is different from the language used by teachers in history classrooms to teach history to P-12 students.

Turkan, de Oliveira, Lee, and Phelps (2014) similarly focused on specific content areas as they proposed *disciplinary linguistic knowledge*—their language-oriented knowledge base for teaching ELLs in content area contexts. Like pedagogical language knowledge, disciplinary linguistic knowledge is specific to a given content area and is rooted in disciplinary discourse, or

the ways in which members of groups (e.g., historians, scientists) speak and act appropriately in a given context (e.g., laboratories, conferences, academic articles). Knowing the appropriate discourse of a discipline or content, the authors argued, means understanding the ways in which language is used to construct ideas, and then using that language to participate in knowledge construction within the group. This includes knowing the linguistic features associated with a particular content area, such as the syntactic forms used and how those forms contribute to the construction of meaning.

In contrast to earlier works that offered specific details regarding the knowledge teachers need to teach ELLs (e.g., language forms, academic and conversational language, the role of affect), pedagogical language knowledge and disciplinary linguistic knowledge are defined and bounded largely in terms of pedagogical actions and include whatever knowledge teachers need to act on a specific instructional purpose. Returning to the earlier examples of WWII and the Battle of the Bulge, a teacher's purpose might be to draw students' attention to language and meaning and reveal how the textbook author used language to portray Americans as heroes and Germans as villains. Pedagogical language knowledge and disciplinary linguistic knowledge would include any knowledge about language that would achieve this instructional goal. This might entail knowledge of how the passive voice is constructed, content area vocabulary (e.g., *troops*, *soldiers*), or why historians choose words like *halt* rather than *stop* or *pause*. It might also include knowledge of how militaristic events are sequenced or how historical meaning changes based on who performs a given action. The teacher would also need to know what language she would deliberately draw attention to and then create classroom activities, provide instructional modification, scaffolding, or otherwise unpack the language of classroom tasks, making it more visible to ELLs in order to broaden the students' access to academic content.

Turkan at al. (2014) proposed that teachers use these demands as opportunities to model the related language features for ELLs and to demonstrate how meaning is communicated within a specific content area. Included in this modeling is the explicit teaching or "unpacking" of the linguistic forms used to construct meaning, with the intent to then instruct ELLs in how to make appropriate linguistic choices within the content area. Teachers then need to be able to engage ELLs in the discourse of the content area and provide instructional opportunities to appropriately use those linguistic forms in context. Engaging ELLs in the discourse of the content area, Turkan and colleagues argue, allows for more equitable content area instruction for ELLs by enabling them to more fully participate in academic discourse.

In brief, pedagogical language knowledge or disciplinary linguistic knowledge have the potential to create opportunities to develop language and literacy skills in content area classes (Bunch, 2013) and make disciplinary discourse explicit (Turkan et al., 2014). These proposed knowledge bases added a distinct content area component, but both were consistent with previous calls to make language visible in content area classrooms (de Jong & Harper, 2005) and utilize more linguistically responsive teaching practices (Lucas et al., 2008, 2008).

Central Themes

To summarize, a central idea that runs throughout this literature is that to successfully teach ELLs, all teachers must be skilled at identifying the language demands of academic tasks (Bunch, 2013; de Jong & Harper, 2005; Lucas & Villegas, 2011; Lucas et al., 2008; Turkan et al., 2014). For the most part, content area teachers are familiar with the academic demands of their given content area and are likely aware of much of the content-specific vocabulary within it (Bruna, Vann, & Escudero, 2007; Chamot & O'Malley, 1987; Fillmore & Snow, 2003), but they are less adept at identifying language demands embedded in learning tasks largely because this

requires both understanding the nature of the language students need to successfully participate in specific tasks and anticipating aspects of the language most likely to be challenging for particular ELLs in their classrooms (Lucas et al., 2008).

In a biology lesson on the skeletal system, for example, a textbook passage might include the following sentences: "Eight fused bones create the human cranial cavity: occipital, frontal, sphenoid, ethmoid, left parietal, right parietal, left temporal, and right temporal. The volume of this cranial cavity for an adult human skull is approximately 1,400 cubic centimeters." Many teachers would likely identify the names of the eight bones as well as *cranial* and perhaps *fused* as part of the lesson's language demands or science-specific vocabulary. They might not identify *volume* and its specialized use in science as compared to its more common use when referring to music or noise. In this lesson the teacher might elect to emphasize the more common word *skull* instead of the more scientific *cranium*. This vocabulary choice might benefit a Swedish-speaking ELL who can use the Swedish cognate *skalle*, but could hinder a Spanish speaking ELL's use of the Spanish cognate *cráneo*. Ironically, the Spanish speaker's opportunity to demonstrate knowledge of scientific language might be limited in this lesson if the teacher elected to use an 'easier' word like *skull*.

Identifying vocabulary in content area lessons is important but is not enough for the purposes of teaching ELLs. Teachers might also ask if the reading passage requires students to decipher definitions from context (an inferencing skill) or to examine the text for embedded clauses or frequent pronouns that refer back to previously introduced nouns or noun phrases. If the students are required to answer questions, teachers might ask whether the questions require a paragraph response complete with a topic sentence and a few supporting sentences, and whether the supporting sentences need specific cohesive devices. If students are expected to participate

in a Think-Pair-Share, teachers might consider whether students need to summarize the text, provide an opinion, or ask a question. Students might also need to utilize culturally-specific turn-taking strategies to respond appropriately to peers. If the teacher above had only identified names of cranial bones such as *parietal* and *occipital* as key language, she would have missed several opportunities to specifically attend to the language of biology while making content accessible to ELLs.

Collectively, the research on the teacher knowledge base needed for teaching ELLs has emphasized the centrality of language, especially academic language, to learning academic content and has advocated that language needs to be made more visible in content area classrooms. Teachers need to be able to look 'at' language, rather than just 'through' it (de Jong & Harper, 2005), and scaffold classroom instruction accordingly. Though this type of teaching and the teacher knowledge base it requires is still in need of further research, extant literature indicates that it involves the ability to combine formal and explicit knowledge of both language and academic content with pedagogical skills related to both language and the content area. There is also consensus that teachers need to understand the unique nature of academic language and how language and content interact with each other within a given content area, and then be able to use that knowledge to enable ELLs to access both academic language and academic content.

Approaches to Teaching ELLs in Content Area Classes

While some scholars have wrestled with conceptualizing the knowledge and practice needed to teach ELLs in content area classrooms, others have focused their work on documenting and studying approaches to teaching ELLs in content area classes and equipping teachers to do so. A review of the empirical literature shows that different approaches have been

used to help teachers engage in teaching that makes language visible to ELLs (e.g., Buxton, Lee, & Santau, 2008; Echevarría, Vogt, & Short, 2000; Schleppegrell, Achugar, & Oteíza, 2004). In what follows I highlight a few examples that illustrate this line of research.

Functional Linguistics Approaches

Some scholars have approached the teaching of academic language to ELLs by drawing on language function and functional linguistics (Halliday, 1975, 1985, 1994), a system in which language is theorized as a resource for making meaning in a given context and for a specific purpose. Learning about language in functional linguistics entails deconstructing linguistic structures to reveal the nature and expectations of language in a given context or genre—in this case, academic language within distinct content areas. Instead of using linguistically-oriented terms such as *noun*, *verb*, and *adjective*, functional linguistics traditionally categorizes language in terms of its *field*, *tenor*, and *mode*, conceptualizing the functions as who is writing about whom, to whom, or for whom (i.e., tenor), about what (i.e., field), and how (i.e., mode).

The California History and Social Science Project developed by Schleppegrell, Achugar, and Oteíza (2004) uses functional linguistics within a professional learning program that focuses on history and social science. Created in response to teachers' requests for additional strategies to address increased numbers of ELLs in mainstream history classrooms, the California History and Social Science Project develops not only teachers' instructional strategies but also their knowledge of the language of history (Achugar, Schleppegrell, & Oteíza, 2007). Initially, the project used functional linguistics in conjunction with historical genre analysis, an approach to analyzing the larger discourse patterns, typically of texts, to expose teachers to the language of history and how meaning is constructed in historical texts. The results of this stage were initially shocking to teachers, as many were not aware that the texts students were typically asked to read

bore little structural resemblance to the type of texts that students were typically asked to write (Achugar et al., 2007). Although such awareness-raising seemed promising, upon further observation the researchers noted that participating teachers treated knowledge of genre and functional linguistics as facts to be transmitted to students rather than tools for making meaning from historical texts (Achugar et al., 2007).

Given that the teachers, in general, lacked strategies for working with ELLs on grade-level texts (Schleppegrell et al., 2004), the researchers concluded that teachers were more likely to use genre knowledge if they learned the metalanguage associated with functional linguistics as well as some analytic tools and strategies with which to talk about and deconstruct texts on a grammatical level. The program was revised and a meaning-making approach was introduced to help teachers learn to deconstruct sentences in historical texts. This language analysis, when enacted by the teachers in their classrooms, led to better class discussions and deeper understanding of history for the ELLs in the classroom. As Schleppegrell and colleagues (2004) noted, through language analysis, students can reflect on historical material, explore and question the manner in which historical events are presented, analyze whose voices are present or absent, and describe how organization can point to the views of the historian. Many of the California History and Social Science Project teachers reported that focusing on the language of history enhanced student attention to historical content and increased the quality of class discussions as students worked to interpret meaning from linguistic evidence in the text (Achugar et al., 2007). However, details of the practices teachers used and their connection to new language knowledge, especially after the program was modified, were not specified, leaving questions about the teacher knowledge base needed to successfully use language analysis as a part of history and social science instruction.

Teaching Science in Linguistically Diverse Classrooms

Lee and her colleagues (Buxton et al., 2008; Hart & Lee, 2003; O. Lee & Buxton, 2013; O. Lee, Lewis, Adamson, Maerten-Rivera, & Secada, 2007; O. Lee & Maerten-Rivera, 2012; Lewis, Maerten-Rivera, Adamson, & Lee, 2011; Santau, Secada, Maerten-Rivera, Cone, & Lee, 2010) conducted a five-year longitudinal study focused on teaching science to ELLs. The researchers designed inquiry-based science units that incorporated English language and literacy into science instruction. They subsequently provided all curriculum materials and conducted a series of workshops throughout the year to support teachers' use of the new curriculum, including strategies for teaching both language and science. The researchers considered that implementing the curriculum and related instructional strategies was not enough to achieve reformed teaching and new curricular goals; teachers also needed to "understand *why* they are doing what the curriculum asks" (Buxton et al., 2008, p. 498). Therefore, the researchers purposely incorporated conceptual knowledge of both science and language—using language function and genre analysis—to allow teachers to develop deeper understanding of the curriculum's theoretical foundations.

Hart and Lee (2003) found that teachers who engaged in the professional learning opportunities described above used more linguistic scaffolding in their lessons; nevertheless, the overall knowledge and practices of participating teachers only somewhat reflected the reform-oriented practices modeled and promoted in the professional learning experiences (Santau et al., 2010). Teachers consistently used graphics, rephrased student responses, assisted and corrected pronunciation, and reminded students to use scientific vocabulary, but as the researchers noted of a typical teacher, "[she] did not use varied language support strategies, nor had she effectively used such strategies in significant events" (O. Lee et al., 2007, p. 754). Furthermore, many of

the teachers lacked awareness of their own strategy use, leading the researchers to question the extent to which teachers were even cognizant of the curricular goals with respect to language (Buxton et al., 2008). Simply following a curricular plan does not lead to curricular reform needed for integrative teaching; as Lewis and colleagues (2011) emphasized, "understanding matters" (p. 162) and teachers need to be knowledgeable practitioners who respond to students rather than technicians executing a script. Lee and Buxton (2013) later presented specific instructional strategies for integrating science and language, though they maintained an emphasis on the role of teachers as knowledgeable and strategic practitioners. In essence, much like students in a knowledge-based society are expected to be knowers and not just doers, Lee and Buxton (2013) emphasized that teachers should be able to be both as well.

Sheltered Instruction Observation Protocol

Finally, and likely the most widely utilized of the documented approaches to teaching ELLs in mainstream classrooms to date, is the Sheltered Instruction Observation Protocol (SIOP; Echevarría et al., 2000), a practice-based protocol "for integrating language development with content teaching" (Echevarría & Short, 2011, p. 1). Originally developed as a model for sheltered instruction, SIOP has been used for content area instruction in English within classes comprised mostly or solely of ELLs as well as by content area teachers who teach linguistically diverse students. SIOP is a protocol for designing and delivering lessons by attending to eight specific components: lesson preparation, building background, comprehensible input, strategies, interaction, practice/application, lesson delivery, and review and assessment. Each component, in turn, involves specific instructional strategies, such as emphasizing key vocabulary, using scaffolding techniques, and reviewing key content concepts. In total, 30 different teaching strategies are specified across the eight components.

In a SIOP exemplar scenario from a fourth grade social studies class on the Gold Rush (see Echevarría, Vogt, & Short, 2010), Ms. Chen had explicit content and language demands written on the board and opened her lesson with a brainstorming session on reasons for seeking gold. When working in a small group with her lowest proficiency ELLs, Ms. Chen used picture books on the Gold Rush, maps, and a rock of pyrite to simulate gold to give her students a "jump start" and pre-teach some key vocabulary. By contrast, a scenario based on Mrs. Hargraves' teaching showed that she did not include language objectives and used only a wall map and the textbook in her lesson. While it was clear that Ms. Chen's lesson was more appropriate for ELLs than Mrs. Hargraves' lesson, the researchers' explanation and analysis of the teaching scenarios seemed to functionally equate the presence of more features with better overall instruction. Given that SIOP teachers are scored primarily on the number of included practices rather than the quality of those practices, pure fidelity to the SIOP model may not be an entirely accurate indicator of quality instruction for ELLs.

Furthermore, although the SIOP strategies are consistent with many characteristics of linguistically responsive teaching, such as modifying oral language, providing comprehensible input, and giving clear and explicit instructions, they fall short of offering a holistic and integrative framework for teaching ELLs. Several categories and practices relate to teacher and student language use, such as ensuring ample opportunities for student interaction, allowing sufficient wait time, and using an appropriate rate of speech for student proficiency level, but only one relates to the explicit teaching of language itself—reviewing key vocabulary. Teachers are required to include language objectives in addition to content objectives for all SIOP lessons, but the SIOP practices do not specify whether these language objectives should include academic or general language; focus on language form, semantics, or appropriate use in context; or include

content-specific language. None of the practices seem intended to draw attention to content-specific language, and as critiqued by Turkan and Buzick (2016), "SIOP does not address the specifics of how a content area teacher would unpack the linguistic characteristics specific to the discourse of a particular content area" (p. 229). Making language visible to ELLs using only SIOP practices, then, is likely a limited instructional approach in content area classrooms.

SIOP is, in effect, an extensive list of teaching practices. It is neither a method of educating teachers, nor a guide for how to develop the knowledge teachers need to identify the language demands of classroom tasks or teach the language needed to complete those tasks. Though there is ample professional development surrounding SIOP, these activities focus on fidelity in the implementation of SIOP practices, which the authors note is the key to SIOP success (Echevarría, Richards-Tutor, Chinn, & Ratleff, 2011; Short, Echevarría, & Richards-Tutor, 2011), rather than on developing the knowledge teachers need about the language of their content areas and the pedagogical practices needed to teach that language to their ELLs.

Making language visible to ELLs and teaching content integratively clearly can be done, but how to make language visible in content area classes as a general practice within content area instruction rather than merely implementing or adhering to a specific instructional model or protocol remains unclear. Although functional linguistics has been widely used as a conceptual tool for educating both teachers and students about the language of content areas and SIOP is widely used to provide instructional guidance for teachers of ELLs, these approaches do not appear sufficient for helping teachers to make language visible and teach language and content integratively.

Content Knowledge for Integrative Teaching

Up to this point, I have discussed relevant literature related to integrative teaching and the teacher knowledge base that may support it. As a reminder, integrative teaching is teaching that attends to the whole of content, inclusive of the curricular contents as well as the language that contains, binds, and shapes those contents. This section synthesizes this literature, focusing specifically on the knowledge base needed for integrative teaching. Because I locate language within, and not outside of, content, I similarly locate the language-related knowledge for teaching within, and not outside of, content. As in previous sections, in this section I draw on bricolage and show how an existing content knowledge for teaching framework (Ball et al., 2008) can be used to construct a framework for content knowledge for integrative teaching.

Based on the literature previously discussed, I conceptualize that content knowledge for integrative teaching requires attention to the language of content. While some attention has been paid to examining the relationship between teaching language and teaching content, extant literature focuses primarily on teaching language within general education or content area classes—not on making explicit and teaching the language of content. In this literature, language seems to function as a bridge to content area task completion by providing the means by which ELLs can participate in the learning of academic contents. This approach, however, does not necessarily develop ELLs' capacities to use content language or present their knowledge of those contents in the accepted and expected formats that often serve as gatekeeping mechanisms to collegiate study or careers in those disciplines. This is not to say that practices that aim to prepare ELLs to participate in the learning of academic contents is unimportant; on the contrary, the approaches discussed in the previous section help students access, take in, and build understandings of the contents taught in their content area classes. Integrative teaching is then

necessary to allow students to apply and demonstrate their understandings within and beyond their content area classes.

Integrative teaching prepares students for college and careers by teaching language 'as' content rather than language 'and' content. Teaching language as content promotes the preparation of students for the whole of content, including understanding of contents and how to present those understandings in the accepted and expected formats that provide them with opportunities to access further study and careers in corresponding disciplines. In essence, whereas the approaches previously discussed allow content to be moved closer to students by teaching the language needed to access contents while engaging and succeeding in classroom tasks, integrative teaching moves students closer to the content by making explicit and teaching them the language needed to present and use their understanding beyond classrooms. Together, the previously discussed approaches, which focus on principles of second language learning, pair with integrative teaching to ensure that teaching provides ELLs access both to learning as well as the opportunity to use that learning to succeed in a knowledge-based society.

The approaches and frameworks discussed thus far in this chapter focus on teachers knowing more about second language learning, learners, and pedagogy in order to better teach ELLs. Juxtaposed with these approaches and their corresponding literature is content area literature, which focuses on teachers knowing more about their content in order to better teach that content (e.g., Ball et al., 2008). From this second perspective, knowledge of content includes deeper conceptual knowledge, understanding of how students learn and approach concepts, and more effective pedagogy. My view of integrative teaching and the content knowledge needed to enact it draws from both of these bodies of knowledge and literature bases. Specifically, I argue that teaching for a knowledge-based society is improved with more

knowledge about second language learning, learners, and pedagogy, along with more knowledge about content and how to teach it. That is, I theorize that positioning language as a part of content (i.e., recognizing the concurrent presence of language in content) may further improve the teaching of content to all students. The overlapping of these two established perspectives, each of which primarily considers either language or content but not both, is a meaningful reflection of the utility of bricolage that makes language visible in content area classes and captures the completeness and holistic quality central to what I call integrative teaching.

In light of this, I contend that to provide all students, including and especially ELLs, equitable educational access, teachers need to know more about the language of their content areas and to teach that language to all students. In essence, this view—which encapsulates the integrative viewpoint I hold—asks content area teachers to recognize the teaching of the language of content as the teaching of the content itself. To situate the knowledge base needed for integrative teaching within the understandings from content area literature, I ground it in the content knowledge for teaching framework (CKT; Ball et al., 2008). The CKT framework emerged from research on mathematics teaching and deeply examines the different types of knowledge teachers need to teach within a given content area. However, while Ball and colleagues aptly identified the domains of professional knowledge teachers need for exceptional content area teaching of students in general, their CKT framework did not specifically take ELLs into account.

Content Knowledge for Teaching

The origins of content knowledge for teaching lie in the synthesis of content and pedagogy. Shulman (1986) articulated his influential argument that teachers needed not only content knowledge, but also pedagogical skill concerning how to present and explain that content

to students. As Shulman emphasized, "Mere content knowledge is likely to be as useless pedagogically as content-free skill" (p. 8), which he noted was a shift from previous generations of educational researchers who considered content knowledge to be the pinnacle of pedagogical achievement. Shulman defined *pedagogical content knowledge* as a unique blend of content and pedagogy that allowed teachers to interpret content and make it accessible to students through a variety of representations, examples, illustrations, and analogies. Pedagogical content knowledge, Shulman argued, allows teachers to anticipate student misunderstandings, adapt content, and understand why certain concepts are easy or difficult for students at a certain age or developmental level—skills that are essential for content area teachers, but irrelevant for content area specialists who simply need to use their skills rather than teach those skills to children. Thus, pedagogical content knowledge is a type of knowledge that recognizes the unique work of teaching and differentiates the knowledge of a history teacher from that of a historian or the knowledge of a mathematics teacher from that of a mathematician.

Ball (1990), building on Shulman's (1986, 1987) work and contextualizing pedagogical content knowledge within mathematics, usefully distinguished between *knowledge of mathematics*, wherein teachers understand the concepts and procedures of mathematics, and *knowledge about mathematics*, wherein teachers understand the nature of mathematics as a field and how that knowledge is constructed within it. Ball (1990) found that the preservice teachers who participated in her study were able to correctly perform computations, such as calculating division problem using fractions, thereby demonstrating their knowledge 'of' mathematics; however, they did not demonstrate much knowledge 'about' mathematics, as "strikingly few were able to represent the meaning underlying the procedure they had learned" (p. 458). Ball continued that simply being able to perform a computation by rote process is insufficient;

additional knowledge enabling teachers to "describe the steps…discuss the judgments made… [provide] reasons…[and] generate explanations" (p. 458-459) associated with those computations is necessary in the work of teaching.

Mathematics, like language, can have a high degree of automaticity and procedural fluency associated with it, but teaching mathematics requires that teachers go beyond describing the processes of the procedures to also explaining why those processes and procedures work, both as part of instruction and in response to student questions or errors. As Ball (1990) noted, most preservice teachers considered themselves to know mathematics, yet few seemed to have any explicit knowledge of their conceptual understanding of mathematics.

To know mathematics for teaching is to use different types of mathematical knowledge to solve problems and address issues in actual mathematics classrooms, such as understanding the reasons behind the mistakes students make and explaining the content in ways that allow students to understand and correct mistakes. Seeking to better understand the "work of teaching" (Lampert, 2001), Ball, Hill and Bass (2005) described what teachers actually do in classrooms and the ways in which the pedagogical actions teachers take "demand mathematical reasoning, insight, understanding, and skill" (p. 17). Teaching mathematics involves analyzing student errors, explaining why a procedural event occurs, and representing mathematical meaning. Using an example of multiplying two two-digit numbers, teaching each procedural step, the authors argued, involves "deeper and more explicit" (p. 20) mathematical knowledge than the knowledge required to merely calculate the correct answer.

Ball and colleagues (2005) also pointed to mathematical language and a teacher's "need for a special kind of fluency with mathematical terms" (p. 21). This fluency includes knowing and using mathematical terms as well as defining those terms in age-appropriate ways and

making decisions about when to use technical, mathematical nomenclature and when to use conversational language. When choosing to use conversational language, teachers must consider to what extent any vagueness or ambiguity of informal language, though familiar to students, might obscure mathematical conceptual understanding. Defining *rectangle* by using *box*, for instance, might be convenient because of the ubiquity of the word *box*, but student understanding of two-dimensional versus three-dimensional objects may be compromised. On the other hand, students who memorize a definition of a rectangle that involves pairs of parallel sides with right angles—a precise use of mathematical terminology—might still not be able to identify or conceptually understand rectangles (Ball, Goffney, et al., 2005). Furthermore, students who understand rectangles as either boxes or shapes with parallel sides and right angles still may not be able to appropriately present their knowledge in ways that meet current academic standards. Language clearly matters in mathematics as well as other content area classrooms and has consequences for student learning. It is this language-focused aspect of content knowledge that is particularly important for teaching ELLs in content area classrooms. Teachers need to know content area language and how to use language to present their content in ways that not only allow ELLs to access and comprehend the given content, but also to access the content area language so that they can display their knowledge in ways that both demonstrate achievement of content area academic standards and prepare them for future success in the given discipline.

Continuing to build on Shulman's (1986) work with pedagogical content knowledge, Ball and her colleagues (2008) proposed content knowledge for teaching, or the knowledge about content needed for the purposes of teaching. Contextualizing their work within mathematics, they identified six domains, or categories, of content knowledge for teaching. First, content knowledge for teaching includes *common content knowledge*, or the previously mentioned

knowledge of mathematics needed to correctly perform computations. Second, they identified *specialized content knowledge*, the "unpacked" or "decompressed" knowledge through which teachers make "features of particular content visible to and learnable by students" (p. 400). This is the knowledge teachers use to make content explicit to students, understand why students make the errors they make, and explain why procedures work to guide students' conceptual development.

The third domain of content knowledge for teaching is *knowledge of content and students*, or the knowledge teachers need in order to relate the content to the students. This pedagogy-based knowledge is related to student thinking and includes anticipating difficulty in student comprehension, such as difficulty with conceptual understanding. Recognizing an incorrect answer to a subtraction problem, for example, would involve common content knowledge, but recognizing the reason a student made the mistake he did would use specialized content knowledge. Additionally, knowing the most common errors students make while subtracting and adjusting teaching accordingly is also included within knowledge of content and students (Ball et al., 2008).

Knowledge of content and teaching includes knowing about teaching and knowing about the content area. This knowledge involves decision making and sequencing with respect to the overall curriculum and which pedagogical methods are most appropriate for teaching a given concept, such as using a case study to teach correlation and causation as opposed to other instructional options like experimentation or demonstration. It includes knowing when to go off on a tangent in response to a student's question or comment, and which task would best allow students to take the next conceptual step in their understanding.

Lastly, in addition to the four main domains, Ball and colleagues (2008) identified *horizon content knowledge* and *knowledge of content and curriculum*, both of which relate to Shulman's (1986) idea of curricular knowledge, as provisional domains within the content knowledge for teaching framework. Knowledge of content and curriculum is rooted in teaching and involves knowing the range of tools, options, and materials available to teach a given content at a given level. Horizon knowledge is an awareness of how the content of the curriculum of a given grade level is related to the content curriculum that spans years throughout schooling, or the knowledge teachers use to relate the content at hand to the content out on the horizon of further content area study. Together, these two domains of content knowledge for teaching give teachers the ability to know how the content at hand is connected within and across curricula as well as make appropriate choices to reach larger curricular goals.

The content knowledge for teaching framework (Ball et al., 2008) allows for the inclusion of content area language, as discussed above in the example of rectangles, but it neither explicitly addresses language as one of the six domains nor emphasizes language as an essential component in conveying, understanding, or demonstrating academic content. As I have previously argued, to successfully teach ELLs in content area classes, teachers need to teach language and content integratively and give explicit attention to language during their instruction. This suggests that language must be explicitly included within the domains of knowledge needed for content area teachers—a topic I discuss next.

Conceptualizing Content Knowledge for Integrative Teaching

The conceptual framework I developed for use in this study, which I name *content knowledge for integrative teaching*, takes up the conceptualization of content knowledge for teaching advanced by Ball and colleagues (2008) and Thames (2009), while also drawing on the

knowledge base for teaching ELLs synthesized in this chapter (i.e., Bunch, 2013; de Jong & Harper, 2005; Fillmore & Snow, 2003; Lucas & Villegas, 2011; Lucas et al., 2008; Turkan et al., 2014). These two bodies of research together value knowing and understanding content as well as knowing and understanding language—two essential principles of integrative teaching. Thus, following Ball et al. (2008) and subsequently Thames (2009), I adopt the four main domains of knowledge—common content knowledge, specialized content knowledge, knowledge of content and students, and knowledge of content and teaching—modifying each to explicitly include matters of language.

I am excluding horizon content knowledge and knowledge of content and curriculum for several reasons. These domains were originally designated as provisional domains (Ball et al., 2008) and not taken up in subsequent work within content knowledge for teaching (see Thames, 2009), which may be related to their more limited scholarly attention as compared to the other main domains. Secondly, these domains are highly related to the contents of stated school curricula. Since content and the hidden curriculum are more pertinent to integrative teaching than contents and the overt curriculum, I did not include them in the content knowledge for integrative teaching framework. Furthermore, preparing students for a knowledge-based society means preparing students for a society in which knowledge is continuously changing and evolving (Hargreaves, 2003). Along these lines, the horizon in a knowledge-based society can be considered a "dark horizon" of opacity, unpredictability, and perpetual change (Bouton, 2013). Attempts to determine the horizon of a knowledge-based society, then, are somewhat impractical.

The resulting framework is a tool for structuring the theoretical context of the proposed study, not a prescriptive or normative instrument to evaluate teachers or their teaching. In this

study, I used this framework to inform my subsequent in-depth exploration of integrative teaching in practice, examine the practices of four successful teachers of ELLs, and explain the teacher knowledge that might support this teaching. It could easily be argued that content knowledge for teaching (Ball et al., 2008), as it was conceptualized, is at least partially attentive to issues of language in content area teaching. I do not disagree. However, because teaching needs to expose the hidden curriculum of language in schools to ensure more equitable access for ELLs, language must be an intrinsic component for teaching content, particularly given the increasingly complex language-based standards students are expected to meet. Consistent with this thinking, I explicitly highlight language as an essential layer of each of the four domains comprising the content knowledge for integrative teaching framework.

The first domain in my conceptualization of content knowledge for integrative teaching is *common content knowledge*. This includes the knowledge of content that is similar for both teachers and content specialists, such as knowledge of how to solve an algorithm, the properties of noble gases, or the key dates of WWI, as Ball and colleagues contend (2005; 2008). In the context of integrative teaching, this domain also includes *common language knowledge*, or knowledge of how to use the English language to communicate. This knowledge of language allows speakers of any profession to use English fluently and appropriately for professional purposes. Common content knowledge includes knowledge 'of' language in the sense of knowing how to use English fluently and appropriately in a given context, such as a school or a mathematics classroom. It does not include knowledge 'about' language, or how meaning within a given content area, such as mathematics, is constructed using language. For example, common content knowledge would allow a teacher to use the words *add* and *sum* during an addition

lesson, but not necessarily differentiate the meaning between the two words or identify these words as specialized mathematical words.

Just as the knowledge needed to do complex mathematics is not the same as the knowledge needed to teach others to do complex mathematics, the knowledge needed to use English is not the same as the knowledge needed to teach others to use English. Beyond common content knowledge, teachers who enact integrative teaching need *specialized content knowledge*, or the knowledge unique to teaching. In integrative teaching, specialized content knowledge involves knowing how language is used to construct meaning within a given content area. This specialized knowledge is absolutely essential for a teacher to identify language demands embedded in instructional tasks, to attend to linguistic form, and to provide comprehensible input that supports unpacking curricular contents as well as unpacking the language that constructs these contents and scaffolding it for ELLs. In the previously mentioned example ("When the stone was dropped into the pond, rings formed on the surface of the water"), specialized content knowledge would involve knowing why rings form when objects are dropped into water as well as understanding passive voice and why utilizing the passive voice contributes to expressions of objectivity in science. Furthermore, as previously discussed, how verbs like *form* differ in meaning from verbs like *create* or *make*, and the fact that *ring* has different meanings outside science are similarly related to a teacher's specialized content knowledge.

As applied to integrative teaching, the *knowledge of content and students* domain is deeply connected to knowing and learning about ELLs. Knowledge in this domain allows teachers to anticipate difficulty that language learners might have with specific language within the content area. In the previously introduced example ("Eight fused bones create the human

cranial cavity: occipital, frontal, sphenoid, ethmoid, left parietal, right parietal, left temporal, and right temporal. The volume of this cranial cavity for an adult human skull is approximately 1,400 cubic centimeters"), teachers with ample knowledge of content and students might know that a word like *volume* could be problematic for ELLs because of its association with music. They might also know that a word like *cranium* might be easily understood by a Spanish speaker because of the cognate *cráneo*, but less easily understood by Swedish speakers.

The knowledge that allows teachers to anticipate language-related difficulty also enables them to provide comprehensible input and to scaffold meaning and language learning for their ELLs. Identifying temporal markers in a historical text, for example, and using that information to construct meaning through chronology can be particularly difficult for ELLs. A history teacher might use this knowledge about the language of her content and its difficulty for language learners to organize a mini lesson to identify and explain all the temporal markers in a text and use a timeline as a graphic organizer to scaffold the chronology for her ELLs.

Finally, the domain of *knowledge of content and teaching* might involve identifying exemplary passages of content-specific language, such as the previously discussed passages in history ("Nazi soldiers attacked American troops at the Battle of the Bulge," and "The Axis advance was halted by P-47 bombers"). The teacher might choose these passages to specifically focus on key issues of linguistic agency in historical writing. This type of knowledge might also allow a teacher to decide which linguistic features to draw extended attention to and which features to ignore. In the example given, an ELL asking about the word *advance* and its use as a noun might be allowed more attention in a history class than a question about the meaning of *bulge*.

Conclusion

In the same way that the work of teaching can be viewed as bricolage (Hatton, 1988), so too can the work of integrative teaching. How teachers enact integrative teaching and make the language of content visible to their ELLs likely draws on a complex and multifaceted set of knowledge. This chapter has identified some of the components that might be part of the integrative teaching bricolage, conceptually represented in this framework of content knowledge for integrative teaching, but it is not likely inclusive of all components. The domains of knowledge outlined above offer a guide by which to delve into integrative teaching that is grounded in previous research and current thinking about teaching language, teaching language learners, and teaching content. There is not yet a robust body of empirical research at the intersection of these three areas that forecasts what integrative teaching might look like in the context of a content area classroom; the study reported herein sought to contribute to and to clarify the relationships between these bodies of literature. Data that document integrative teaching as it is enacted by successful teachers of ELLs can provide rich and valuable insights into the nature of integrative teaching and serve to further refine, critique, expand, and rethink a framework for content knowledge for integrative teaching. In short, this study sought to more deeply understand not only the practices that contribute to and are enacted within integrative teaching, but also to explore the knowledge that supports this teaching within content area classrooms.

CHAPTER 3: METHOD

This study set out to examine what I have conceptualized as integrative teaching; more specifically, it aimed to explore possible integrative teaching as enacted by content area teachers of ELLs and the knowledge these teachers seem to draw on as they enact this teaching. Research on teaching has been conducted using qualitative (e.g., Schleppegrell et al., 2004), quantitative (e.g., Lee & Maerten-Rivera, 2012), and mixed method approaches (e.g., Hill et al., 2008). To account for the exploratory nature of this study, which seeks to describe and explain rather than to confirm or measure, I used a field-based qualitative research design.

I began this study with a case study design, which allows for the in-depth exploration of a phenomenon as it exists within the context of a bounded system (Merriam, 2009; Yin, 2014). Although this type of research is often used to study schools, departments, teachers, or other clearly bounded cases, I anticipated that I could study cases of integrative teaching. However, as I began analyzing data, I realized that case study was no longer an accurate description of the design because the activity that I was seeking to find was not the activity that I was observing and the conditions of finiteness and boundedness necessary for case study research were no longer met. I recognized that the focus of the teaching was much more on content than on ELLs or on teachers and that how I had initially envisioned what integrative teaching would look like was not exactly how it was enacted by the four teachers in this study. This prompted me to shift my approach and adjust the analysis to better capture the activity I was observing and focus specifically on PARALEXICAL teaching—one way in which integrative teaching can be enacted in practice.

I returned to the conceptual framework of content knowledge for integrative teaching I had constructed and adjusted my method to a broader qualitative design that could better capture

what I was seeing in the data and could allow me to ask questions about what it meant to teach content and to explain the process of teaching as I was seeing it across multiple participants and multiple teaching instances. Had I pursued this study in the way in which I set out to, I would likely have missed the richness, complexity, and multidimensionality of the teaching and the implications that this teaching could have on teacher education.

My resulting method entailed collecting different types of data from each of the four participants, including classroom observations, interviews, and classroom artifacts from their teaching as well as my own field notes. Data analysis included an iterative process of coding, analytic memo writing, and check-ins with critical friends. This analytic process, combined with a bricolage approach helped me to observe what I was expecting to find as well as consider what else was happening and what else could be.

Bricolage "demands a new level of research self-consciousness and awareness" (Kincheloe, 2001, p. 2), and as this study progressed, I felt my own consciousness and awareness of research being raised as I tailored methods to better describe or highlight what I saw in the teaching. This heightened consciousness allows me view my future work in new and multidimensional ways, but also compelled me to re-view my methodology in new light, revealing the pre-existing "dysconsciousness" (Villegas & Lucas, 2002b) with which I entered the study. As I raised my own consciousness through the data analysis process, I found that I shifted from an expectant, theory-driven researcher whose perspective was drawn from existing literature, to a bricoleur.

Identification of Participants

I used purposeful sampling techniques to identify four participants who had been recognized as successful teachers of ELLs. In this study I used "successful" not as a selection

criterion, but as an identifier for nominations of "successful" teachers of ELLs. Literature reviewed in Chapter 2 described theoretical teacher knowledge bases required for teaching ELLs, which indicated that a successful teacher of ELLs should have certain types of language-related knowledge and skills (cf. Bunch, 2013; de Jong & Harper, 2005; Fillmore & Snow, 2003; Lucas et al., 2008; Turkan et al., 2014). While these types of knowledge and skills have been hypothesized as related to successfully teaching ELLs, they neither predetermine successful teaching, nor have they been used as indicators of success in teacher evaluation tools. Therefore, the teacher- and teaching-related theoretical stances and frameworks presented in Chapter 2, including content knowledge for integrative teaching, are useful heuristics for viewing teaching, but not for evaluating teachers. To that end, I did not seek to determine whether or not a teacher was "successful" by means of applying external heuristics; instead I sought to examine the teaching of successful teachers.

"Successful" teachers in the context of this study are teachers who are perceived by others to be experts at teaching English language learners. The characteristics that comprise teacher expertise are varied and largely lie outside the scope of this study, but social recognition by peers is a widely used and accepted measure (Agnew, Ford, & Hayes, 1997). In a review of indicators of teacher expertise in educational research, Palmer, Stough, Burdenski, and Gonzales (2005) found that social recognition by peers, principals, administrators, or teacher educators were frequently used in education research, along with years of experience, professional membership, or other normative or criterion-based performance indicators. I explicitly used the social recognition of expert and successful teachers for this study and identified participants based on recommendations by principals, curriculum supervisors, or other peers.

I identified successful teachers who teach mathematics and science since these content areas are central to the preparation of students for college and careers. Together, the Common Core State Standards and the Next Generation Science Standards emphasize mathematics, science, and language, and, as previously discussed, heavily involve language skills to meet standards in both mathematics and science. Furthermore, mathematics and science have long been said to be the foundations for a knowledge-based society (Bureau of Oceans and International Environmental and Scientific Affairs, 2008; H. Res. 196, 115 Cong., 2017; National Commission on Excellence in Education, 1983), making these areas especially pertinent for studying teaching.

Etymologically, mathematics, from the Latin *mathema*, refers to matters related to that which is learned ("Mathematic," 2018), and science, from the Latin *scientia*, refers to that which is known ("Science," 2018). Together, this learning and knowing are essential skills in a knowledge-based society that values not just learning something, but creating, manipulating, separating, or reconfiguring that which was learned. However, the etymology of both mathematics and science suggest that the process or learning or knowing is done and completed (note the use of the past participles *learned* and *known*, and not the present continuous forms of *learning* and *knowing*). A knowledge-based society, by contrast, assumes production of new knowledge, so skills related to "that which is learned" are no longer enough since this type of society values not just the possession of known things, but the application and manipulation of those things to create new things through learning and knowing. In the shift from an industry-based society to a knowledge-based one, the locus of mathematics and science shift from focusing on that which is learned or known, to that which can produce knowing or learning, making mathematics and science pertinent content areas of study in a knowledge-based society.

The compartmentalization of schooling that contributes to the division of content areas and specialization of teachers is especially pronounced in middle and secondary grades (grades 5-12 in the United States). Content area teachers tend not to perceive themselves as teachers of language (DelliCarpini & Alonso, 2015; Fisher & Ivey, 2005; Ness, 2016), and content area instruction in these grades is usually viewed as separate from the literacy-focused instruction typically common in earlier grades, despite the need for language and literacy to be addressed in middle and secondary school grades and across content areas (Alvermann, Moon, & Hagood, 2018; Moje, 2006; Sturtevant et al., 2016). As mentioned in Chapter 1, the language that students are expected to use to meet new academic standards differs across content areas; for example, creating a scientific argument differs from creating a literary argument. Teaching students this content-specific language, then, is perhaps best done by "those who are experts in the disciplines themselves" (Moje, 2006, p. 2). In the context of this study, these are content area teachers, especially those at the middle school and high school levels. If content area teachers are most qualified to teach content area language and language should be taught in content area classes at the middle and secondary levels, it seems reasonable that successful content area teachers at middle and secondary levels of schooling might be engaging with the language of their content areas and more fully teaching content rather than simply transmitting what I previously referred to as "curricular contents," that is, the facts, topics, and concepts of a subject area. Following this logic, I targeted these types of teachers and grade levels and anticipated that they might provide especially good insights into teaching in ways that prepared students to access content as well as curricular contents.

I recruited participants by contacting administrators affiliated with the Northeastern Teaching Residency (NTR; a pseudonym) program and asking them to nominate content area

teachers at the middle or secondary levels who they considered to be successful or expert content area teachers of ELLs, that is, those content area teachers who happen to have ELLs in their classes—and teach them well—but who are not language specialists. The NTR is an apprentice-based teacher education program offered through a large public university where preservice teachers, or "residents" in the nomenclature of the program, work alongside and are mentored by master teachers for one year as they earn teaching certification and a Master of Arts in Teaching through on-site learning during the day and university coursework in the evenings. They then receive another three years of mentoring once they become teachers. The NTR was created in response to the growing need for qualified science, technology, engineering, and mathematics teachers in urban schools and specifically addresses these content areas in one of its residency strands. Furthermore, the residency program itself models the decompartmentalization characteristic of integrative teaching in that it has removed barriers between schools and universities, and between preservice and inservice teaching. Instead of nominating specific teachers, NTR administrators nominated a school, Market Street High School (a pseudonym), as a fitting context for my study because of its administrative support for mathematics and science teaching, the overall quality of Market Street teachers, and its large population of students who speak languages other than English at home. Many NTR residents have continued to teach at Market Street after their graduation, but participants were identified from all mathematics and science teachers, which included NTR graduates as well as those from other programs. The principal, vice principal for mathematics, and vice principal for science together nominated two mathematics teachers (Mr. Bennett and Mr. Hanson, both pseudonyms) and two science teachers (Mr. Cruz and Ms. Desanne, both pseudonyms) as possible participants for this study. All four identified teachers agreed to participate.

After these four participants had given their consent to take part in the study, I contacted each and arranged to be present as he or she engaged in the work of teaching. As a reminder, the "work of teaching" carries a particular significance in this study and refers to all the work teachers do, including, but certainly not limited to, classroom instruction. I observed each teacher's work of teaching contextualized within one section of one course (e.g., fourth period Biology) for one academic unit—approximately eight lessons per teacher. The section I observed was negotiated with the teacher beforehand and was primarily based on scheduling factors, including the availability of a non-teaching period after the class in order to conduct debriefing interviews. Observing an academic unit allowed me to see a range of teacher work including planning, classroom instruction, and assessment within a cohesive group of lessons. These observations included classroom instruction as well as planning, grading, and other work of teaching for that course section.

The four individual teachers who participated in this study were extraordinary and exemplary teachers. One was pursuing a doctoral degree, another had accepted a prestigious grant to study education in Asia, and a third had recently been invited to Washington, DC to urge congressional leaders to better support and transform urban education. They were all dedicated to their teaching, inspiring to observe, and certainly lived up to their initial identification as successful and exceptional teachers. The focus of this study, however, was on teaching, not on teachers. To maintain this teaching focus and avoid the common pitfall of looking past teaching to the teachers themselves, I have purposefully excluded detailed descriptions of these individual educators.

Study Context

Market Street High School serves approximately 1,600 students in a large urban center in the Northeastern United States. The school sits across from a large park and, like the surrounding area, shows the intertwining of both a historic neighborhood and a modern city. Market Street High's unassuming brick façade blends in with the surrounding townhouses, apartment buildings, and businesses built decades ago, belying the advanced robotics laboratory and the ubiquity of smart boards and chrome books also housed in the school. Market Street High School draws students from the surrounding neighborhood—a multicultural community where corner bodegas sell newspapers printed in English, Spanish, and Portuguese in addition to viands from European, Central American, and South American countries. At the café next to the school, retired men congregate to drink cappuccino and have heated discussions over Brazilian politics while groups of students at nearby tables pass around cell phones, laughing at video clips as they share plates of French fries and mango sodas before heading to fourth period history class.

At the time of the study, nearly 70% of Market Street's students spoke a language other than English at home, predominantly Spanish or Portuguese. According to the teacher participants, most Market Street students were either currently or formerly classified English language learners, meaning that they were currently taking ESL (English as a Second Language) classes or had taken ESL classes earlier in their education.

Market Street offered general education courses taught in English as well as both Spanish and Portuguese bilingual programs in which core courses in mathematics, science, history, and health were offered in Spanish and Portuguese. Honors, Advanced Placement (AP) and International Baccalaureate (IB) classes were also available in English.

Market Street students currently classified as ELLs were grouped in levels from ESL 1 (newcomers and beginners) to ESL 5 (advanced and transitioning to general education), based on a district exam. Students classified as ELLs generally took ESL courses and, for the students who spoke Spanish or Portuguese, took core courses in their native languages within the bilingual program. Elective classes, art, physical education, and music classes were all taught in English. Students enrolled in the bilingual program began to transition to general education upon reaching ESL 4 or ESL 5, often by taking some general education classes taught in English, usually mathematics and science, while continuing to take other bilingual or ESL classes. Students at Market Street also came from language backgrounds such as Bengali, Russian, Gujarati, Mandarin, Haitian Creole, or Arabic, but because these students represented only a small percentage of classified ELLs, no bilingual programs were available in these languages. These students were, aside from ESL classes, placed in general education classes taught in English.

Students could also elect to enroll in honors sections instead of taking corresponding bilingual or general education courses (e.g., enrolling in honors Geometry, taught in English, instead of general education Geometry, also taught in English, or bilingual Geometry, taught in either Spanish or Portuguese). For example, an ESL 4 student who was placed in a bilingual Spanish Geometry class could elect to transfer to a general education Geometry or honors Geometry section of the class taught in English, even though that student was still eligible to enroll in a bilingual section. According to the teacher participants, ELLs did not need to necessarily be at a specific ESL level in order to take honors classes, but the teachers estimated that the classified ELLs who elected to take honors classes were classified as ESL 3 and higher. According to Mr. Cruz, who also taught in the Spanish bilingual program, students at the ESL 3

level could communicate in English most of the time and were transitioning to doing more written assignments in English.

I observed Mr. Bennett teach honors Geometry, a class taken by tenth grade students who had been successful in their Algebra I classes the previous year. The honors Geometry class followed the same curriculum as Mr. Bennett's general education Geometry class, which he taught earlier in the day. Mr. Bennett said his honors section sometimes could "go a little deeper" than his general education section, but the class averages for the two sections on the last two tests were nearly identical. Nearly all of the 28 students in honors Geometry spoke Spanish or Portuguese, and Mr. Bennett thought that about five or six were currently classified as English Language Learners and estimated those students to be at ESL 3 and ESL 4 levels. At the time of the study, Mr. Bennett's class was working on geometric transformations on a coordinate plane and beginning to apply deductive reasoning in geometric proofs.

I observed Mr. Cruz teach a general education Biology class. Whereas students attend mathematics and English classes every day in Market Street's block schedule, they attend science classes every other day. Biology is normally taken during a student's ninth grade year at Market Street, but Mr. Cruz's section had 19 students in multiple grades, including students who had transferred from other schools but had not yet taken Biology, students who had previously failed Biology and were retaking the course, and three ESL 1 and ESL 2 students who spoke languages other than Spanish and Portuguese and who did not have a bilingual course option. Mr. Cruz estimated that three students in the class were at ESL 4 and ESL5 and taking science classes in English for the first time, and that about three or four other students had transitioned out of ESL within the last few years. Like Mr. Bennett's class, most of Mr. Cruz's students

spoke Spanish or Portuguese at home. At the time of the study, Mr. Cruz's class was learning about the different organelles of a cell and using text-based evidence in scientific reasoning.

I observed Ms. Desanne teach a unit on cell life cycles and mutation to a class of 28 ninth grade honors Biology students. Ms. Desanne said that "several" of her students were currently classified ELLs who spoke Spanish or Portuguese. By my estimation, about seven or eight students were likely classified ELLs, one of whom was approximately at an ESL 3 level, the rest of whom were ESL 4 or 5. At Market Street, ninth grade classes were loosely cohort-based, meaning that ninth graders in their first year of high school spent at least half the day with the same group of students, with the exception of electives, foreign languages, and ESL courses. Some of the students had transferred to Ms. Desanne's honors section during the first few weeks of school, either from general education or bilingual classes. Other students were initially placed into an honors section before school started, although Ms. Desanne did not know how students were initially placed into an honors section. During the first marking period, approximately half the students in the class made the Honor Roll.

I observed Mr. Hanson teach honors Algebra I to ninth grade students. Coincidentally, due to the cohort model, Mr. Hanson's honors Algebra I class comprised nearly the same students as Ms. Desanne's honors Biology class. Neither Ms. Desanne nor Mr. Hanson mentioned that they knew the exact number of classified ELLs in their classes, but according to Mr. Hanson, approximately eight of the 30 students were currently classified as English language learners, all of whom Mr. Hanson guessed to be ESL 3 or higher. This was consistent with my estimation based on observation of both his and Ms. Desanne's classes. At the time of the study, the class was working with linear data and creating viable arguments. To accommodate a last-minute standardized-testing-induced schedule change, Mr. Hanson rescheduled one lesson on

creating viable arguments that was originally scheduled to be included in the observed unit for a later unit. I observed this postponed lesson approximately six weeks later.

It must be said that, while all the classes observed contained a mix of monolingual English-speaking students, students who had been previously classified as English language learners, and students currently classified as English language learners, the current ELL status of each student or their proficiency level (e.g., ESL 4), did not seem to be useful information to the teacher participants. This is not to say the language proficiency of their students was irrelevant to the teachers—on the contrary, the teachers seemed to have an acute sense of who the linguistically vulnerable students were in their classes and made specific pedagogical moves according to this identification. However, some of these linguistically vulnerable students were never classified as or no longer classified as ELLs, making the school's designation of "English language learner" not particularly helpful to the teacher participants. Additionally, aside from Mr. Cruz, who taught in the bilingual Spanish program, the teachers had little understanding of the ESL levels and what they meant in terms of English proficiency, so the difference between ESL 3 and ESL 4 was not a meaningful difference for the teachers, and not particularly relevant to their classroom instruction.

Because of these factors, each of the teachers seemed to know roughly how many ELLs they had, and certainly knew that their classes included several ELLs, but all seemed to take the perspective that accounting for language needed to be addressed as a class-level and teaching-level issue, rather than only as a student-level issue. In this way, the teaching could seemingly address issues of language for all students, including those who the teachers identified as linguistically vulnerable, regardless of whether or not they were currently classified by the school as an English language learner; as Mr. Hanson noted, "best practice for ELL students is

best practice for all students" (closing interview, Dec.19). Consistent with linguistically responsive practices, teachers did adjust their language and teaching based on the language proficiency of individual students, but they also approached the overall teaching of the content itself by addressing and accounting for the language of their respective disciplines. This study primarily focuses on the latter.

The participants had access to each student's file and could look up whether they were a classified English language learner and, if so, their ESL level, but instead seemed to teach their classes as if any student could be an ELL. How ELLs were defined, classified, de-classified, or placed into bilingual, general education, or honors classes was largely unknown to the teacher participants, although they speculated that test scores, class sizes of bilingual sections, scheduling availability, parental choice, or teacher recommendation influenced student placement. In this study, I use the term English Language Learners in a similar way that the teachers in this study did—not as a rigid legal classification, but as a description of students who still seemed to be learning English to academic levels of proficiency.

Researcher Role and Positionality

In qualitative research, the researcher is the primary instrument through which data are collected, analyzed, and interpreted (Creswell, 2013; Merriam, 2009). I represent the largest demographic of teachers in the United States: White, middle-class, native-English-speaking, and female; I very much look and sound 'American.' However, I grew up using a non-English language, spent over 5 years living outside the United States, and identify as a polyglot, thus making me somewhat less like the traditional demographic of an American teacher and more like the traditional demographic of an English language learner. Because of these characteristics, I

can often relate to both ELLs and their content area teachers, but I am not a full member of either group myself.

Studying teaching of ELLs put me in a unique situation where I could identify with teachers of ELLs, but also come into schools and classrooms with a certain degree of power given my status as a university researcher and language specialist. I am an experienced teacher of ELLs and have a high degree of language knowledge from my own teaching experiences, postgraduate education, and second language studies, but I have never taught academic content such as mathematics, science, or history. I have passing common content knowledge of each of these content areas, but do not have any of the specialized content knowledge required for teaching within these content areas. I was not previously acquainted with the four participants in this study, so I actively attempted to reduce any potential power imbalances stemming from status by positioning my participants as the experts and myself as the learner. My language knowledge and the noticings I made based on my own expertise were essential to the study, but I carefully moderated those factors in conversations with the teachers, as I was seeking to unpack the practice and expertise of my participants and was approaching and observing their work as a learner, rather than displaying or validating my own existing expertise. From the outset, I was explicit in my conversations with these four teachers that my role in this study was to explore and unpack exemplary teaching, not to evaluate whether or not the teaching I saw was exemplary. Accordingly, I did not share any data with administrators or supervisors, offer instructional critiques, or suggest improvements for teaching, instead emphasizing their expertise as content area teachers over my own expertise as a language specialist.

Data Sources and Collection

To understand the teaching that was enacted and the type of knowledge it seemed to draw on, I collected different types of data from each of the four participants. Teaching is complex and crystal-like with multiple facets and angles, and, as such, multiple and varied data sources allow for triangulation and subsequent crystallization of data (Tracy, 2010). Using multiple data sources and multiple teacher participants created opportunities for me to look at some of the different aspects of integrative teaching that I had established prior to data collection, which, in turn, created opportunities for me to better understand additional aspects of teaching that I was observing. Data sources for this study included lesson observations throughout the unit, field notes, semistructured interviews, and classroom artifacts. A summary of the interview and observation data I collected during the Fall 2017 semester appears below:

Table 1

Summary of Observation and Interview Data

Data Source	Description	Count (*n*)	Time
Initial Interviews	Interviews conducted with each participant at the outset of data collection	4	≈ 90 minutes each
Classroom Observation	Observation and audio recording of teaching during a full instructional period	32	80-minute periods
Field Notes	Documented ongoings of the class period observed focused on teacher actions and language usage. Also included researcher interpretations, questions, and reflections	32	
Post-lesson Debriefing Interviews	Reflective interviews immediately following classroom observation	32	≈ 45 minutes each

Closing Interviews	Interviews conducted with each participant at the close of data collection	4	≈ 90 minutes each

Observations and Field Notes

I worked with each participant to determine which unit of which course might be appropriate to observe both to accommodate the teacher's schedule and to ensure that ELLs were enrolled in the course to be observed. I then acted as an "observer as participant" (Merriam, 2009), wherein I was present in the classroom, close enough to observe the teaching and interact with the participants and their students, but not participate in the teaching itself (cf. Adler & Adler, 1998). To reduce the effect of an observer on the students, I introduced myself to each class as a researcher studying "really good teaching," explained that I was there to watch and listen to their teacher, not to them, and invited and answered questions they had about the study (e.g., Merriam, 2009). For example, one student asked to see the notes that I was taking during class, and others asked more general questions about the research process. I observed the same section of the same course throughout the duration of the unit, since prolonged engagement with each teacher was necessary for me to begin to understand the contextual meaning of content area teaching in practice (Cho & Trent, 2006).

During each observed lesson, teachers used a lapel microphone to record the spoken language used in their teaching, including whole-group instruction and responses to individual students or small groups. I also took field notes during each lesson to document the events of the class in detail and capture data outside the teacher's speech, such as student activity and reaction to the teacher, student questions, or references to class materials such as presentation slides, textbooks, or posters around the classroom.

In addition to capturing the paralinguistic ongoings of the classroom, these field notes also included a self-reflexive commentary on my own reflective interpretations, comments, wonderings, and insights (Creswell, 2013; Emerson, Fretz, & Shaw, 2011; Merriam, 2009). To this end I used a dual entry observation protocol with one column devoted to my descriptive notes and observations and the other to my reflections, hunches, initial interpretations, ruminations, questions, and comments (Creswell, 2013; Merriam, 2009). Within these field notes I also generated questions or elicitations to be used in post-lesson interviews, where I would ask teachers to reflect on their use of or attention to language at particular points throughout the lesson and the decisions they made regarding their teaching. For example, I recorded that Mr. Hanson cautioned one group to "attend to precision" as small groups were completing classwork. On the right column I made a note reminding myself during our post-lesson debriefing interview to ask Mr. Hanson what he noticed that made him instruct students to "attend to precision" (observation, Nov. 1) Based on how I had heard the phrase used in the class, as well as in Mr. Bennett's class, I speculated on the broad uses of this phrase, which seemed to be used as a reminders to read and follow directions, a hint to include units of measure, or an alert that an arithmetical mistake had been calculated.

I particularly observed the ways in which the teachers attended to language, the curriculum, and academic concepts in their practice, both the ways that seemed planned as well as ways that seemed spontaneous. I specifically looked for ways in which teachers seemed to be adapting or modifying content so that it was comprehensible, ways in which teachers encouraged students to use disciplinary language, and other teaching instances at the intersection of language, discipline, and curricular contents. In other words, ways that teachers seemed to be moving the content toward the students (e.g., making contents comprehensible), as well as ways

that teachers seemed to be moving the students toward the content (e.g., preparing students for disciplinary language). For example, this difference could be seen in Mr. Bennett explaining the word *pedestrian* in a word problem (i.e., making contents comprehensible), and Mr. Cruz teaching his students the order and construction of scientific arguments (i.e., preparing students for disciplinary language).

Semistructured Interviews

Interviewing is a common technique that can be a key source of evidence in qualitative research because it allows the researcher to ask participants specific questions related to the study (Merriam, 2009; Yin, 2014). Semistructured interviews were ideal for this study since they allow for some systematicity across each of the four participants as similar lines of inquiry are pursued, yet still offer room to explore topics that arise organically in the field (Merriam, 2009; Patton, 2002). To that end, I conducted and recorded several semistructured interviews with each teacher before, during, and after the observed unit. I conducted one semistructured interview before the unit began to ask each teacher about his or her general teaching practice, approaches to the concurrent teaching of language and content, perceptions of the role of language in content area classes, and experience with language and language learners. For example, in each initial, pre-observation interview I asked each participant about their overall experience teaching language learners, how they felt they taught the language of science or the language of math, and what they thought contributed to being identified as a "successful teacher of ELLs."

During the observed units and most often immediately following the instructional period, I conducted post-lesson debriefing interviews guided by the questions generated during my observation of the instructional period. These interviews centered on the ways teaching attended

to both language and academic concepts in that particular lesson and specific instances in which the teacher engaged with content area language. These interviews borrowed from critical decision method, a technique designed to help experts articulate the thinking behind their decisions of practice and task performance (Seamster, Redding, & Kaempf, 2000). With this approach, the interviewee is asked about a specific incident that occurred and questioned as to the decision strategies and knowledge involved in the incident (Hoffman, Crandall, & Shadbolt, 1998). For example, after noticing Ms. Desanne give oral corrective feedback to an ELL on how to phrase a particular scientific thought, I asked questions about why she chose to correct the student's wording, why she used a particular pedagogical technique to do so, or what she knew about science, scientific language, the student's language, or other contextual factors that influenced her decisions to act in the ways she did. In short, these post-lesson debriefing interviews were opportunities for teachers to explain and reflect on specific instances in which issues of language were addressed and for them to provide more detail about the circumstances, knowledge, or skill involved in specific teaching instances.

As used in this study, *teaching instances* are significant moments identified by me, as the researcher, about each participant's practice that could be related to understanding the teaching of content. This draws on Tripp's (1993) "critical incidents," which refer to even quotidian moments in teaching that are noteworthy points of reflection or analysis through critical thinking, as opposed to incidents that might readily be seen as 'inherently' serious, unusual, or career-altering. According to Tripp, critical incidents are moments identified by teachers or researchers about practice that can be analyzed critically in order to ascertain meaning. These teaching instances were varied and included single teacher comments, brief exchanges with students, longer stretches of teacher explanation, and whole class conversations. During debriefing

interviews, I asked participants to reflect on the teaching instances I identified during observation.

In addition to using the critical decision method to structure post-lesson interviews, I also used this method in teaching instances in which I observed a teacher's work of teaching outside of the lesson, such as when teachers were grading student work. In this way, I was able to ask teachers about their thoughts and decisions related to teaching instances as they happened in real time. For example, the following excerpt was from a debriefing interview in which I observed Ms. Desanne grade student essays on elephants and cancer and write formative comments to students:

> Ms. Desanne: [begins reading student essay; Circles *only* in the sentence *[Elephants] only have 20 copies of p53, which is a protein for suppressing tumors.*]
>
> Researcher: Why is *only* circled there?
>
> Ms. Desanne: Because she said ONLY five copies. When you say ONLY it means it's not that much, but compared to normal it's actually MORE than the norm. And that's the reason why they don't get cancer because they have more than normal- like humans only have two copies but elephants have 20 and this regulates it. Regulation stops cells from dividing so that they can just die if there's any issues with them. So I want her to realize- …but then she gets the idea later on. So I want her to make a connection that ONLY is not appropriate in this context. [Ms. Desanne continues writing in the margin] (debriefing interview, Dec. 20)

After the conclusion of the unit and classroom observations, I conducted a final semistructured interview with each participant in which I asked additional questions that

emerged from the data about the knowledge, processes and decisions involved in their practice. These final interviews were opportunities for the participants to bring up new ideas, for me to ask further questions, to ask for feedback about the trends or patterns I had been noticing, and to check to see if initial interpretations I was drawing were accurately represented. I asked teachers what they had been thinking about in their practice with respect to mathematics/science and language since I had observed their classes. I also asked teachers for more information about implicit and explicit teaching, and about the role of procedures in skill development, since all teachers were deliberately avoiding "proceduralizing" skills, such as the writing of scientific and mathematical arguments.

Classroom Artifacts

In addition to observations and interviews, I also gathered classroom artifacts from each teacher that pointed to the intersection of language and curricular contents in teaching. These included lesson plans, presentation slides, text translations, classroom posters, supplemental handouts, assessments, and feedback written on student work, which complemented that which was observed during the lessons. In sum, these multiple data sources allowed me to develop a thorough understanding of the teaching I had observed.

Data Preparation

After the data were collected, I prepared them for analysis. I uploaded and anonymized paper and digital documents, photographs of classroom environments, and field notes. I transcribed all audio recordings for initial and closing interviews, instructed lessons, and post-lesson debriefing interviews and de-identified all transcripts. I organized and stored all data sources using NVivo 11 software.

Transcription and Text Representation

Spoken data can be represented in written form in myriad ways (Bucholtz, 2007; Edwards & Lampert, 2014; Gee, 2011; Rymes, 2015), leaving the researcher confronted with many decisions as to which aspects of language (e.g., accent, body movements, word stress) will be documented, or not, and how. Because transcripts were not intended to be used for conversation or discourse analysis, the transcriptions were not as 'fine-grained' as would have been necessary for these types of analysis; intonation, for instance, was not a needed transcription feature for analysis. Still, I needed to visually illustrate word stress, reading written speech aloud, and contextual information from the researcher. I used fully capitalized letters to indicate word stress:

> Mr. Cruz: Yeah, because it's not GETTING energy as much as it's PRODUCING energy. (debriefing interview, Dec. 1)

I use italics to indicate student writing that was read aloud. This was most often used in the data preparation to separate words generated by the teachers from words generated by students as teachers read student work aloud during grading:

> Ms. Desanne: I don't think she understood the question clearly. Because she said *the amount of energy the cells can make is enough*. I don't know why she used the word *enough*. *The damaged protein channel can either not let glucose pass or bits and pieces can pass.* I don't know if she thought these were bits and pieces of glucose, so she didn't read the table correctly. (debriefing interview, Dec. 12)

I also used brackets to provide other information to the reader, such as physical movements or other paralinguistic or contextual information:

> Mr. Bennett: Let's look at another one [switches papers on the document camera]. So again I wrote some things down. (observation, Oct. 19)

Brackets also indicate where a student's name was said by the teacher, with the student's name replaced with a generic identifier:

> Mr. Hanson: OK, [Student A] is going to be teacher and [Student A] is going to explain how she got the function rule and the symbolic representation. We're all going to be paying attention to [Student A]. [Student A], nice and loud, level two voice. The floor is yours. (observation, Oct. 24)

In non-transcribed portions of the text I use italics and single quotation marks (i.e., *scare quotes*) to call the reader's attention to specific words in the text. Consistent with the APA 6th edition style manual, I use italics to indicate when a word is used as a term or label, or to clarify linguistic focus, as in the sample sentence, "The student twice mispronounced *contribute* when describing factors of age and size in elephant cancer development." Following Predelli (2003) and Fairclough (1992), I also use single quotation marks throughout this document to alert the reader that I am representing my desire to distance myself from and contest the words others have said (e.g., 'normal'), or to emphasize contrast (e.g., 'listen' and 'hear').

Data Analysis

This study aimed to both build from and build on conceptualizations of teaching content in science and mathematics. Consequently, I specifically chose pre-existing analytical methods well suited to each of those aims, which together aspired me to view what was and what could be. I used coding, analytical memo writing, and check-ins with critical friends as an iterative process to break apart and reassemble the data in multiple ways as well as to clarify and solidify my own thinking and interpretations. While the framework for integrative teaching presented in

Chapter 2 initiated this study and very much informed data collection, it did not dictate data analysis. Instead of combing through the data to test the construct of integrative teaching, I sought to consider the data in multiple ways and allow findings to emerge organically from the teaching I had observed. Of course, it was impossible to approach the data with a purely objective orientation, but I took efforts to "bracket" (Moustakas, 1994), or recognize, my preexisting knowledge and assumptions, discussed later in this section.

In qualitative analyses, coding is a way of classifying or categorizing data according to a word or phrase "that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, 2016, p. 4). Coding is the "critical link" between data collection and data explanation that allows data to be classified, grouped, and organized in order to develop meaning (Charmaz, 2001). Initial coding "breaks down qualitative data into discrete parts" (Saldaña, 2016, p. 115), offering the researcher the opportunity to gain a deep understanding of their own data. This initial coding provided multiple opportunities for me to comb and re-comb through my data and allowed me to look at the data in different ways based on the codes that emerged in previous initial coding cycles.

I initially examined artifacts, field notes, and audio recordings through a process of initial coding (Charmaz, 2014). To ensure focus on teaching rather than teachers, I set teaching instance as the unit of analysis and, in combination with reading the Common Core State Standards and Next Generation Science Standards, combed through the data to identify and code instances wherein teaching specifically addressed mathematics or science according to corresponding content area standards.

Initial coding included analytic techniques often associated with grounded theory—in particular, process coding (Saldaña, 2016), which focuses on actions, and in vivo coding

(Saldaña, 2016), which utilizes quoted speech from the participants. For example, "collateral vocabulary," "kid-friendly language" and in-process learning that was "OK for now" emerged as meaningful in vivo codes. These coding processes first supported an unfolding of overlapping layers of instructional actions that allowed me to shed my tendency to 'listen' from a linguistics perspective and learn to 'hear' from a content area perspective. For example, these coding processes shifted my focus from the ways in which teachers corrected students' use of English to the ways in which the teaching taught students how to represent and construct mathematical and scientific understanding.

Moustakas (1994) offered the phenomenological technique of *bracketing*, which is a way of putting down or setting aside one's own beliefs, hunches, and expectations about what the data hold. In this study, this involved my deliberately looking at 'non-linguistic' teaching instances as opposed to only analyzing the 'linguistic' instances I could easily see. This bracketing also led me to reposition the participants as the language experts and discover what I could learn from them, rather than identifying pieces of my own expertise in the teaching practices of my participants. Bracketing prompted me to acknowledge and hold my presuppositions about teaching, language, and content—as far as I was able to—so that I could view the data from other perspectives and seek the meaning those perspectives bring. Engaging in these initial coding processes allowed me to look beyond my own expertise by inviting me to consider different perspectives and reconsider things I thought I knew, thus making the familiar strange and the strange familiar.

I identified distinct teaching instances for further analysis after initial coding processes repeatedly hinted that some aspects of the teaching I was observing were not well explained or categorized by existing frameworks identified in Chapter 2. To more deeply unpack these

instances, I then extended the analytic process through axial coding (Saldaña, 2016), which reassembles data isolated into discrete codes during initial coding and identifies relationships between and among the codes. Axial coding is often used in grounded theory research to identify central categories and the subcategories that revolve around it, much like the axis of a wheel and its spokes. For example, *unschooling* emerged as a central category through axial coding, with subcategories including *avoiding rote learning* and *beyond learned procedures*. Axial coding allowed me to pick up, set down, and reprioritize data, frequently "reshuffling the deck" and regrouping codes into meaningful categories. For example, codes relating to *logic* frequently moved and were regrouped as my understanding of the content taught evolved. I then identified themes spanning these categories to determine which configurations offered potential insights, presented in later chapters. This in vivo, process, and axial coding continued cyclically until no additional information emerged, suggesting data saturation had been achieved. For example, as *logic* evolved into *logos*, discussed in the next chapter, I stopped noticing new or unexplained aspects of the coded data and the subcodes were more consonant with the axes.

Throughout the coding process, I wrote analytic memos (Saldaña, 2016) to help me reflect on the codes I was creating to interpret the meaning I was making of coded data, to identify possible avenues to explore in more detail, and to make connections to the extant literature base. These memos varied from marginalia and questions to ask myself later to longer paragraphs unpacking complex ideas or dialoguing with extant theories. For example, the simple question, "What if the teacher's L1 is *math*?" proved to powerfully impact both findings and implications of this study. I traced my thinking through writing, reading, and rereading these memos, which led me to engage in processes of both reflection and refraction, as described by O'Connor (2007). Like the variety of images made visible when walking through a carnival fun

house full of distorting mirrors, this became a tool for seeing beyond what was immediately apparent to what remained hidden or obscured—focusing on what was blurry, minimizing that which I could already see, and amplifying that which may otherwise go unnoticed. I knew I could see the English being taught throughout the data, for example, but it was only after the coding process that I could also see the depths of mathematics and science. Instead of remaining tethered to seeing only my initial perspective reflected in the data, this allowed me to see how what initially appeared blurry and obscure could be brought into sharp focus.

To push back on and push forward my thinking and ensure that my ideas made sense to a wider audience, I also relied on a core group of fellow doctoral students, some of whom were outside the teacher education program, who knew my work well. I frequently shared my preliminary findings, interpretations, and wonderings with these critical friends throughout the data collection and analysis processes. They interrogated my thinking, asked difficult questions about the interpretations I was forming, and suggested other possibilities for me to consider. They also served as a repeated bias check by making sure I focused on content and teaching, not on language, teachers, or learning. Coupled with professional mentors and advisors with whom I met regularly, critical friends offered different lenses on my work and compelled me to continuously articulate and defend my findings as I was refining them.

Selecting qualitative analytical techniques typically used in grounded theory and phenomenological research, I constructed an inductive, recursive, and iterative process of data analysis. This process comprised coding, re-coding, writing memos, and holding in-process findings up to critique as well as comparing them with extant literature, which strengthened my findings. Following bricolage tradition, which values multiplicity over singularity the findings

of this empirical study seek to provide an entry point into 'answering' questions about teaching, as opposed to providing 'the answer.'

Study Scope and Boundaries

This research was initially designed as a study to investigate the teaching of four successful content area teachers of ELLs; however, the study evolved into an investigation of the teaching of content to all students in four linguistically diverse, mainstream, high school classrooms. This offered insights into the concurrent work of teaching ELLs and academic content, but the findings of this research are not generalizable to all teaching, all content areas, all teachers, or all teaching contexts. I observed each teacher for one instructional unit, or about two weeks, during one fall semester from September to January, when classroom routines were still being established and the ninth-grade students in two of the four classrooms I observed were still acclimating to a new school and high-school-level curricula. This was enough time to glimpse into each teacher's teaching, but may not have been representative of the teaching within each unit and throughout the duration of the school year. However, this study focused on teaching, not on what had been (or should have been) learned or what had been (or should have been) covered by the end of the year, making the time period in which data was collected and the topics and concepts of the units observed relevant to understanding the context of data collection, but not necessarily relevant to the outcomes of data analysis.

This study investigated the teaching of four mainstream content area teachers perceived to be successful, but it makes no attempts to define successful, good, or effective teaching, nor does it attempt to package a reductionist version of the practices that comprise this teaching or proceduralize the ways other teachers could affect it. Instead, this study explored aspects of teaching as enacted by successful teachers and deconstructed the aspects of successful teaching

embodied through certain practices. In accordance with bricolage tradition, this study honored existing research by bringing multiple perspectives without necessarily privileging one over another or using one to refute another. It did not seek universality through its design or methods, but instead attempted to both speak to and speak about good teaching in ways that can prompt further discussion in content area teaching, second language teaching, and teacher education.

Importantly, this research and my writing of the results take an assets-based approach to viewing and portraying teachers. Building from literature on responsive teaching (e.g., Gay, 2010; Lucas et al., 2008; Villegas & Lucas, 2002b), in which students are approached from the assets they bring to a learning environment rather the shortcomings they are perceived to have or errors they are perceived to make, this study pushes against deficit perspectives of teachers. The participants in this study were identified as successful teachers—a status which I affirmed by means of my observations of and conversations with each. Any perceived teacher limitations, knowledge gaps, or missed opportunities were outside the scope of the study given its focus on identifying instances in which teaching was responsive.

Trustworthiness

One of the primary concerns of qualitative research is establishing or developing trustworthiness, a concept referred to in quantitative studies as validity and reliability. Bricolage approaches tend to deemphasize the centrality of singularity and finding the 'correct' or 'singular' answer to a given question. Triangulation, one of the ways in which trustworthiness is developed in qualitative designs, refers to providing and attending to multiple and different forms of evidence across sources, participants, theories, and investigators (Creswell & Miller, 2000). In qualitative research designs, one common form of triangulation is data triangulation, in which multiple data points and sources are used to support the internal validity of the

researcher's claims (Mathison, 1988; Miles & Huberman, 1984). Bricolage approaches do not necessarily seek singular, confirmable findings; however, that does not mean they eschew trustworthiness through triangulation. Although the findings I report in subsequent chapters were often seen in multiple instances and chosen from multiple data sources, I would not have excluded them had they only occurred once, thus tacitly invalidating a meaningful instance of content area teaching simply because it did not occur with sufficient frequency. Moreover, their inclusion and positioning as findings serves as recognition that teaching instances, even if only occurring once, can meaningfully inform teacher education.

Approaching research in terms of 'validation' in addition to 'validity' acknowledges that trustworthiness can transcend conceptualizations of a fixed, rigid, two-dimensional triangle, as suggested by the term *triangulation*, to better resemble a multidimensional, multi-angled, and complex crystal. Often used in ethnographic research, *crystallization* "provides us with a deepened, complex, thoroughly partial, understanding of the topic" (Richardson, 2000, p. 14). Crystallization and bricolage are both conceptualizations that draw from a wide range of practices, methods, and perspectives to work toward the goal of embracing a complex, though perhaps partial, understanding of a given topic. In this study, I use crystallization alongside bricolage as a way to push back against positivist assumptions of singular truth, to embrace multiplicity, and to question what is known.

Lastly, Denzin (2012) argues that qualitative research has an ethical obligation to confront injustice, elicit change, and undo the present to build a better future for us all. Previous research on improving teaching of ELLs has focused largely on people, their characteristics, and their knowledge—often described in the negative by what they lack or need. Rather than normalizing 'otherness' (e.g., knowledge of diverse cultures, awareness of grammars of non-

standard Englishes), this study calls attention to existing norms by focusing on the level of teaching from an assets-based approach, which helps retain focus on system-level changes that benefit ELLs rather than on characteristics or interventions of individual teachers.

On the surface, it may seem that teaching ELLs to see and be able to use the communicative norms needed to pass disciplinary shibboleths may appear to unquestioningly uphold hegemonic Anglo/Eurocentric norms of communication. Quite the reverse, teaching and researching methods that work to ensure every student is taught what is necessary to access a discipline catalyzes social justice, not hegemony, because these methods "make the injustices of history visible and hence open to change and transformation" (Denzin, 2012, p. 85). These potentially empowering bricolage approaches construct a more democratic society by combating the positivist and experimentalist norms that still pervade qualitative and mixed research methods (Denzin, 2012). Bricoleurs are "in the business of changing the world for social justice purposes" (p. 85); they must rise up to meet this challenge and "act as catalysts for social change" (p. 85). This study is my attempt to answer that call.

The Bricoleur

Understanding the bricoleur is prerequisite to understanding a bricolage. Bricoleurs understand that research is more than a remix of methodological techniques for the purposes of building and unbuilding; it is a complex, iterative, and recursive process replete with partiality and duplicity that is shaped by the people involved (Denzin, 2012). The people in the bricolage are part of the work and their actions, perspectives, and experiences are woven throughout the data and findings, but their identities can be folded into a larger story. This bricolage is infused with people—teachers, researchers, students, content area specialists, linguists, ELLs, and teacher educators, among others—and it stems from and is inspired by them. Focusing on the

lives of the people in the bricolage is necessary to understanding the bricolage, but they, themselves, are not the focus of the work. The focus of this study is teaching, not the participants as teachers, students as learners, or myself as researcher, but to fail to acknowledge our role in the work would be inauthentic.

When I began this research and stepped into the role of the bricoleur, I already knew that I needed to document how my participants saw and enacted their identities, knowledge bases, and expertise so I could understand content area teaching and how to improve it for ELLs. However, as I began to apply the data collection and analysis procedures detailed above, I quickly found that more was required of me. Consequently, although my shift in approach and perspective, captured in an excerpt from one of my analytic memos below, resembles a finding, methodologically it models a shift in perspective and sets up an inquiry question that I returned to throughout data collection, analysis, and reporting of the study. This shift was a crucial methodological step that shaded everything afterwards.

> *I always assumed my greatest resources coming into this study were my own identity as a language learner, knowledge base as a teacher, and expertise as a linguist. I knew the conceptual and empirical literature and the established teaching practices. From this, I expected to see many teaching practices used and championed by the second language literature, I expected teachers to be bilingual or at least have a deep understanding of the English language, and I expected to find evidence that teaching was working toward improving English fluency as it was also working toward improving mathematical or scientific understanding. Some pieces were there, but something else was the driving force behind this teaching.* (researcher journal, Jan. 3)

This crystallization had many facets reflecting and refracting traditional research—positionality, context, trustworthiness, method, and finding—that come together to create something different and new: an invitation. Sharing here how my own expertise was blinding me from seeing other forms of expertise in this work invites others to move beyond their own perspectives. It invites researchers to transcend siloed or isolated methods that essentially begin by validating studies through the triangulation of the multiple aspects of the researcher's identity, knowledge, and expertise. It welcomes uncertainty as to whether research questions are the only questions that need to be asked, or whether or not answers are superior to questions.

In many ways, the underlying task of research is to question existing understandings to construct new and, ideally, 'better' ones. However, to embrace the bricolage is to have the freedom to move between different and possibly contrary perspectives—to examine and turn the crystal, seeing in ways that prompt questioning. Everything I knew as a language expert said that if teachers had more language knowledge and could see language the way I did, they would enact better teaching of ELLs, and my initial approach to the work and questioning of the data reflected that. This orientation led me to believe that if I studied cases of content area teachers who successfully teach ELLs, 'the answer' would be that those teachers did indeed have more knowledge of language than their peers, and that their knowledge closely resembled my own.

As I began to stitch together the bricolage, it became immediately apparent that my 'expert hunch' not as accurate as I initially hoped and that finding answers to my research questions required me to begin with different questions than the literature told me to ask. In order to have a trustworthy analysis, I had to trouble my disciplinary expertise rather than trust it.

In Chapter 1, I asked readers to consider what if content was really language, pointing to the idea that content was broader and deeper than it is usually considered. As I transitioned from

expert to bricoleur, I inverted this question and asked myself to consider if what is language is really content. As this inquiry helped me to step further and further away from my own expertise, I became increasingly responsive to what language expertise is, to the previously unseen language expertise of others, and to what is necessary to be seen as a language expert. Additionally, as I observed classes, scribbled field notes, interviewed teachers, coded data, selected exemplars, and wrote findings, I questioned whether I was, indeed, the one with language expertise.

The following chapters make it apparent how, in this bricolage, these inquiry questions and the study research questions can be understood as facets of the same crystal. Broadly, they speak to the language expertise of content area teachers, trouble what it means to be responsive, and suggest how language experts can recognize the language expertise of others. The next chapter offers details of the content that was taught, followed by aspects of the teaching itself, which together show a new facet of culturally and linguistically responsive teaching.

CHAPTER 4: THE CONTENT

The purpose of this study, as initially designed, was to explore the ways in which my bricolaged conceptualization of integrative teaching was indeed enacted by successful teachers of ELLs, thereby giving this conceptualization of integrative teaching useful explanatory power, and to unpack the knowledge that seemed to inform this type of teaching. In light of my review of the existing literature, I expected to observe a variety of ways that teaching responded to the linguistic diversity of the students and ways in which the teaching was culturally and linguistically responsive.

When I examined teaching instances within the data, I found copious evidence of culturally and linguistically responsive teaching as described in the literature (Lucas & Villegas, 2011; Lucas, Villegas, & Freedson-Gonzalez, 2008; Villegas & Lucas, 2002). In Ms. Desanne's biology class, words such as *prophase*, *maintain*, and *prone* were defined, re-defined, contextualized, and given synonyms (observation, Dec. 5, Dec. 7, Dec. 13). Greetings in Mr. Cruz's and Mr. Hanson's classrooms could be heard in English, Spanish, and Portuguese, and linguistically-oriented clarifications, such as "I mean pair like two, not pear like the fruit" (observation, Oct. 16), were scattered throughout Mr. Bennett's teaching. Teachers modified classwork task scenarios to include student names and local landmarks, and Mr. Hanson built on student knowledge of "Mega Pizza" to draw an analogy to viable mathematical arguments. The instructional periods were structured not just to include student-student talk, but to maximize the time students spoke and worked with each other. Furthermore, all mistakes—conceptual, linguistic, or otherwise—were "expected, respected, and inspected" (Hanson, observation, Nov. 1), an approach that created content area environments responsive to the languages and cultures of the students and conducive to language learning.

These culturally and linguistically responsive teaching instances provided students with the opportunities to access classroom tasks and pass through scholastic gates, but the teaching that was preparing students to enter disciplinary gates looked different. It was responsive primarily to the language and culture of a given discipline and worked to bring students into that disciplinary language and culture. In short, I found something surprising: that the teaching treated content as a language.

In this chapter and the one that follows, I unpack how content was taught as a language, paying particular attention to what was taught and how it was taught. Much of the teacher education literature centers on what teachers need to know and be able to do to teach students. Since this study focuses on teaching, these two chapters embody the understanding of content reflected in the teaching (this chapter), and the pedagogical actions used to reveal this understanding to students (the next chapter). This chapter illustrates the content that was empirically observed, which I describe as a crystallization that includes facets of academics, logos, and expectations, or ALEX. In the next chapter I examine the ways in which the teaching purposefully attended to realizing this content, or PAR. Together, these two chapters show how what is taught (ALEX) and how it is taught (PAR) are integral to teaching content as a language (ICAL). The observed teaching then could be described as PARALEXICAL—Purposeful Attention to Realizing the Academics, Logos, and Expectations Integral to Content As a Language.

Throughout the next two chapters, I deconstruct the concept of PARALEXICAL teaching and how it was embodied in the data. Like the acronym suggests, PARALEXICAL teaching goes beyond lexis; that is, the teaching of individual words and vocabulary items are included within PARALEXICAL teaching, but PARALEXICAL teaching is primarily oriented toward

apprenticing students into a disciplinary language. This includes teaching students the patterns of thinking and reasoning used within the discipline as well as the accepted and expected ways in which those patterns of thinking and reasoning are represented. In short, I found that the teaching was indeed attentive to the culture and language of a discipline, making these visible to all students in the class.

PARALEXICAL Teaching

PARALEXICAL teaching emerged from my analyses of the data as I began to see beyond how I initially expected integrative teaching to be enacted. The teaching I observed was complex and multifaceted and, to convey this complexity in a succinct way, I wanted to give it a name rather than refer to it ambiguously as "teaching." *PARALEXICAL teaching* went through several iterations during my data analysis phase as I wrestled with my own understanding and ways of articulating the complexity I was observing among language, learning, academic content areas, pedagogical deliberateness, and disciplinary literacy.

My working term for what I was seeing as I progressed through data analysis was *ALEXICAL*, which at the time referred to Attention to Language Expectations in Content Area Learning, but as analysis progressed, I found that the idea embodied in this acronym did not accurately depict what I was seeing in the data. I began to see that the teaching of content resembled the teaching of a language, and that aspects of logic, pedagogical action, and goals for students, for example, emerged in my analysis of the data but were not well represented in the name *ALEXICAL*. The acronym ultimately expanded to capture these key facets of the teaching and became an adjective that described teaching rather than a noun focused on learning.

I hold PARALEXICAL teaching as an idea and an acronym somewhat gently and humbly; I did not arrive at this name lightly and acknowledge that this teaching could have been

linguistically represented in other ways. PARALEXICAL is noticeably longer than most acronyms, which perhaps makes it more susceptible to misinterpretation and difficulty for readers in keeping track of what the many letters represent; additionally, linguistics-oriented readers will likely notice that I do not split the acronym according to linguistic structures of prefixes and roots (i.e., I divide sections according to PAR and ALEX instead of PARA and LEX). Nonetheless, I chose PARALEXICAL to honor the complexity of the work of teaching enacted by the teachers, to give voice to the multifacetedness of their teaching, and to avoid reducing their practice to fit into a shorter, and therefore inadequate, term. I encourage readers to focus on the complexity and multifacetedness of the teaching rather than on remembering the acronym itself. While I use PARALEXICAL teaching as a way to organize the data, my ultimate goal is to show teaching in new light, not to teach, define, or defend the acronym; consequently, I unpack the facets of the teaching 'out of order,' presenting them from CAL to ALEX to PAR. Laying out the findings in this way allows readers to see first what I saw last in my analysis—how content was taught as a language (CAL). This then allows readers to see the content taught (ALEX) and the teaching itself (PAR) in light of this outcome before I bring all the findings together in a section on PARALEXICAL teaching at the end of the Chapter 5.

CAL: Content As a Language

Many scholars (e.g., de Jong & Harper, 2005; Fillmore & Snow, 2003; Lucas et al., 2008) have contended that teachers of ELLs need to understand language, but as my data analysis process began, I questioned whether the teaching I was seeing in the data actually reflected broader knowledge of 'language,' or knowledge of one specific language—'a language.'

Language has been described as a system (e.g., de Saussure, 2006; Halliday, 1975) or a tool (e.g., Everett, 2012; M. A. Snow, Met, & Genesee, 1989) used for making meaning (e.g.,

Halliday, 1994; Schleppegrell, 2004) and interacting with the world (e.g., Gee, 2013b). It includes shared patterns and structures (e.g., de Saussure, 2006), carries complex social meanings (e.g., Hodge, 2017; Hodge & Kress, 1988), varies according to context (e.g., Gibbons, 2015), is more than the sum of its words (e.g., Norton, 2013), and is deeply connected to culture (e.g., Kramsch, 1998; Lucas & Villegas, 2013) as well as to ways of thinking (e.g., Gee, 2004; Vygotsky, 2012). Definitions, components, and uses of language are varied and largely outside the scope of this study, but these definitions are broad and characteristic of many different languages and different types of language. Specific examples of these languages include English, Russian, American Sign Language, and even computer languages, such as Java Script as well as the social uses of language where word and delivery choices vary according to context, purpose, and the social practice within which language is being used.

The distinction between 'language' and 'a language' was an empirical question I asked of the data, and as analysis progressed, it became clear that teaching was drawing on knowledge of a language, and this language seemed to be a narrow, specific version of English that was distinct from broader notions of 'English' or general constructs of 'language.' In short, I argue that content, in the way that I define it as inclusive of curricular contents as well as the language that contains it, functioned as a specific language in the teaching I observed. As such, the teaching of content can be viewed as similar to the teaching of a language, and the teaching of mathematics content or science content can be viewed as similar to the teaching of Russian, American Sign Language, or Java Script.

Teaching a Language

As discussed in Chapter 2, communicative approaches to language teaching have been prominent in recent decades, many of which draw on the idea of "communicative competence"

(Canale, 1983; Canale & Swain, 1980; Hymes, 1972)—the idea that knowing a language includes knowledge of language use in addition to knowledge of grammatical rules. Communicative competence stands in contrast to the "linguistic competence" endorsed by Chomsky (1957) and it led language teaching to shift focus from grammatical knowledge (e.g., through grammar translation methods) toward the development of communicative skills. Scholars have debated the components of communicative competence (see Canale, 2013; Canale & Swain, 1980; Celce-Murcia, 2007; Celce-Murcia et al., 1995; Pawlikowska-Smith, 2002), but generally acknowledge competencies related to sociolinguistic and sociocultural appropriateness, discourse and genre, communicative strategies, and grammatical form—competencies needed in order to use language in a communicative context. Communicative language teaching still incorporates "focus on form" (Long, 1991; Swain, 1998; Valeo & Spada, 2016) and aspects of grammatical structures, but grammar is positioned in communicative language teaching as in service to communication, interaction, and meaning making. As a result, modern language teaching draws on discourse, cultural norms, and other nuanced aspects of language teaching in addition to grammatical structure.

This focus on communication, interaction, and meaning making is also seen in disciplinary contexts within the Common Core State Standards and Next Generation Science Standards. In the same way that proponents of communicative approaches to language teaching (e.g., Canale & Swain, 1980; Celce-Murcia et al., 1995; Savignon, 1983, 1990, 2006; Spada, 2007; Widdowson, 1990) emphasized the skills used to communicate, not just knowledge of grammar, so too do current academic standards. For example, skills such as reasoning, arguing, and explaining, for example, are emphasized over knowledge of facts, figures, and formulas.

The importance of culture and contextualization cannot be overstated in language teaching, despite the structured construct of communicative competence. Meaning is made in situated social settings and contexts, or within what many discourse scholars would call speech communities or discourse communities (e.g., Duff, 2010; Swales, 2014). Whereas Chomsky (1957) considered contextual and sociocultural aspects to be outside the scope of language, these aspects are considered to be fundamental components of communicative competence and essential aspects of language teaching. Teaching specific languages then requires teaching the social settings and contexts in which those languages are used.

Because cultures and contexts are varied and dynamic, so too is communicative competence. Communicative competence comprises what speakers need to know to be considered competent communicators by other members of the social group (Jones, 2012), thus making it highly subjective and contextualized. As a result, what it means to be able to 'speak a language,' for example, is dependent on context and judged by members of specific groups. The same is true of academic standards—what it means to 'meet' a standard is based on a subjective measure of what it means be 'competent' at a certain age or grade level. Of particular salience is that specific groups may determine what it means to communicate competently in different ways and using different measures. Consequently, mathematical communicative competence, as judged by those within mathematics discourse communities, and scientific communicative competence, as judged by those within science discourse communities, are different. The ways in which communicative competence differs between mathematics and science remains largely outside the scope of this study, but this difference points to the idea that if communicative competence is different for mathematics and science, mathematics and science might be different

languages, with each being taught based on implicit judgments of competence according to each social group and discourse community.

Communicating competently in the context of science, for instance, involves the use of evidence to support an idea, but using evidence and 'proving' are quite different in science. As Ms. Desanne commented to a group of students:

> Ms. Desanne: You don't ever prove anything in science, you support it with evidence. So science is a discipline based on evidence and its… kind of… acquisition of it. You have to make sure that it's clear, because science is always evolving and changing, so you can't ever prove something. It could always be changed or amended. The word *prove* kind of sounds final, and science is never final. There's always something that could be revisited. (observation, Dec. 20)

Ms. Desanne's comment to her students reveals something about science as a discourse community. Avoiding the use of the word *prove* is an important feature of scientific writing, but Ms. Desanne's comment also indicates a reason why scientists avoid the word *prove*, that is, the perspective that science is dynamic and new understanding could change current thinking, making scientific conclusions more ephemeral than absolute and definitive.

Proving in mathematics is a requisite skill performed in a very specific way including a specific format with specific components and representing a specific way of thinking. One of Mr. Bennett's geometry students seemed to notice this difference between mathematical and scientific proof. Although the class was a few days away from learning the formal geometric proof structure, this student asked a question while he and his tablemates were engaged in group

work that led Mr. Bennett to describe the perspective difference between mathematics and science:

> Student: I have a question, so I was thinking, like in science, cuz science is related to math, when you have science, to prove something in science- or not PROVE prove, you have to like [inaudible]. So… does math prove itself?
>
> Mr. Bennett: Any closed logical system proves itself. That way I can always say that one plus one equals two will always be true based on the rules of arithmetic. But if I change the rules of arithmetic then one plus one no longer equals two. If I change the rules. In science you can't change the rules because you can't change the way the universe works, right? So we're already working in a system and we're trying to figure out the rules by which that system works. So science is kind of going from the opposite end of mathematics. Mathematics we make up our own rules and then build a system around it. In science, we live in a system and we're trying to figure out the rules by which it functions.
>
> Student [nods] (observation, Oct. 12)

In this exchange, the student's self-correction of prove (i.e., "or not PROVE prove") indicates his understanding that one does not use *prove* in a scientific context, as Ms. Desanne stated above, but his question indicated that he understood that the perspective from which science and mathematics each 'prove' was different, even if he did not yet know how they were different. Mr. Bennett's explanation seemed to clarify this for the student, emphasizing that science seeks to explain the rules of an extant, yet not fully known system, and mathematics seeks to use a known and agreed-upon, yet abstract, system as a tool to reason and provide logic about what

exists. This describes the shared ways of thinking, or the culture, within each disciplinary discourse community.

This difference in perspective between mathematics and science creates different ways of 'proving' in each discipline. What and how one 'proves' within each discipline is related to the underlying culture, values, and norms of each discipline. Beyond the obvious structural differences between a formal geometric proof and the use of evidence to support a scientific claim lie different perspectives, assumptions, and purposes. This can parallel the idea of communicative competence in a language, which involves knowing grammar or structure, understanding cultural norms and perspectives, and leveraging both of those to create meaning in context and participate within a community. Although both mathematics and science use evidence, for example, to communicate competently, 'proving' is not the same across mathematics and science; it has different structures with different norms that need to be understood in order to communicate in the accepted and expected ways of the scientific or mathematical communities. These structures and norms are both present—though not always explicit—within the content of mathematics and the content of science. As such, the content of mathematics and science have different expectations for communicative competence, which indicates that each was functioning as a language itself.

As stated above, these languages seemed to be narrow versions of English for specific communities (e.g., mathematics, science). The language students used to explain, provide reasons, describe, interpret and argue academics, in the context of the study, used the English language; however, the teaching attended to a particular subset of the English language specific to the discipline of mathematics or science. Indeed, some students in the study were still actively learning the English language, but the content area teaching reduced focus on 'English' and

placed it on teaching students to use language to communicate scientific or mathematical ideas within a disciplinary context.

For example, a biology student interpreting a particularly troublesome text on elephants and cancer, twice mispronounced *contribute* (by placing the stress on the first syllable instead of the second; i.e., CONtribute) when describing factors of age and size in elephant cancer development (observation, Dec. 15). Seemingly ignoring the error, Ms. Desanne evaluated the student's interpretation of the text as "excellent," and used her response to begin a teaching sequence focused on the other students in class still struggling to comprehend the text. By contrast, in the class before on cancer cells and tumors, a student responded to a teacher question about an image of a small tumor and what would happen next. The student responded, "It starts spreading around" (observation, Dec. 11). Ms. Desanne immediately asked, "Did it spread yet, or did it just grow?"

Student errors were made in both of these examples, yet only one was attended to in the teaching. Since the teaching ignored the mispronunciations of *contribute* and instead attended to the text interpretation in the first example, the student appears to have made an error of English, not an error of science. By contrast, the second student's error was immediately attended to. The words *grow* and *spread* may not be meaningfully different in a high school history course (e.g., The Ottoman Empire grew/spread), but in a science class in a unit on cancer cells, the difference between these words is the difference between understanding and misunderstanding a key scientific process. Although language-oriented errors were made in both examples, the first student made an error of English, while the second made an error of science.

Together, these examples indicate that the teaching was moving students toward proficiency in a specific language—the one used in the discipline of mathematics or the

discipline of science. In effect, this turned the content of mathematics or the content of science into a language, complete with patterns of thinking, ways of communicating, and situated and social meaning characteristic of any language, suggesting that the content was taught as a language. I unpack the content taught, which I call ALEX, in the next section. It is important to note that I present an empirical argument of content, not an ontological one; that is, I describe the content constructed in the teaching observed in this study, but I make no claims about what 'real' content is or should be.

ALEX: Academics, Logos, and Expectations

The results of my data analysis suggest the teaching observed in this study appeared to attend to at least three interrelated and inseparable facets of content, which I describe as academics, logos, and expectations, or ALEX for short. Although I will go into more detail regarding these facets later in the chapter, *academics*, as used here, refers to the concepts and topic of the given discipline, *logos* refers to the appeal to logic, and *expectations* refers to the accepted and expected norms of the given community.

In this study, teaching of content as a language seemed to draw from, enact, and build a disciplinary view of academics, logos, and expectations that brought students into a multi-faceted understanding of content not well explained by existing academic research literature. This teaching included the concepts, standards, terms, and topics often associated with 'content' as well as the patterns of communication, ways of thinking, and norms expected within a discipline. The facets of content identified in this chapter do not constitute an exhaustive list of all facets of content, but they were most noticeably foregrounded in the teaching I observed. Indeed, the teaching of all four teachers appeared to deliberately and strategically attend to these facets of content, seemingly building and teaching a holistic understanding of content.

I use the metaphors of facets, crystals, prisms, and crystallization (Richardson, 2000) to illustrate and explain the multifacetedness of the content taught. When viewing a crystal, one facet may directly face the viewer, providing a direct, unobstructed view of that facet. Some adjacent facets may also be viewed, but perhaps more indirectly or peripherally, and others may face away from the viewer, seen only from the other side of the crystal itself through the facet facing the viewer. Although only a few facets may be visible from any given angle, every facet is always present. As the crystal is rotated, different facets may move into full view while others are moved away from the viewer; these other facets may still be seen, but are shadowed, obscured, or only seen indirectly through the facet in full view. As I present data, a few examples from the data are revisited from different orientations. This is deliberate, even at the expense of possibly reducing the spread of examples, to show the depth and complexity inherent in each instance of teaching as well as highlight how viewing teaching from different perspectives can alter what is seen.

A Multifaceted View of Content

I use this crystal metaphor because it illustrates the complexity of content evident in my data and provides a way to see that content is multifaceted and that those different facets can be attended to in content area teaching. As I mentioned earlier, I found three facets of the crystallization of content—academics, logos, and expectations. 'Content' is traditionally understood to be the concepts and topics of the curriculum—what I consider to represent only one facet (i.e., academics) of my view of content. The teachers in this study had a multifaceted understanding of content, a topic I address more explicitly in later sections of this chapter; however, their students seemed more aligned with traditional understandings of content, creating a difference in how content was viewed by teachers and students.

While other sections in this chapter focus more on individual facets of content, in this section I call attention to the overall multifacetedness of content, showing instances from the data in which the complexity and multidimensionality of the content taught could be seen. For example, in an exchange between Mr. Bennett and a geometry student, the student was struggling with the task at hand, which was to articulate the reasons why a geometric rule worked.

Student A: Cuz it's like… um… It's hard to explain, like we KNOW why. I can't explain it, but I got it!

Mr. Bennett: That's how I know you don't. You can't explain it! (observation, Oct. 6)

The student felt she understood the rule because she could compute the answer, yet Mr. Bennett declared that she did not really understand because she could not complete the mathematical task of explaining her reasoning. In this example, the student perceived that she "got" the geometric rule (i.e., knew the academics), yet she could not explain or justify her understanding (i.e., apply logos), which meant that she did not satisfy the requirements of the task (i.e., meet expectations), despite claiming she understood the right answer. In this instance, the student's vision of content might be characterized as somewhat one-dimensional and limited to conceptual comprehension; to continue the crystal metaphor, the student seems to be viewing content only through the facet of academics and to be unaware of the presence of other facets. In contrast, the content that Mr. Bennett was teaching was broader and more complex, indicating a multifacetedness not represented in the student's understanding of the content. Conceptual understanding of the geometric rule was necessary, but more was required—there were other facets of content that the student needed to account for. The teaching in this instance reflected a vision of content that

extended well beyond comprehension and the vision of content that the student seemed to have prior to this interaction.

Similarly, Mr. Cruz focused attention on 'the point' of a scientific task (i.e., the purpose), rather than 'the points' of one (i.e., the grade). A biology student was contesting that his evidence-based response on an exam question should have gotten partial credit because it included nearly all of the relevant information. After a short dialogue about the question itself, the student commented:

> Student A: You can at least give me half a point.
>
> Mr. Cruz: Yeah, but then the thing is, you'd be like, 'I have it,' and you don't. (observation, Dec. 11)

For Mr. Cruz, the purpose of this task went beyond comprehension of an academic concept to the explanation or justification of an idea. Therefore, and also drawing on Mr. Bennett's student above to make my point, neither student "got" the actual scientific or mathematical task, though both argued they fully or partially did. For Mr. Cruz, academic comprehension was essential to the task of argumentation, but actually accounted for less than half a point, as the bulk of the work was in the argumentation. Mr. Cruz's teaching similarly pointed to a multifaceted understanding of content that included, but was not limited to, factual information (i.e., academics). For Mr. Cruz, "having" the content meant being able to explain an idea (i.e., logos) in a scientific way (i.e., expectations).

Later in Mr. Bennett's geometry unit, the students were toiling with reasoning in a ramp-up to the unit that would follow on proofs when he posed what seemed to be a very simple question: "what is math?" (observation, Oct. 12). One student offered "numbers," others

suggested “equations” and “1+1.” Referring to a moment earlier in the class in which a student used inductive reasoning to solve a puzzle, Mr. Bennett contested their answers:

> Mr. Bennett: That’s math. [Student A] was understanding a situation and using logic to articulate something about the situation. That’s why Galileo famously wrote that the world is written in the language of mathematics. He wasn't talking about 1 + 1. That's meaningless. We use it as a tool, we use 1+1 as a tool, but 1+1 on its own is useless. Mathematics is understanding the world and articulating that understanding, and why I love [this part of the unit on inductive reasoning] so much is it's gonna start us on that journey of using real mathematics. Not this B.S. computation stuff. (observation, Oct. 12)

In this example, the teaching and classroom talk show the distinction between academics (i.e., computation) and logos (i.e., using logic to articulate understanding) in the content of mathematics (i.e., understanding the world). In Mr. Bennett’s teaching, the computations and calculations are subordinate tools—utilitarian functions with which to access “real math” to be learned—but were considered “meaningless” in the absence of logos, much like the academic understandings of Mr. Cruz’s biology student that accounted for less than half a point on his exam question.

Together, these three examples show how the multifacetedness of content was seen in the teaching. Whereas the students in these examples seemed to be viewing content through the facet of academics and shadowing (metaphorically, via the prism facets) expectations, the teachers seemed to be viewing content through expectations, shadowing both academics and

logos. Although Mr. Bennett referred to content as "real math," perhaps it is better understood as "full math," in that academics functioned as part of the content, but did not fully comprise it.

Multiple views of what constitutes content were simultaneously apparent in the teaching instances above. For example, the students' views were generally unidimensional and focused on fact identification and comprehension, but the teachers' views were more complex, revealing added dimensions that addressed the expression of logic and ideas in mathematical and scientific contexts. It is important to note that the teaching did not end with each of these excerpts; later in the class period or unit, the teaching returned to the student view of content and further attended to the facets not in direct view by the student. For instance, Mr. Cruz returned to evidence selection and fact identification in later classes in the unit, emphasizing their role in scientific argumentation. It is possible that the teaching returned to these differences in what content entails not to show that one vision was right and the other wrong, but to show the multiplicity of all that is involved in the content of mathematics or science. This can be seen as the teaching metaphorically walking students around the crystal of content, showing previously unnoticed facets and shifting their perspectives. Even though the teachers in these excerpts seemed to give each student a "no" (e.g., "you don't have it"), the teaching was actually working toward a "yes, and" by expanding students' perspectives on content to include other facets beyond academics.

The next sections unpack the multifacetedness of content seen in the teaching by focusing on academics, logos, and expectations separately. While I attend to these three facets individually, it is important to remember that, like a crystal, each facet is always present and cannot be viewed completely independently from the other facets in the crystal. Although I attempt to highlight each facet, the other facets are still present, revealing the complexity and interconnectedness of the content taught.

The Academics Facet

In Chapter 1 I troubled the idea of 'content' by suggesting a theoretical distinction between *content* (i.e., the practices of thinking and communicating within a discipline) and *curricular contents* (i.e., the topics and concepts of curricula). As data analysis progressed, there appeared to be much overlap between the curricular contents that I referred to in Chapter 1 and the academics facet of content that emerged from the data, as presented above. However, to avoid conflating a theoretical construct (i.e., curricular contents) with empirical evidence and to allow space for data that extended beyond the theoretical notion of curricular contents, I refer to these curricular topics, facts, and concepts as *academics*.

Academics and content. The academics facet of content is often referred to colloquially within education as content itself. This was also evident in the language of the teachers in this study. For example, Mr. Cruz was grading responses to an in-class prompt where students were shown a picture of an unknown skin malady (which turned out to be athlete's foot) and a picture of the specific type of cell causing the skin condition, then asked to determine if tolnaftate, an anti-fungal medication, or an antibiotic should be used to resolve it. They were asked to write an evidence-based response during class arguing for one type of medication (tolnaftate) based on the type of cell in the picture (eukaryotic). As Mr. Cruz evaluated the students' responses to the tolnaftate prompt after class, he focused on the following response:

> *You should use an antibiotic on your foot. My evidence is that the cell in the picture has a nucleus. Since the cell has a nucleus, it is prokaryotic. Since the cell is prokaryotic, the only medication that can be used to treat your foot is an antibiotic because it kills prokaryotic cells.*

According to Mr. Cruz, this response provided an incorrect answer (i.e., antibiotic instead of antifungal medication), presumably based on the misidentification of the cell as bacterial (i.e., prokaryotic) instead of fungal (i.e., eukaryotic). Comparing this response to a previous response, Mr. Cruz explained:

> Mr. Cruz: I can tell [this person] understands the argumentation way better than [the person who wrote the other response]. Because they have all the components, they know exactly what they're supposed to do, they just don't know the content. Like it's just clear that they have misunderstandings about the content. (debriefing interview, Dec. 5)

Mr. Cruz's references to "the content" in this teaching instance point to knowledge of the difference between prokaryotic and eukaryotic cells. Mr. Cruz's references to "the content" seemingly refer to a smaller piece of content that contributes to the larger practice of scientific argumentation. Mr. Cruz's use of *just* in the statement "they just don't know the content" even downplays the role that factual knowledge of eukaryotic and prokaryotic cells plays in the practice of constructing a scientific argumentation, further indicating that Mr. Cruz was making a distinction between knowledge of scientific facts and the practice of constructing a scientific argument. This factual knowledge was only one component—or facet—of the larger scientific understanding Mr. Cruz was teaching.

Based on the above response, it seems as though Mr. Cruz detected a similar distinction. In the above teaching instance, Mr. Cruz seemed to understand that factual knowledge, though important, was only one part of the content to be taught. Mr. Cruz even affirmed that, despite basing the response on misidentification of a eukaryotic cell, the student "[understood] the argumentation" and "[knew] exactly what they [were] supposed to do" (debriefing interview,

Dec. 5) indicating that the role of scientific facts was certainly relevant, but knowing whether cells were eukaryotic or prokaryotic was not the end goal Mr. Cruz was working toward; instead these facts functioned as information to be used to develop scientific ways of thinking and communicating.

In a similar teaching instance from geometry, Mr. Bennett contrasted "real mathematics" with "computation," asserting that:

> Mr. Bennett: Calculation and computation are the smallest, lowest, tiniest bit of what math is…. [instead]… mathematics is understanding the world and articulating that understanding, and why I love [this unit] so much is it's gonna start us on that journey of using real mathematics. Not this B.S. computation stuff. (observation, Oct. 12)

This statement from Mr. Bennett is consistent with the above teaching instance from Mr. Cruz's class in which facts and procedures are part of the content of mathematics or science, but not considered the content themselves. In both instances, Mr. Cruz and Mr. Bennett indicate that these facts and procedures are smaller than the broader content of science or mathematics, seen in Mr. Cruz's use of *just* in "they just don't know [the difference between eukaryotic and prokaryotic cells]" and Mr. Bennett's list of superlatives describing computation as "the smallest, lowest, tiniest bit of what math is." In both of these instances, facts and procedures are certainly perceived to be included within the content taught, but considered only one facet of the content. I include this factual information, such as the characteristics of eukaryotic and prokaryotic cells, and mathematical computation within the *academics* facet of content.

Facts, topics, and concepts. The academics facet also was present in Ms. Desanne's teaching of content, in which her biology students first needed to understand the cell cycle in

order to understand and evaluate an article about HeLa cancer cells the following class. In this excerpt, Ms. Desanne summarizes the cell cycle presented earlier in the class and how cancer cells fail to complete the cycle:

> Ms. Desanne: Okay, cancer develops only after a cell experiences the following things: unlimited growth, okay, because they turn on something called a growth promoter. So remember what I said promoters do, they start things up, so they start this kind of… it's like signal to say you can continue to divide. They ignore the checkpoints, remember we talked about the checkpoints before mitosis, after mitosis, and G1. They ignore all of that, so they turn off the tumor suppressor genes, and then they escape apoptosis. So, they're like, 'Oh, I'm not sacrificing myself, I'm going to live.' So, they turn off the suicide genes. So these are the three ways that your body cells are able to kind of control cell division: they stop promoter genes, they go through checkpoints, and they commit apoptosis if they're messed up. But with cancer cells, they ignore certain things. So they have unlimited growth, they ignore the checkpoints, and then escape apoptosis. (observation, Dec. 11)

In this teaching instance, Ms. Desanne focused on the process of cell division, including key checkpoints at which cells typically detect problems with dividing cells (i.e., before mitosis [G2], after mitosis [M], at G1) and the conditions necessary for the development of cancer cells that avoid completing this cycle (i.e., ignoring checkpoints, activating promoters, deactivating suppressors, avoiding apoptosis). Ms. Desanne's summary of how cells normally regulate cell division and explanation that cancer cells are a deviation from this cycle points to an emphasis

on student comprehension of the cell cycle and the ways in which cancer cells avoid this process. During the next class period the students read and responded to an article on Henrietta Lacks and HeLa cells in which they used this cell cycle information in order to complete a different scientific task, but this class period and teaching instance above focused on the facts and processes of the cell cycle itself, revealing the academics facet of content in Ms. Desanne's teaching.

Similarly, the academics facet could also be seen in Mr. Cruz's teaching in the following instance in which he explained one of the characteristics of life, clarifying the concept of maintaining internal stability by giving examples of shivering and sweating:

Mr. Cruz: All right, and now the final two characteristics. All living things maintain a stable internal environment… so what this means- okay, if you're cold outside, what's gonna start happening, [Student A]?

Student A: [wraps arms around self, holding arms close to body]

Mr. Cruz: OK, you're going to start holding yourself? What else is gonna happen?

Student B: You're shivering.

Mr. Cruz: You start shaking, right? So, that's your body's way of creating heat. So your temperature actually stays at 98.6 no matter what, because if it goes down, then bad things happen to you. The same thing- what happens when you're outside in the heat and it's 106 degrees outside. [Student C], what happens? You're in 106 degree heat outside, what starts happening to you?

Student C: You get hot…. and [inaudible]

Mr. Cruz: You get hot and then what'd you say again?

Student C: You start sweating.

Mr. Cruz: You start sweating like crazy. Why do you sweat?

Student C: Because it's hot.

Mr. Cruz: I have a question for you. If there's sweat on your skin, right, and suddenly you feel a breeze, what do you feel?

Student D: Cold.

Mr. Cruz: You suddenly feel cold, right? So, that's meant to cool you off. Literally as that breeze comes, things evaporate, that sweat evaporates to cool you off. So that's to make sure your temperature never goes above 98.6 on the inside of your body. So, that's what maintaining an internal environment means. (observation, Nov. 13)

In this teaching instance, Mr. Cruz seemed to clarify and expand upon the somewhat abstract idea that all living things "maintain a stable internal environment." His explanation drew upon two common mechanisms (i.e., shivering, sweating), which help ensure that humans maintain a stable body temperature, thereby relating the scientific concept to students' personal experiences, which they supplied as they volunteered answers. Mr. Cruz's teaching in this instance seemed to focus on the conceptual meaning; that is, he was helping students interpret the concept of maintaining a stable internal environment, including what that meant (i.e., "your temperature actually stays at 98.6 no matter what") as well as what that looks like in humans (i.e., shivering, sweating). By describing and providing examples of a key scientific phenomenon using familiar terminology and situations, Mr. Cruz's teaching seemed directed at enabling students to comprehend the idea of internal regulation. This focus on comprehension of a scientific concept indicates that Mr. Cruz was attending to the academic facet of content in this teaching instance.

As in Ms. Desanne's cell cycle example above, at this point in the lesson and unit, Mr. Cruz's students were becoming familiar with scientific processes and concepts. Mr. Cruz's students later transitioned to using information to create scientific arguments, seen in the first example concerning prokaryotic and eukaryotic cells, and Ms. Desanne's students later transitioned to critiquing the use of HeLa cells, but the teaching instances presented in this section show a smaller piece of content focused on the facts (e.g., nuclei in eukaryotic cells), procedures (e.g., mathematical computation), processes (e.g., the cell cycle), and concepts (e.g., maintaining a stable internal environment) that would eventually be used for other purposes within the teaching of content.

In sum, I characterize the academics facet of content as including the curricular contents and aspects of a discipline that are often taught in schools. Although the academics facet is often colloquially referred to as "content" within education, as seen above, references to this idea seem to point to something smaller than content—one facet of it. The academics facet of content includes the facts, concepts, and topics of curricula, as well as the procedural aspects of content often associated with and based in schools (cf. Ball, 1993; Houseal, Abd-El-Khalick, & Destefano, 2014). This academics facet seems largely information based, focusing on the 'what' that is being communicated. In the next section I shift focus from the 'what' of content to the 'how' of content as I unpack the *logos* facet, which focuses on the way in which ideas are communicated.

The Logos Facet

Often recognized as a component of Aristotle's Modes of Persuasion along with ethos and pathos, *logos* is the appeal to logic. This Greek word is often translated simply as *word*, but logos is not vocabulary; it refers to both reason and meaning and incorporates aspects of logic

and discourse. I use logos to describe this facet of content that emerged out of an unexpected outcome of my data analysis—that is, the role of thought, logic, and reason and its connection to language.

Thought and language. Language and its relationship to logic and reason were not explicitly addressed in the construct of Integrative Teaching presented in Chapter 2. This brief subsection provides some background to this topic and the relationship among thought, language, and teaching, especially as it relates to responsive teaching (Bowers & Flinders, 1990; Gay, 2010; Lucas & Villegas, 2013; Lucas et al., 2008; Villegas & Lucas, 2002a, 2002b, 2007).

Technicist, or transmission-oriented, teaching tends to view logic, reason, or thought as culturally neutral, thereby also viewing the processes of logic, reason, or thought as culturally neutral (Bowers & Flinders, 1990; Freire, 2000). That is, this position assumes that thought and thinking are devoid of culture rather than being embedded within and inseparable from it. The "teacher-as-technician" model (Zeichner & Liston, 2014) is limited in that it communicates information to students in a prescribed way—delivering the contents dictated by the curriculum, school, or discipline. In this model, language serves as a mere conduit (Bowers & Flinders, 1990), neutrally and linearly transmitting information from teacher to students along with the values of the dominant society and drawing a sharp divide between thought and language. Though many factors contribute, paradoxically, focusing on communicating, speaking, writing, or thinking, as though they exist independent of language, as done in transmission-oriented teaching, renders language invisible and part of the hidden curriculum.

By contrast, teaching that acknowledges the deep connection, rather than sharp divide, between thought and language undergirds responsive teaching. Language has been described as the "stuff of thought" (Pinker, 2007) as well as "a tool that creates the possibility of thinking and

organizing thought processes" (Holbrook & Rannikmae, 2007, p. 1355). A detailed discussion of linguistic determinism and linguistic relativity are outside the scope of this study, but these two quotations show deep connection between language and thinking. In the same way that language cannot be separated from content, as I argued in Chapter 1, language cannot be separated from thinking. The language used to pose, describe, explain, and question is central to and inseparable from the ability to understand the world (cf. Mutanen, 2014); thinking, then, is not a nonlinguistic task, but a language-dependent one.

Responsive teaching takes this connected approach to thought and language and recognizes that concepts such as language, thinking, reason, disciplines, and values, are constructed and non-neutral. Consequently, responsive teaching takes a sociocultural approach to logic and logical processes through its acknowledgement that patterns of logic, thinking, and reasoning associated with schools, content areas, and disciplines are firmly rooted in and indistinguishable from language and culture (Gay, 2010; Villegas & Lucas, 2002b). Following this logic, mathematical or scientific thinking can be seen as indistinguishable from the language used to convey it.

As such, the work of responsive teaching includes socialization into the ways of schooling as well as into the thinking, reasoning, and applying logic and attending to the social language practices that are characteristic of disciplines. Responsive teaching thus involves 'disciplining' students—guiding students in ways that move their behaviors toward those consistent with the discipline. Although the verb 'discipline' is often thought of in reference to bodily comportment or classroom management, in a content area teaching context, this disciplining involves teaching and apprenticing students into the thinking and expression of

thought in ways that are accepted and expected within a discipline, thus responding to cultural language practices of a given discipline.

Logos. I observed this 'disciplining' of students, reflective of a connected, sociocultural approach to thought and language, across the data. Many teaching instances appeared to be bringing students into disciplinary ways of thinking and how that thinking is expressed in disciplinary ways.

For example, as Mr. Bennett's class was in the beginning stages of constructing geometric proofs, the teaching focused on making mathematical statements and providing reasons as to why those statements could be made. Small groups of students worked together to complete a worksheet in which they solved equations by providing statements (e.g., $2x - 7 = 3$) and supplying reasons (e.g., the Reflexive Property) for those statements from a phrase bank provided.

Mr. Bennett (to class):	Right now I see statements but not reasons!
Student (with raised hand):	[Mr. Bennett approaches the student, inaudible dialogue, but the student seems to ask Mr. Bennett a question]
Mr. Bennett (to student):	Those are the reasons for the equation, yes. Statement is what you already have written. This is a statement, what's the reason you were able to do this? It's one of these [points to the phrase bank on the student's page]. So that's the reason. We're going to be more formal about this as we go on, for right now, just make sure you have the articulation. We're going to give it a form tomorrow. (observation, Oct. 12)

In this teaching instance, the ways of thinking and patterns of logic used to structure geometric proofs are highlighted. This includes a mathematical claim or a statement, followed by the reason that the statement can be made given mathematical systems. These reasons never precede their corresponding statements, but instead always follow them, revealing the logical patterns of thought expected in mathematical thinking and geometric proofs. These patterns of logic were the teaching focus of that day; the established form of representing that logic—the structure of the proof itself—was the focus of the next day.

This teaching instance from geometry reveals the logos facet of content through the way in which it foregrounds the expected mathematical ways of thinking. Had this teaching instance focused on what the reflexive property entailed or the procedures to compute 2x-7=3, this instance would have likely shown the academics facet, discussed earlier. However, the teaching was using the reflexive property and the equation 2x-7=3, while temporarily holding the presentation of this thought and logic (i.e., "we're going to give it a form tomorrow") in abeyance, to focus on the mathematical thinking and logic needed to construct geometric proofs.

In a similar way, Mr. Cruz focused on scientific ways of thinking as he incorporated hypothesis testing as a way to introduce the characteristics of life. To begin the class period, Mr. Cruz asked his students to each write four hypotheses that were true about all living things. Many students wrote hypotheses such as *all living things breathe*, *all living things eat*, or *all living things grow*. Students combined their lists with their small groups and, as a group, were tasked with crossing off the hypotheses that were shown to be false as, one-by-one, Mr. Cruz showed characteristics of life. Before the activity Mr. Cruz gave the following directions:

Mr. Cruz: What do you think? Let's say you say all living things have red noses. And I show you a bear that has a black nose. Is that hypothesis true?

Student A: No.

Mr. Cruz: No. And so that's the whole point. So this is what we're going to be doing. [Students continue compiling their lists with each other]

Yeah, so if it's not true, do you necessarily know the right answer, or do you just know that's that not true?

Student B: It's not true.

Mr. Cruz: Yeah, so [then] what should you do with it?

Class: [Several students respond simultaneously] "Put a slash through it," "Cross it out," "remove it." (observation, Nov. 13)

As the class progressed, one student seemed to be struggling with whether or not to cross out one of his hypotheses, *all living things think*. Mr. Cruz had just shown a picture of a salmonella bacterium, with the description that it was a single-celled organism that can lead to illness if eaten. The student was staring at his list with a puzzled look. Noticing the student's quizzical stare, Mr. Cruz looked over his shoulder and engaged the student:

Mr. Cruz: So, for this one, [pointing to student's hypothesis *all living things think*] so, that's a single cell, right [looking up to the salmonella slide still on the screen]? So, is it thinking? Does it have a brain?

Student: No.

Mr. Cruz: So then, would this stay here?

Student: No.

Mr. Cruz: So, you would remove it.

Student: Oh I-… But-… But some think and some don't.

Mr. Cruz: What do you mean?

Student: Like… but some DO.

Mr. Cruz: I know, but it has to be true for ALL living things.

Student: So even if it's only, like, false for one or two things… [Student picks up pencil and crosses out the hypothesis *all living things think*] (observation, Nov. 13)

In this teaching instance, the student seems to be experiencing some tension between his knowledge that some living things do indeed think, and the logic of hypothesis testing, which would dictate the crossing out or removal of the hypothesis that was not true of all living organisms, even if it was true of some living organisms. Although the overall purpose of the activity may have been to introduce students to the characteristics of life, the focus of the teaching was on using the logical patterns associated with hypothesis testing, which, in this activity, included assessing available evidence (i.e., reading the organism information on the slide) and determining whether or not a given hypothesis should be rejected based on the available evidence (i.e., keeping or removing the hypotheses on the list).

Further illustrating the logos facet, as Mr. Cruz introduced the activity, he also asked the question, "so if it's not true, do you necessarily know the right answer, or do you just know that's that not true?" This question seemingly made sure that students understood the scientific way of thinking wherein the failure to reject a given hypothesis did not necessarily mean that hypothesis was true. This reveals scientific logic and reiterates the discipline-related thinking behind the reasons why "you don't ever 'prove' anything in science" (Ms. Desanne, observation, Dec. 20), as there is a difference in logic between "not false" and "true" in science.

In each of these two examples, the teaching focused on disciplinary ways of thinking. The teaching focus was on the patterns of thought used within mathematics and science, while

instruction of how those patterns of thought were represented using language was reserved for a different time, seen explicitly in Mr. Bennet's comment, "we're going to give it a form tomorrow" (observation, Oct. 12).

The following example, also from Mr. Cruz's biology class, shows the logos facet in a slightly different way, wherein the teaching foregrounded the presentation of logic while backgrounding the patterns and ways of thinking seen in the examples above. This teaching instance takes place during the lesson in which students responded to the previously discussed prompt concerning identifying a eukaryotic athlete's foot cell and arguing that an antifungal medication should be used instead of an antibiotic. After all the students had completed and turned in their arguments, Mr. Cruz and the class began co-constructing an exemplar response:

Mr. Cruz: Alright so I want to go through this and I want you guys to compare your responses with what we're going to go through. So the first thing is, we need to restate the question. So how can I restate this question? [Student A] how do you think I should restate this question?

Student A: You should use…

Mr. Cruz: You should use, so you're restating, so you should use [Mr. Cruz begins to write on white board]. And what did you pick [Student B]?

Student B: Tolnaftate.

Mr. Cruz: Tolnaftate. Alright, so tolnaftate… on your what?

Student B: Your foot.

Mr. Cruz: Your foot, so tolnaftate on your foot [Mr. Cruz continues writing]. So this is our response [referring to the sentence he had just written: *You should use tolnaftate on your foot*.]. Alright, so what comes after a response? So

after this so what should appear? We have a response, what do we do now?

Student C: Evidence.

Mr. Cruz: Evidence.

[the class discusses some of the possible evidence]

[approximately two minutes later]

Mr. Cruz: So what do we do after we cite our evidence? From there we should do what [Student D]? What should we do [Student D]?

Student D: Explain.

Mr. Cruz: Explain the evidence. So our explanation should tie back to the original claim by talking about what this evidence means. So what does this evidence mean? (observation, Nov. 17)

In this teaching instance, the focus of the teaching was on presenting logic in a scientific context. As Mr. Cruz modeled a correct response by writing on the white board, his teaching focused on the structure of restating the question to make a claim, providing evidence, explaining the evidence, and connecting the explanation back to the claim. Comments such as "so this is our response," "what comes after a response?," and "what do we do after we cite our evidence?" make the logical structure of scientific responses explicit to the students. The students had already considered the logic as they constructed their own responses in the previous activity, so the focus of this teaching instance was on its presentation and the way in which information is communicated and arguments are structured within scientific contexts.

The structure that Mr. Cruz reinforced and guided the students through as part of his teaching of content revealed an accepted and expected pattern of communication used within

scientific disciplines. These expectations, discussed in the next section, include both school-based as well as discipline-based expectations of content. This included academic expectations, such as conceptual understandings of the curricular contents, and expectations for logos, which included the ways ideas are expressed and arguments are made within the discipline—both of which, I argue, are necessary to participation in the creation and contestation of knowledge within disciplinary spaces.

The Expectations Facet

The teaching observed in this study seemed to take a 'disciplined' view of content in which it addressed the school-based expectations needed to complete the assignment or pass the class as well as the discipline-based expectations needed to enter and participate in the discipline. In the same way that culturally and linguistically responsive teaching begins with sociocultural and sociolinguistic consciousness (Lucas et al., 2008; Villegas & Lucas, 2002b), the teaching in this study began with what I call a *sociodisciplinary consciousness*, or an awareness of the ways in which thought, language, and other factors (e.g., history, philosophy) are used by members of a discipline and shape the culture of that discipline. In other words, the teachers seemed to have an understanding of what was expected for students to be able to participate in the discipline and could make that understanding apparent in the content they taught and explicit in their teaching.

Many content area teachers seem to have an implicit understanding of the expectations held by their discipline. Teachers are often able to identify examples of 'good writing,' 'strong thinking,' or 'clear arguments' within their content area, even though few are prepared to identify discourse features of disciplinary thinking or writing (cf. Behrens, Johnson, Allard, & Caroli, 2016; Schleppegrell, 2004). Within the data, comments such as "you just have to be clear" (Ms. Desanne, debriefing interview, Dec. 20), "you [can't] write a scientific paper that

way…" (Mr. Cruz, debriefing interview, Dec. 5), or "[this one is] slightly better… but it's not convincing a skeptic" (Mr. Hanson debriefing interview, Nov. 2) point to these implicit expectations that force teachers to "rely on their own intuition and discursive knowledge in making judgment calls" (Fang & Wang, 2011, p. 148).

This intuition and implicit sociodisciplinary consciousness seem to allow content area teachers, including the teachers in this study, to identify what is consistent and inconsistent with disciplinary norms. This identification as consistent or inconsistent with disciplinary norms points to the idea that disciplines hold expectations and content area teachers, as representatives of those disciplines, teach and enforce those expectations, even if implicitly as part of the hidden curriculum. The teachers in this study seemed to understand that to become and be identified as a member of a discipline is to embody and use those disciplinary norms, or the accepted and expected ways of thinking and communicating. Fortunately, the teaching I observed extended beyond the implicit and intuition-based expectations, seen in the few examples described above, and explicitly focused on disciplinary expectations. In short, the teachers seemed to teach content in ways that 'disciplined' students by preparing them to access the cultural norms of the discipline, that is, participate in the knowledge-building activities of those within the disciplinary community.

Disciplinary expectations were not the only expectations at play in the teaching observed in this study; school-based expectations that spoke to in-process learning were also seen in the data, seemingly shaping the content that was taught. In the sections that follow, I unpack the expectations facet of content, making analytic cuts to show what appear to be both disciplinary and school-based expectations of the content taught, as well as the expectations for understanding and production. The expectations facet is the final facet of content discussed as

part of this study. Although it is the third facet of content discussed in this chapter, to continue the crystal metaphor, the crystal of content observed in the teaching was undoubtedly more complex than three facets of academics, logos, and expectations. Still, this crystal of content offers insight into the complexity of the content taught and how interrelated facets of academics, logos, and expectations can be seen in the content taught, which seemed to be working toward preparing students to enter and participate in disciplinary spaces.

Expectations for 'us' and expectations for 'we.' It is important to note that expectations are held within education by myriad stakeholders, including, but certainly not limited to, students, teachers, school administrators, curriculum designers, testing companies, teacher educators, and experts within disciplines. Identifying how those expectations came to be or whose expectations are being met or attended to in any teaching instance is important work, but largely outside the scope of this study. Of more salience to this study and PARALEXICAL teaching is identifying the role that differing expectations (held by any or all of these stakeholders) have in the construction of content for classroom learning and apprenticing students into a given discipline.

Expectations for us. The teaching in this study seemed to account for different types of expectations for content, including discipline-based expectations (i.e., expectations that allow students to enter and participate in disciplinary spaces), as well as classroom-based expectations (i.e., expectations that allow students to complete assignments, pass the course, or meet grade-level academic standards). These classroom-based expectations are situated within classroom contexts, guiding and scaffolding in-process student learning. I refer to these as *expectations for us*.

For example, when geometry students were first introduced to vectors, they threw a ball around the classroom to build understandings of the direction of vectors (i.e., where to throw the ball) relative to a given point (i.e., where the student was standing) based on teacher commands (Bennett, observation, Oct. 6). The expectation was that students could throw the ball in the right direction based on his or her current position in the classroom space. The command "positive, negative" meant that the student was to throw the ball to the student to her right and behind her, while the command "negative, positive" meant that the student was to throw the ball to the student to her left and in front of her. This classroom-based expectation fell well short of external, academic expectations of vector understanding for both the discipline and the Standards, but served as an important preliminary classroom-based expectation of the content.

Expectations for us were also viewed through the logos facet, as students used language outside the norms of the discipline as their understanding developed. For example, geometry students were encouraged to use *believe* or *faith* as they developed their understanding of conjectures (mathematical statements that have not yet been proven; e.g., angles of a triangle summing to 180 degrees is a mathematical conjecture). The usage of these words developed organically in Mr. Bennett's geometry class as the students supplied terminology for geometric concepts. While his third period class (the section I observed) chose to describe conjectures as "beliefs" or "things you believe," his first period geometry class referred to them as "things you take on faith." The respective choice of wording then functioned as the definitional norm within the context of the classroom, including in oral classroom communication as well as on written classwork and exit tickets. As Mr. Bennett noted in his post-lesson debriefing interview:

> Mr. Bennett: [The first period] class started using 'things you take on faith' instead of 'things that you believe,' for conjectures, [and I'm] fine with that. But

> then I would be looking for the word 'faith' on all of their papers. (debriefing interview, Oct. 17)

Although *belief* and *faith* typically lie outside traditional mathematical discourse, they became established expectations for logos within the classroom context. By generating their own nomenclature for talking about conjectures, students were engaging in the mathematical practice of coming to a community-based decision about language and then using it; consequently, the use of *belief* and *faith* were not just tolerated but came to be expected by Mr. Bennett. Furthermore, consistent with disciplinary discourse norms, students were expected to be disciplined about their language choices and use *believe* and *faith* as evidence of their geometric understanding of conjectures.

In a similar teaching instance, Mr. Hanson's algebra class was learning the term *zeros* of graph, more commonly referred to as an *x-intercept* in lower grades and with linear functions. Seemingly noticing the puzzled faces of some students who presumably were confounding *zero* the number with *zeros* of a graph, Mr. Hanson commented:

> Mr. Hanson: Treat this word right now as a vocabulary word. And if you get confused today, circle the word 'zero,' and I want you to write the word 'x-intercept'… It's never wrong if you call it the x-intercept (observation, October 24)

As small groups worked, a few students had used the term *x-intercept* instead of *zeros* when talking with their peers. Although Mr. Hanson heard some of these instances, he did not correct students who used the more familiar *x-intercept*. After class that day, Mr. Hanson reflected on his teaching and his expectations for students using this new term:

> Mr. Hanson: And that zeros word is not there yet. [Many students during class had used 'x-intercept' instead of 'zeros'] We just did it today. It's not going to be there for weeks, because really that's a big thing with quadratics and stuff like that. I'm looking for them to understand zeros by the end of the year. By the time they take [the annual state assessment at the end of the year]. We're going to get to a point in which 'zeros' BECOMES [comfortable] language. (debriefing interview, October 24)

Within the discipline of mathematics, x-intercepts are more frequently referred to as *zeros* or *roots*, especially in reference to quadratic and polynomial functions; Mr. Hanson indicated that his expectation was that all students would eventually use the term *zeros* in later months, but not necessarily that day. This "OK for now" approach seemingly allowed for students to use a familiar word as their mathematical understanding of intercepts continued to develop. As the year progressed and students began working with quadratic functions, expectations would likely shift and usage of *zeros* would become more expected, seen in Mr. Hanson's comment that he was looking for students to be using *zeros* by the end of the year. Both this teaching instance and the belief and faith example from Mr. Bennett above indicate students were still held to high academic expectations, that is, understanding of conjectures and x-intercepts that build toward the skills of constructing geometric proofs or analyzing quadratic and polynomial functions; however, classroom-based, rather than discipline-based, expectations for presentation were used to facilitate students' growing mathematical understanding.

Expectations for we. As discussed in the previous section, *expectations for us* can be seen as internal, classroom-based expectations that facilitate the learning process. In contrast, I consider *expectations for we* to be external, discipline-based expectations that facilitate entry into

and participation within a discipline. This *we* is the royal we, in which an individual person (historically, a king) speaks for or on behalf of a group or entity (historically, his subjects). In content area teaching, this looks like a teacher speaking on behalf of a discipline. *Expectations for we*, then, are external expectations held by the discipline and communicated to students; for instance, teaching students "how we say that" within the discipline of science.

Returning to a previous teaching instance, *expectations for we* can be seen later in the discussion that Ms. Desanne was having with her students regarding the use of the word *prove* in science. In this teaching instance, the student reiterated what Ms. Desanne had been teaching about communicating in science:

Student A: I remember that you mentioned that whenever we write a lab, we can't say that our hypothesis was proven, it supports- it's being supported.

Ms. Desanne: By?

Student A: By the evidence.

Ms. Desanne: Yeah.

Student B: Cuz prove is like a swear word in science.

Ms. Desanne: Yeah. (observation, Dec. 20)

The student seemingly internalized the expectation that we, as scientists, do not use the word prove; instead, we say that a hypothesis was supported by evidence. The rationale for this expectation was discussed in previous sections, but this example illustrates the expected language used within science to report results. The comment "prove is like a swear word" indicates other scientists would likely understand the meaning of the information being communicated, but had the student said, "the hypothesis was proven correct," the phrasing would be considered taboo within the discipline.

Within mathematics, a similar taboo is using a combination of decimals and fractions when writing mathematical expressions:

> Mr. Hanson: I'll specifically harp on it if a kid uses decimals and fractions in the same equation. So for example, once again, there's nothing mathematically wrong with that, but it's inconsistent. And for the sake of argument, you're never going to see that. You're never going to see ½ x + .4. So anyone who's 'fluent in math,' they're going to know what you mean if you write y = ½ x + .4, but they're going to be like, 'why are you mixing fractions and decimals?' (debriefing interview, Nov. 2)

This insight from Mr. Hanson shows the disciplinary expectations for expression writing that, like the previous example, go beyond the communication of meaning. It is likely that "y = ½ x + .4" and "the hypothesis was proven" could effectively communicate meaning, but the appropriacy of these statements in their respective disciplinary contexts would likely be called into question.

In a more subtle example, Mr. Bennett called the phrasing of one his geometry student's answers into question when the student reported part of a quadratic expression as "*a* to the power of two:"

> Mr. Bennett: [looking over the student's shoulder at the problem the student was working on] OK, I see what you did. So what happens when I have *a* multiplied by *a*? [Student A], what goes here?
>
> Student A: Uh, *a*- *a* to the power of two?
>
> Mr. Bennett: Yep, *a* squared.
>
> Student A: [continues working]

Mr. Bennett: And tell me what goes in this box.

Student A: *b* squared

Mr. Bennett: Great [moves to another table]. (observation, Oct. 12)

In this teaching instance, the answer "*a* to the power of two" met academic expectations in that the student correctly calculated the answer (i.e., a^2 and not $2a$); furthermore, the student's use of "to the power of" was in many ways consistent with mathematical ways of communicating. Though this answer closely approximated disciplinary expectations, Mr. Bennett responded to this student's answer by recasting the response and saying "squared," indicating that this was the preferred terminology, which the student then repeated in the following sequence. Although both *a squared* and *a to the power of two* are used within mathematics, *squared* is more commonly used, especially within algebra and geometry.

This pattern in some way parallels a comment Ms. Desanne made in her teaching as she made sure her students knew the accepted plural form of *nucleus* as she introduced her students to the process of mitosis:

Ms. Desanne: This is called mitosis, the division of the nucleus into two nuclei. We don't say nucleuses, we say nuclei, okay? (observation, Dec. 5)

Nucleuses is considered an acceptable plural form of *nucleus*, but *nuclei* is far more commonly used, which likely informed Ms. Desanne's decision to call attention to this disciplinary expectation in her teaching. In both this instance and the one preceding, "nucleuses" and "*a* to the power of two" follow established patterns of language use within the respective disciplines (i.e., -es to form a plural; "to the power of" to indicate an exponent), yet are 'not how we say it' within disciplinary contexts.

Beyond the word- and phrase-level expectations described above, *expectations for we* also include discourse-level expectations. For example, Mr. Hanson's algebra students had been struggling to justify their answers and construct viable arguments. After students had written their responses as to why toy trains could only be sold in multiples of eight, Mr. Hanson showed a slide with an answer he had prepared. "This is an example of what a mathematician would write" (observation, Oct. 30) he said, showing the four-sentence justification meant to show the type of response both created and expected by mathematicians. He pointed out specific information that was included, such as rate, but he emphasized that this example did not need to be copied word-for-word. This emphasis on overall structure accentuated the same point he would make in a later lesson that using "big words and sophisticated words" (observation, Dec. 15) did not mean that an answer had been justified in a way that met mathematical expectations as set by both the Standards and the discipline. This teaching instance is discussed in more detail in a later section, but Mr. Hanson described the overall structure of viable mathematical arguments, including the role and importance of base cases and connecting them to the problem at hand.

In sum, the teaching observed in this study seemed to attend to a plethora of expectations, including classroom-based *expectations for us* and discipline-based *expectations for we*. These different expectations shaped the content that was taught, seemingly giving students a glimpse into disciplinary practices while also acknowledging the learning processes in which the students were currently engaged.

Expectations for understanding and expectations for being understood. In addition to internal, classroom-based *expectations for us* and external, discipline-based *expectations for we*, the teaching observed in the study also attended to expectations surrounding comprehension

and production. This focus on having knowledge and performing a skill resembles the distinction drawn in the second language literature between competence/knowledge and performance/production (e.g., Canale & Swain, 1980; Chomsky, 1965; Gass, 2013; Saville-Troike & Barto, 2016); that is, there is a difference between possessing knowledge and being able to use that knowledge in context for a purpose. A student may 'understand' a concept, but that understanding may not transfer to being able to 'be understood' by the teacher. For instance, the geometry student who, earlier in the chapter, thought she "got it" even though she couldn't explain it may have actually possessed the requisite knowledge, that is, comprehended why the geometric rule worked, but because she could not express her understanding, that is, make herself understood, Mr. Bennett did not consider her to be knowledgeable about this geometric concept.

The teaching observed in this study seemed to attend to both of these expectations—understanding and being understood—as it worked toward developing conceptual understandings, which I refer to as *expectations for understanding*, as well as speaking and writing in ways that reflected the established conceptual understandings of the discipline, or *expectations for being understood*.

Expectations for understanding. Separating knowledge or understanding from performance is notoriously difficult since only individuals can determine the knowledge inside their minds. In teaching and learning contexts, teachers are consistently tasked with both determining and developing student understanding. In Ms. Desanne's biology class, she frequently asked students to review, summarize, or interpret information; questions such as, "what type of cells are eukaryotic again?," "how does the cell know when to divide?," "what does it mean to regulate something?," and "why would the cell want to check the DNA?"

(observation, Dec. 11) were found throughout her teaching. Although these questions were eliciting student responses, they seemed to serve as comprehension checks and opportunities where Ms. Desanne could correct student understanding:

Ms. Desanne: So cyclins regulate the timing of the cell cycle in eukaryotic cells. What type of cells are eukaryotic?

Student A: Single-celled

Ms. Desanne: Nope

Student B: Complex cells

Student C: Animal

Ms. Desanne: Animal and plant, complex cells. Don't get them confused. Prokaryotic cells are single celled.

These comprehension checks also seemed to indicate when students had demonstrated sufficient understanding and the instruction could progress. After describing the cell cycle and the three checkpoints within it, Ms. Desanne asked the class which checkpoint they thought was most important. After several students volunteered reasons for all three checkpoints, Ms. Desanne commented:

Ms. Desanne: Okay good. All you guys have valid reasons. There's no right answer.

Student A: Wouldn't it be all of them?

Ms. Desanne: Yeah, all of them are important. I just wanted to know if you understood why, okay? And you did. [Ms. Desanne takes a long inhale]. So, moving on, cell cycle regulators… (observation, Dec. 11)

In this teaching instance, Ms. Desanne indicated that she felt satisfied that the class seemed to understand how checkpoints functioned within the cell cycle, seen through her affirmation and

confirmation that the students understood. This then allowed Ms. Desanne's teaching to transition and progress from the cell cycle to the next topic of cell regulators.

Questioning strategies such as these to check student comprehension were common across the teaching in this study as all four teachers leveraged both oral and written questions, among other techniques, to gauge student understanding. The vast majority of the time these questions followed a similar pattern as they did in Ms. Desanne's teaching wherein an incorrect or incomplete student answer seemed to indicate a partial student understanding, which the teacher would then attend to, as she did in the correction of eukaryotic cells, or affirm a correct response as an indicator of sufficient student understanding.

A correct response, however, does not always mean correct understanding, as seen in an example from Mr. Bennett's geometry class. In this teaching instance, the students had been tasked with working with their small groups to create a rule for a 180° rotation and then apply that rule to rotate the point B, located at (-X, Y), 180°. The correct location of B' (point B after it had been rotated) was (X, -Y), as point B had rotated from quadrant IV (the upper left region on a Cartesian plane) to quadrant II (the lower right region). All groups determined that the location of point B' was (X, -Y), but not all the groups had actually done a rotation.

Instead of rotating point B 180°, one group had chosen to reflect the point over the Y axis (to quadrant I), and then reflect it again over the X axis (to the correct location in quadrant II), thereby correctly locating point B. Importantly, the content of the lesson was aimed at student understanding of rotation, not correctly locating a rotated point. Noticing what the group had written, Mr. Bennett commented to the group:

Mr. Bennett: What you said here is correct, it's just not a rotation. But the rule that you have here is correct, you're just not describing a rotation. So I want you

guys as a group to talk about the difference here. What is the difference there? Cuz you're not wrong. (observation, Oct. 4)

After the groups finished working, Mr. Bennett asked the group to report their response, in which one group member described the series of reflections they used to arrive at their answer. Mr. Bennett then clarified the concept for the class:

Mr. Bennett: What about from this one to this one, what's the transformation there? [Student A], what's this transformation?

Student A: Reflection

Mr. Bennett: A reflection. What about this one to this one, what's that transformation? What are we doing there, [Student B]?

Student B: It's a reflection

Mr. Bennett: Yeah. These are all true, these are all reflections, if I take this one out and I go directly from here to here, what transformation am I doing on this one? [Student C]?

Student C: Rotation

Mr. Bennett: Rotation. That's why I'm so happy that we're talking about this. Because this gets at the whole point. (observation, Oct. 4)

The group had correctly determined the location of point B', thereby meeting expectations for the procedural aspect of this task; however, despite answering 'correctly,' the group did not meet expectations for the conceptual understanding of a rotation, which Mr. Bennett addressed and clarified for his class. Although 'right answers' were often indicators of sufficient student understanding of content in the data, this teaching instance shows that 'right

answers' and 'right understanding' are not always the same, and 'right understanding' was far more salient to the content taught.

Expectations for being understood. This section focuses on student production, or how the understanding discussed in the previous section is used to meet disciplinary expectations. Students are frequently asked to make themselves understood to their teachers, often leaving teachers to "read between the lines" or infer what a student understands, seen in Ms. Desanne's comment while grading, "I'm [just] trying to figure out what they mean" (debriefing interview, Dec. 12). *Expectations for being understood*, by contrast, speaks to students meeting the expectations for communication within a discipline. In short, these are the expectations for being understood by anyone in a discipline, not just by a teacher.

Expectations for being understood were seen in Mr. Cruz's biology teaching through his focus on how to write evidence-based responses. The example depicted earlier in this chapter in which students were given a picture of an athlete's foot cell and asked to determine whether an antifungal or antibiotic cream should be used to treat it was one of the evidence-based responses Mr. Cruz's students were asked to write. To construct these responses, students were expected to know information (e.g., the function of lysosomes in a cell) as well as to produce scientific arguments using that information. To assist students with this task, Mr. Cruz offered a "restate, response, evidence, explanation" to help structure their evidence-based responses, wherein students needed to restate the question or prompt, respond by giving their answer, provide evidence in support of their response, and then explain that evidence. Mr. Cruz explained in a debriefing interview that he focused on writing this way because it followed the structure of scientific writing. In response to a question asking if the response pattern and structure he used in his class followed the same structure of scientific writing, Mr. Cruz commented:

Mr. Cruz: Yeah, like that's how [scientific] arguments are presented. You say what your argument is, you provide evidence, you interpret it, and you link it back. (debriefing interview, Dec. 5)

This comment was made as Mr. Cruz graded responses to the athlete's foot prompt, in which students were asked to identify the cell as eukaryotic and conclude that tolnaftate, an antifungal cream, should be used. Mr. Cruz evaluated the following response as receiving full points:

You should use tolnaftate on your foot. My evidence is that the picture of the cell below contains a nucleus. Since this cell has a nucleus, it is eukaryotic. Since this cell is eukaryotic, the only medication that can be used to treat your foot is tolnaftate because it keeps eukaryotic cells from growing.

Mr. Cruz: Yes, so this is a correct response. I'm seeing that they're noticing a specific characteristic that they can see in the image. They relate the characteristic to being eukaryotic. And then they say that since it is eukaryotic tolnaftate is the only one who could do it because it keeps specifically eukaryotic cells from growing. (debriefing interview, Dec. 5)

Mr. Cruz then encountered a response that was not so straightforward:

The cell has a nucleus so is it is eukaryotic. Eukaryotic cells stop growing with tolnaftate so you should use tolnaftate on your foot.

Working with the science department's four-point rubric designed to evaluate the question restatement, making a claim, provision of evidence, and evidence explanation, Mr. Cruz reread the response a few times, paused, and sighed before saying:

> Mr. Cruz: It HAS everything… They HAVE the correct response, so I would have to give them a point on that. They DO say the evidence I HAVE to give them point on that, and there is a chain of logic, so they do explain it, so I would HAVE TO give them full points. I WORRY about that. (debriefing interview, Dec. 5)

Mr. Cruz went on to explain that he was worried that the writer of this response seemed to understand the different points (e.g., that cells with nuclei are eukaryotic, not prokaryotic), but did not understand how to put those points together to produce a whole response that allowed the writer to be understood in a scientific context. Sighing again, Mr. Cruz began:

> Mr. Cruz: You just can't- …if you write a scientific paper that way- … [sigh]. You always state your argument in advance so that people can understand what the logic is behind it. (debriefing interview, Dec. 5)

From this excerpt, although Mr. Cruz seemed to understand what the student meant in the response, it did meet expectations for being understood in science. He lamented that, based on the rubric, he would be forced to give full points to the response, despite the fact that it was, at best, "minimally proficient." This final comment from Mr. Cruz shows that although the student may have scored well on the school-based task and shown some evidence of understanding, this student may not have fared quite as well if trying to be understood and be identified as knowledgeable by members of the discipline of science.

Similarly, when Mr. Hanson's algebra students were graphing linear functions, some of them had drawn their axes such that the numerical labels on x-axis began at 0, but the numerical labels on y-axis began at 750—the smallest y-value that the students were tasked with graphing. Presenting data in this way is accepted within mathematical disciplines, but must be shown using

a zigzag symbol, which functions somewhat like a graphical ellipsis by indicating that the graph is not drawn to scale or that the data does not start at zero. After a few students presented their graphs, Mr. Hanson responded:

> Mr. Hanson: Very well done. I want to throw one more thing out there too. You might see this on [college entrance exams], you might see this on [the end-of-year state assessment], perhaps most importantly, you might see this in college. You're allowed to put- it looks like a little lightning bolt [draws zigzag symbol on the white board], to let your reader or your professor know that you're skipping a part. But as long as your graph is scaled accordingly, you are allowed to do that. OK?
>
> Student A: So the lightning bolt has to be there?
>
> Mr. Hanson: Yes, the lightning bolt does have to be there. (observation, Oct. 24)

Mr. Hanson's assessment of "very well done" at the start of this teaching instance points to the idea that he has understood the students and that they have meaningfully and sufficiently demonstrated their understanding. The discussion of the lightning bolt symbol indicates that, although the students had made themselves understood to their teacher, this may not have been the case had this occurred in a disciplinary context, such as a college mathematics classroom. Mr. Hanson explicitly pointed out to his students that use of this symbol was an expectation for entry into a discipline (i.e., on a college entrance exam) and within a discipline (i.e., in college), and thus was an expectation that went beyond the school-based context of his algebra classroom. In other words, for a graphical representation to be understood in college by other members of mathematical disciplines, the expectation is that this symbol must be there. Continuing this line of reasoning, if students create graphs not drawn to scale without including the lightning bolt

symbol, their understanding of graphing or mathematics in general might be questioned, which could have implications for their entry or participation in mathematical disciplines.

Conclusion

Together, the three facets discussed in this chapter captured different aspects of the content taught—what I refer to as ALEX. Like a crystal, academics, logos, and expectations were always present in the content taught, even if only one facet was in direct view or highlighted in the teaching. The interrelatedness and inseparability of these facets of content was apparent, as expectations, for instance, did not seem to exist independently of academics or logos, and logos could not be discussed in isolation from either academics or expectations. Academics, logos, and expectations, in addition to being interrelated facets of content, are also meaningfully related to content as a whole. In other words, although I describe the content taught in terms of these three facets, it must be clear that content includes more than the sum of these three facets and speaks to the overall development of students' disciplinary competence and the performance of that competence in accepted and expected ways.

In a similar way that language scholars have attempted to parse communicative competence, discussed earlier in this chapter, I use academics, logos, and expectations to try to parse what I saw as disciplinary competence in my data. The academics facet includes curricular contents, concepts, and topics that carry the 'meat' of the message. The logos facet represents the method through which that message is carried, including the extent to which that message is believable or credible. The expectations facet concerns the appropriacy of that message to a specific audience and for a specific purpose. Together, these three facets of content account for what is said (i.e., academics), how it is said (i.e., logos), and to whom (i.e., expectations), drawing comparisons to the aspects of language that are attended to in communicative language

teaching, which focuses on communicating within social contexts. In other words, the facets of content I observed in content area teaching resemble the facets of language, that is, the aspects of communicative competence, taught in communicative language teaching. This resemblance may help us to view content in a new way and see it not as something that not only uses language, but also functions like a language itself.

The next chapter focuses on ways in which the teaching recursively, intentionally, and strategically highlighted and lowlighted academics, logos, and expectations in teaching instances. Within the data, this emerged in instances where teachers seemed to know which facet—academics, logos, or expectations—to attend to at which time, for what purpose, to build which concept, to avoid which error, or to provoke which question. This teaching took content apart and made it apparent for students as it also developed skills students needed to construct content for themselves and communicate that content in disciplinary contexts.

CHAPTER 5: THE TEACHING

In the previous chapter, I unpacked the content that was constructed in the teaching I observed, identifying academics, logos, and expectations as three interrelated and interconnected facets of it. In this chapter I turn to the teaching itself and show how teaching constructed the content taught and responded to the disciplinary norms of thinking and communicating. To return to the crystal metaphor, whereas the previous chapter described the crystal of content, this chapter describes the ways in which the teaching revealed that content to students. This can be thought of as metaphorically walking students around the crystal, pointing out previously unseen features and repositioning students so they can look at content from different perspectives. The teaching I observed seemed to be in a continuous process of simultaneous building and unbuilding—assembling and constructing the content for students, but also disassembling and taking the content apart in ways that could allow students to examine the parts and reconstruct that content themselves. I begin this section with a hypothetical scenario that will likely resonate with readers with language-based orientations. This scenario is meant to illustrate issues of language and culture within a given context and to parallel later examples from content area teaching.

A Slice of Roast Cow

Imagine sitting at the dinner table when someone politely asks for "another slice of roast cow." This request would likely be completely understandable—it was made using the English language, it was syntactically accurate, and it correctly named the animal from which the meat came. Yet, this request was not quite right to those of us who speak English well. Although *chicken* and *fish* are used for both animals and food, *pig* and *cow* are not, and some English speakers might get a little queasy, fork in hand, at being reminded that they were about to take a

bite of roasted cow. Furthermore, assumptions might be made about the speaker—low English proficiency, uncultured, low class, and unfamiliar with fine cuisine.

There are many possible responses to the request of this hungry diner, including ignoring, ridiculing, mentioning, or teaching. Someone at the table might pass the roast beef and say nothing, because the message had been clearly conveyed and achieved its specific, localized goal. Another person might say, "sure, here's the roast cow," using and legitimizing the speaker's language as he passed the roast beef. A third person might comment on the effect the request had on an English-speaking listener, saying only a vague, "that's gross" before passing the roast beef. Another possible response is, "sure, here's the roast beef," simply recasting the speaker's words into the accepted and expected language of English dinner parties. Another might go further and say, "sure, here you go. We actually say 'roast beef' instead of 'roast cow,' even though you're right—beef is meat from cows," using and explaining the accepted and expected form. Lastly, someone might say, "sure, here's the roast beef. We say 'roast beef' because after the Norman Invasion we used French-based culinary terms to name the food, *boeuf*, eaten by rich people who would have spoken French, while leaving German-derived name for cow, *cu*, referring only to the animal raised by farmers, who didn't have the right to eat the meat of the animals they raised. You know how French food seems fancy still today? That was created almost a thousand years ago."

Any of the possible responses, and likely many more, could be considered acceptable, and all are forms of teaching. Teaching can, for example, ignore, evaluate, implicitly and explicitly correct, explain what something is, and explain how something came to be. This scenario illustrates that someone might be right (i.e., roast cow and roast beef are functionally equivalent), but also wrong at the same time (i.e., roast beef is the accepted and expected term).

Furthermore, as with any use of language, the speaker is subject to be judged by others as a result of this correct, yet also incorrect, way of speaking. It is not inconceivable that a potential business deal might be soured over a dinner of "roast cow." "Judgment systems" (Gee, 2017, p. 71) such as these, which comprise the values and norms of a group, can act as gatekeeping devices, through which the speaker can be identified as belonging—or not—to the group. The next section speaks to this gatekeeping and the ways in which the teaching prepared students to pass through gates in both school and disciplinary contexts.

Formative and Informative Gatekeeping

Within the context of this study, the teaching seemed to be preparing students to face and pass through the gates ahead of them, which included scholastic—or school-based—gates as well as disciplinary—or discipline-based—gates that might identify members and non-members of the discipline. However, preparing students to pass through disciplinary gates ahead did not mean that the teaching itself functioned as a proxy for disciplinary gatekeeping. The teaching was not framed as judging students by disciplinary norms and standards, but instead tended to be both informative as well as formative—that is, this teaching informed students about the gates ahead and formatively guided their development toward meeting those requirements.

Efforts to prepare students to enter disciplines, as seen in my data, were distinct from traditional scholastic gatekeeping. Like most teaching, the teaching observed in this study served to prepare students to pass through scholastic gates by making them aware of and supporting them to work toward meeting school and curricular standards. Scholastic gatekeeping was seen throughout the data in the form of comprehension questions such as "why do you think it's important to have a checkpoint right before G1?" (Desanne, observation, Dec. 11), "what does this evidence mean?" (Cruz, observation, Nov. 17), or "what is inductive

reasoning?" (Bennett, observation, Oct. 12) and subsequent determinations of whether or not the answers indicated sufficient knowledge. Preparation for passing through scholastic gates was also evident in the expectations for and evaluation of written student work, seen in Ms. Desanne's requirement that students "[had] to have seven sentences per paragraph, two paragraphs" (observation, Dec. 7) for a writing assignment—an established classroom-based expectation independent of other departmental or curricular expectations. This expectation was then considered in grading the assignments, as points were subtracted from students whose paragraphs had fewer than seven sentences, which influenced determinations of who passed this scholastic task and who did not.

Of more salience to this study is the way in which teaching served to inform students of and formatively prepare them for the gates beyond the classroom and beyond the gatekeeping power of the individual teachers of this study. For example, Mr. Hanson introduced the term "zeros of a function" to his class, referring to the point at which a function crosses the X axis. As Mr. Hanson walked between groups of students, a student raised his hand to ask Mr. Hanson for clarification, asking

> Student: So [I say], 'this is the zero of the function?'
>
> Mr. Hanson: Right. That's the language you need. Cuz that's the language they're going to use. (observation, Oct. 24)

Although Mr. Hanson never identifies who the "they" are who are going to use this language, it could be understood that "they" are disciplinary gatekeepers students might encounter later in life. "They" could be the SAT, the ACT, or the state-level exam students take at the end of each academic year. "They" could also be college professors, AP exam readers, college admissions panels, or others responsible for judging the students or admitting them—both literally or

figuratively—into disciplinary spaces. This exchange indicates that, regardless of who "they" were, Mr. Hanson was preparing his students to speak like "them," thereby readying his students to pass through disciplinary gates and interact with gatekeepers such as these.

Scholastic and disciplinary gates are complementary, and the teaching in this study seemed to reflect an acknowledgement of these two sets of gates as it prepared students to pass through both sets, thus responding to both school-based and discipline-based expectations. To do this, the teaching focused on acknowledging and valuing the efforts the students made in reaching or approaching scholastic gates, while encouraging them to move forward to reach and pass through disciplinary gates. A group of students in Mr. Hanson's class, for example, calculated the slopes of two perpendicular lines to be $-\frac{1}{2}$ and $\frac{2}{1}$. Looking over one of the student's shoulders, Mr. Hanson said, "Excellent. This is not wrong, this is one hundred percent right, but you're never going to see it written like that" (observation, Oct. 26). Mr. Hanson addressed the whole class a few minutes later:

Mr. Hanson: I saw some people doing this [writes $\frac{2}{1}$ on the whiteboard]. If I wrote that, is that wrong?

Class: No.

Mr. Hanson: No. But are you ever going to see it written like that?

Class: No.

Mr. Hanson: Technically, [you] didn't simplify all the way. What's anything divided by one?

Class: Itself. (observation, Oct. 26)

In this example Mr. Hanson noted that although $\frac{2}{1}$ was mathematically accurate, the only way that students would ever see it written was as itself—simply as 2. Mr. Hanson valued the

accurate academics knowledge held by the students, evaluating $\frac{2}{1}$ as "100 percent right," seemingly acknowledging that the student passed scholastic gates of conceptual understanding of the slopes of two perpendicular lines. Notably, his teaching then shifted to preparing students for disciplinary gates by emphasizing the format that students should expect to see outside of the classroom and the appropriate representation. Thus, the teaching conveyed the message that although both $\frac{2}{1}$ and 2 were both "one hundred percent right," and responded to discipline-based expectations by affirming that only the latter would be considered 'right' by those who knew mathematics. The student, though likely to pass through scholastic gates by writing $\frac{2}{1}$, would need the answer 2 in order to pass through disciplinary gates and be recognized as a member of the mathematical community.

By shifting between preparing students for scholastic and disciplinary gates and responding to school-based and discipline-based expectations, Mr. Hanson's teaching recognized the contributions that students had made toward their conceptual understanding and scholastic achievement while at the same time informing them of and preparing them for the gates they might encounter outside of the classroom. Relating these examples to the scenario earlier, writing $\frac{2}{1}$ was akin to saying "roast cow" in that both answers demonstrated some understanding and were, in a sense, accurate, but presented in ways that would identify each person as an outsider rather than an insider, possibly preventing them from entering into spaces in which *2* and *roast beef* are accepted and expected.

This teaching for preparing students to successfully pass through disciplinary gates resembles the teaching of language as done through communicative language teaching, discussed in the previous chapter. Effective language teaching values and leverages the languages students bring to classrooms and affirms the meaning students are able to imperfectly make, while

simultaneously preparing them to communicate with people outside the classroom. The teaching observed in this study accomplished something similar. Instead of first languages and second languages, the teaching was focused on school language and disciplinary language. The teaching acknowledged and valued student language such as $\frac{2}{1}$ or "*a* to the power of two," affirmed the accuracy of the meaning the students made, but also pushed students toward the ability to enter and be understood in a disciplinary context outside of the classroom.

PAR—Purposeful Attention to Realizing

This section examines and unpacks the work of teaching that purposefully attends to realizing academics, logos, and expectations (ALEX, discussed in the previous chapter) integral to content as a language. The work of teaching, as observed in this study, strategically privileged or highlighted individual facets of content while acknowledging other facets held in the background, thereby paying purposeful attention to realizing (PAR) content.

Using the frame of PAR helps to shed light on what was happening in the teaching, including the moves made within that teaching—moves that resemble those made in language teaching. This PAR frame helps to show the ways in which content was taught as a language in the teaching. Before focusing on purposeful attention, I discuss two ways in which teaching realized facets of content for students. I then return to PARALEXICAL teaching by bringing together PAR and ALEX as a lens for viewing the teaching of content as a language and for understanding PARALEXICAL teaching as a form of culturally and linguistically responsive teaching.

Realizing

The teaching observed in this study purposefully attended to realizing the academics, logos, and expectations of content. *To realize* has many definitions in English, one of which is to

notice, know, or become aware of, as in, “I didn’t realize that ‘content’ was so complex.” Another definition is to make real, to create, or to produce, as in, “I want my students to realize their dreams.” These two meanings of realizing parallel the competence and performance distinction used in the previous chapter to describe aspects of understanding and being understood within the expectations facet of content. The previous chapter spoke to this knowledge/production distinction in describing the content that was taught, while this chapter speaks to how the teaching observed worked toward the development of student understanding as well as student production. The following sections describe the ways in which the teaching worked toward student realizing—both realizing as noticing and realizing as producing.

Realizing as noticing. *Realizing* was often reflected in the observed teaching in instances wherein students were made aware of information, although they were not necessarily required to immediately act on this information. In other words, information was passed on to students that seemed to be for the purpose of conceptual understanding rather than for the completion of a task in the moment. In the following example, Ms. Desanne attended to her students realizing the function of cyclins within the cell cycle:

> Ms. Desanne: Yeah, they can stop and start parts of the cell cycle. So, they regulate parts of the cell cycle, that's what they do. They say, ‘hold up, you can't go any more. I'm not going to let you divide.’ Or they say, ‘okay, you can go ahead, everything's fine with your DNA. You're all good.’ Okay? That's what cyclins do. (observation, Dec. 11)

In this example, Ms. Desanne’s teaching is allowing students to realize something about the academics facet of content—the function of cyclins. Ms. Desanne describes what cyclins do within a cell by defining their function (i.e., “they regulate parts of the cell cycle”) and then

rephrasing that definition using imagery and personification to illustrate (i.e., "[cyclins] say, 'hold up…[or] you can go ahead…'"). At this point, students were not expected to visually represent cyclins in a cell cycle, say what cyclins do or why they might be important, or use their knowledge of cyclins to interpret an article on cancer cells as they did later in the lesson and in subsequent classes. Instead, the teaching helped students to notice and allowed them to build their competence of what cyclins do.

Similarly, the following excerpt from Mr. Bennett's teaching shows how students realized one of the ways in which ideas can be ordered and expressed within mathematics. After various students explained how they arrived at the answer to a deductive reasoning problem, Mr. Bennett drew their attention to the patterns they were using to express their mathematical logic:

> Mr. Bennett: What I'm hearing you guys do is you make a true statement, based on this, statement A, statement B has to be true. Because statement B is true, statement C has to be true, because statement C is true, statement D has to be true, and so on and so on. (observation, Oct. 12)

This teaching instance focused on helping students realize the linguistic patterns they were using to express mathematical logic. In other words, Mr. Bennett's teaching was allowing students to realize something about the logos facet of content as he drew attention to the ways in which the students were using language to represent their logic. Importantly, this teaching went beyond simply engaging or immersing students in mathematical discourse; it made students explicitly aware of the discourse they were using and the ways in which they were saying something, not just reporting what was being said. After the lesson, Mr. Bennett commented on student representation of mathematical reasoning:

Mr. Bennett: [what students say] doesn't necessarily reflect their ability to deductively reason. It reflects their ability to ARTICULATE the way that they're deductively reasoning. (debriefing interview, Oct. 12)

As the class was headed into formal geometric proofs and the structured ordering of ideas would become increasingly important, Mr. Bennett called attention to this articulation of logic in his teaching. He pointed out, and implicitly encouraged the use of, one way in which mathematical logic could be expressed, thereby helping students realize how deductive reasoning could be articulated.

These two examples attended to different facets of content as Ms. Desanne highlighted academics and Mr. Bennett highlighted logos, but both were focused on developing student awareness and understanding. Later in each of these class sessions or units, students were expected to use the information to complete tasks, but the teaching at these particular moments was focused on getting students to realize, or notice, a piece of information about content.

Realizing as producing. The teaching also seemed to move students toward realizing as producing, creating, or making real, which was often in the form of an oral or written product. The following excerpt from Ms. Desanne's teaching attended to the academics facet as she prompted her students to produce a word introduced earlier in the class period:

Ms. Desanne: The cell separating doesn't happen until what? Can someone tell me?

Student A: Cytokinesis.

Ms. Desanne: Cytokinesis. Can everyone say that?

Class: [in chorus] Cytokinesis

Ms. Desanne: Cy-to-ki-ne-sis. [elongating vowels and stressing each syllable]

Class: [in chorus] Cy-to-ki-ne-sis. (observation, Dec. 7)

This exchange allowed the students to realize—to produce—a word with the accepted pronunciation pattern of scientific disciplines. Although Student A felt the confidence to orally produce this word in an answer, Ms. Desanne then created an opportunity in her teaching for the class to orally produce the same word. Earlier in the same class period the teaching had attended to students noticing cytokinesis as both a word and a scientific concept, but this teaching instance focused on producing the word itself. The word was said first with a natural speech pattern, then with exaggerated enunciation to seemingly clarify the sounds of each syllable. The opportunities for choral response essentially gave the students two practice performances in which any errors or mispronunciations would likely be heard only by the speaker, thereby lowering the pressure to correctly pronounce a five-syllable word on the first attempt.

Realizing in terms of making real or producing was also seen in the data through the teaching of writing. In the next example from Mr. Cruz's biology class, the teaching highlighted the facet of logos and the scientific structure of logic. In the previous section Mr. Bennett similarly attended to logos, but whereas Mr. Bennett's geometry students were only expected to notice how mathematical reasoning was presented, Mr. Cruz's biology students were expected to produce a scientific argument, in this case, an evidence-based response. In this teaching instance, Mr. Cruz was walking around the classroom as students constructed their responses. Seeing that a student was seemingly struggling with his response, Mr. Cruz approached the student and, after determining where the student was struggling, he responded:

> Mr. Cruz: Always start with the restating. So it's asking you to identify the characteristic of living things being represented. So [you should write] 'the characteristic of life being represented is…' and then you tell me what that is BEFORE you talk about evidence. (observation, Nov. 13)

In this instance, to prompt student production, Mr. Cruz stated the first component of a response (always start with the restating), interpreted the prompt, and gave the student a sentence starter to prompt their production of an evidence-based response. The student may have introduced evidence prematurely, but Mr. Cruz's attention to logos and the expected way responses are worded and structured in scientific contexts suggests that the student had accurately identified the characteristic of life that corresponded to the evidence. The issue at hand then did not seem to be helping the student to identify the correct the characteristic of life, but on helping him produce a scientific argument.

In these two 'producing' examples, the production seems based on a piece of previously-noticed academics; Ms. Desanne's students had been previously exposed to the concept of cytokinesis and Mr. Cruz's student had identified a characteristic of life and the evidence to support it. This pattern occurred consistently in the data, but noticing did not always precede producing. Recall the example earlier in this section in which Mr. Bennett unpacked the students' answers to the deductive reasoning problem, referring to the pattern they had been using to articulate their reasoning:

> Mr. Bennett: What I'm hearing you guys do is you make a true statement, based on this, statement A, B, statement B has to be true. Because statement B is true, statement C has to be true, because statement C is true, statement D has to be true, and so on and so on. (observation, Oct. 12)

In this example, students had already produced oral arguments, and the teaching then returned to those productions in order to notice a different facet of content. Noticing, then, did not necessarily need to precede student production.

As the teaching observed in this study worked to apprentice students into disciplines, students were required to 'realize' in multiple ways, including noticing and producing, across the facets of academics, logos, and expectations. The next section discusses purposeful attention, or the ways in which the teaching strategically, deliberately, and purposefully attended to this multiplicity.

Purposeful Attention

This section unpacks the multiplicity of purposeful attention by describing some of the ways in which teaching moved within and around the content it was constructing. In this section, I seek to give an account of how this teaching looked in practice, but do not aim to offer definitions of what this teaching is or name the criteria it must contain. Although I offer descriptions such as shifting, dialing up, dialing down, and deconstructing, discussed in detail below, these are meant to guide readers to see the multiplicity in the ways in which teaching paid purposeful attention rather than isolate specific practices of PARALEXICAL teaching.

Attention. Attention was largely explicit and overt, as seen in the teaching instances presented thus far. For example, Ms. Desanne explicitly attended to the definition of *maintain* in her teaching:

Ms. Desanne: This is asking you to explain how mitosis maintains- You know what it means to maintain something?

Student A: Pull apart?

Student B: Pull, right?

Ms. Desanne: No, maintain doesn't mean pull. [reading the question aloud] *Explain how mitosis maintains the chromosomes number*, maintain. Maintain means 'to keep.' If we start off with a cell with 10 chromosomes, the question is

asking how does mitosis ensure that each cell keeps 10 chromosomes. (observation, Dec. 7)

In this teaching instance, Ms. Desanne explicitly informed students of their misunderstanding of the meaning of *maintain* (i.e., "No, maintain doesn't mean pull") and supplied the correct definition (i.e., "Maintain means 'to keep.'") and rephrased the questions at hand. In this way, Ms. Desanne explicitly attended to *maintain* as an abstract concept through its definition, as well as contextualized the meaning by explicitly attending to the current task students were asked to complete. Similarly, Mr. Hanson explicitly called attention to a graph a group of students had drawn on the board:

Mr. Hanson: And I just want to point something out too. This is a linear function. Does this stop at 10? Call it out, yes or no?

Class: No.

Mr. Hanson: Does it ever stop?

Class: No.

Mr. Hanson: No, it goes on forever. There's actually arrows that are kind of invisible here [points to the ends of the line]. So yes, in the graph that's represented, it looks like it goes from negative 10 to 10, but I just want us to be cognizant that that line really goes on forever. Okay? (observation, Oct. 26)

Here, the attention Mr. Hanson gave was also explicit as he pointed out the features of linear functions (i.e., they go on forever) and their corresponding graphical representation (i.e., arrows at the ends of the line drawn) to check and perhaps clarify student understanding.

Throughout much of the data, attention was explicit, but sometimes attention was subtle, implicit, or seemingly inattentive. Over the span of three class periods, Mr. Bennett made a point of emphasizing the words *if* and *then* in his teaching as he made statements about deductive reasoning, seen in the following two instances:

> Mr. Bennett: So, if I start that this is equal to this, IF that's true, THEN I want to PROVE that this little bit here equals this little bit here. So again, IF I'm saying that this is equal to this, THEN how could I go about proving that this is equal to this? What are we thinking? How could you prove that? With your groups, how would you prove that? Take 1 minute, go. (observation, Oct. 12)
>
> Mr. Bennett: There's something I noticed about this statement that I want to point out. IF Z is between A and B, THEN this is true. IF Z is between A and B, THEN this is true, and why does that matter? (observation, Oct. 16)

The attention given in these teaching instances, though subtle, was deliberate and intended to prime students for future instruction, as Mr. Bennett confirmed after the lesson. In response to a question I asked about the if-then structure he was emphasizing in his speech, he commented:

> Mr. Bennett: It's in this unit. That's why I kept putting emphasis on *if* and *then*, but not saying why [I'm emphasizing if and then], because we're going to talk about hypothesis and conclusion… So the goal at the end of this topic is not for them to be able to give like a two-column statement-reason proof, the goal is for them to understand what deductive reasoning is and to be able to draft an argument using deductive reasoning and to look at a statement and know if they're using deductive reasoning or inductive

> reasoning. So one of the things we'll talk about is if-then statements and moving those pieces around and the contrapositives and those sorts of things. (debriefing interview, Oct. 12)

The attention Mr. Bennett gave in this teaching was indeed purposeful, but it was much less explicit because he only emphasized the words with his speech, rather than clarifying or explaining using additional language, as seen in the instances above from Ms. Desanne and Mr. Hanson. Mr. Bennett was purposefully priming his students to be formally introduced to the if-then argument structure that he would explicitly teach toward the end of the unit, right before the next unit on formal geometric proofs.

The teaching I observed used other subtle moves such as answering questions with non-answers, often seen in the data as responses to students such as “I don’t know, what do your tablemates think?” (Hanson, observation, Oct. 30), “I can’t say, write whatever you think” (Cruz, observation, Nov. 17), “try to figure it out” (Desanne, observation, Dec. 7). Mr. Hanson even occasionally walked away from students as a form of being attentive:

> Mr. Hanson: How you guys doing over here?
>
> Student: I don't know.
>
> Mr. Hanson: What's the matter?
>
> Student: It's hard to do.
>
> Mr. Hanson: Why? [motions to the student’s tablemates and walks away] (observation, Dec. 15)

This walking away is consistent with Mr. Hanson’s philosophy that he strives to get students to a point of mathematical understanding “without just giving them the answer” and by “focusing them and not funneling them” (initial interview, Oct. 3). Mr. Hanson’s simple question of

"Why?" before walking away points to this type of purposefulness in his teaching that might give a hint, such as focusing the student on locating the point of the difficulty and gesturing that he talk to his tablemates rather than supplying the answer or the next step needed to arrive at the answer. In other teaching instances, attention was slightly more explicit, such as the following example when Mr. Bennett alerted a student to an error, but did not correct it:

> Mr. Bennett: You need to make one change in this one, [Student A], to make it more precise. Your notation is off in the second one. (observation, Oct. 16)

In this example, Mr. Bennett simply pointed out to the student that an error existed, focused the student on the nature of the error (i.e., the notation), but did not actually correct him. These teaching instances, as well as the ones previously presented, show the wide range of implicit and explicit attention leveraged in the teaching to allow students to realize (i.e., notice and produce) content.

Furthermore, as referenced throughout these examples, the teaching in this study was purposeful and deliberate. In every post-lesson debriefing interview in which I asked the teachers to reflect on, comment on, or provide further information for an observed practice or interaction with students, they provided a thoughtful, reasoned answer. Mr. Bennett said he wanted to give his students multiple opportunities to hear the if-then structure before it was formally introduced in the curriculum, elaborating on the reasons why he "kept putting emphasis on the word *if*," (debriefing, Oct. 12). Mr. Hanson said he often walked away in order to "let students do the heavy lifting" (debriefing, Oct. 24) and Ms. Desanne focused on the definition of *maintain* because she did not want to "take for granted" that all of the students would know this general scholastic vocabulary word (debriefing, Dec. 7). In these teaching instances, along with every other one, the teaching was intentional and calculated; there was never an instance in

which I asked a teacher about a specific practice and received a response such as, “Oh, I didn’t even know I did that,” or “I’m not sure why I do that.” This is not to say that every teaching instance seemed to require a taxing and focused effort; on the contrary, the teachers appeared to have developed a fluidity or automaticity in their teaching. This fluidity and automaticity reflects teaching that was reasoned, deliberate, and purposeful.

Shifting focus. One of the ways in which the teaching observed in this study purposefully and deliberately attended to content was through what I refer to as *shifting focus*. The teaching moved between academics, logos, and expectations facets, shifting student focus from one facet to another. These shifts could occur multiple times within a lesson, either as a planned part of the pacing, or in response to a student. Occasionally, the students were led to take a deep and prolonged look at a given facet over the course of an entire class, rarely moving away from the focal facet. For example, Ms. Desanne’s biology class spent nearly a whole class period focusing on the stages of the cell cycle, spending much time gazing through the academics facet and seeing its intricacies as the teaching attended to the processes of cell division, the stages of mitosis, and the sequence of events that result in two identical cells. Mr. Hanson similarly spent nearly a whole class period focusing on constructing viable arguments, taking an extended view of content through the logos facet to show students how mathematical knowledge is represented and the role of base cases in this representation.

The shift between facets also occurred within shorter time frames, as in the following example from Mr. Bennett’s geometry class as groups were reporting answers to the whole class:

Mr. Bennett: Alright, let’s look at the angle addition postulate, [Student A] can you read us yours? And before you start, because I want to make sure I'm not

stopping you every other word, let's make sure we're saying 'measure of angle.' Go for it.

Student A: Measure...what was that?

Mr. Bennett: The m stands for measure...the angle symbol [∠] literally means angle, so for this one, for example, I would say 'the measure of angle BXD.'

Student A: Okay. The measure of angle AXB plus the measure of angle BXD equals to the measure of angle AXD.

Mr. Bennett: What are you going to ask the class?

Student A: Do you agree or disagree?

Class: [Several students use a hand signal indicating agreement]

Mr. Bennett: Alright, I agree with you guys too. Again, if B is in the interior…

(observation, Oct. 16)

In this teaching instance, the class had been reporting answers to recently completed classwork on discriminating between different postulates, focusing on the academics facet. The teaching shifted to attention to the logos facet, when Mr. Bennett clarified how to orally represent $m\angle AXD$, anticipating that the student would either say, "AXD," "angle AXD," or "M AXD" (Bennett, debriefing. Oct. 16). Since angles can be congruent, but not equal, Mr. Bennett clarified the nomenclature for Student A, and let her successfully state her answer. Although Mr. Bennett indicated that he would have stopped the student had she made a mathematical error and not used the phrase "measure of angle," he neither stopped the student when she made an English error (equals* to the measure), nor addressed it after the fact; instead, focus returned to the academics facet through the class agreement of Student A's correct answer and continued discussion of the addition postulate. The attention given to the logos facet in this teaching

instance indicates that although this facet used the English language, the focus was mathematical representation, not English usage.

Dialing up and dialing down intensity. In addition to shifting between facets of content, the teachers' teaching also adjusted the intensity of them. As most teachers know, not everything can be fully attended to at once, and this dialing up and down in teaching seemed to allow students to closely focus on a new or perhaps difficult aspect of content without being overly encumbered by other taxing demands. For example, in the example presented in the previous chapter of Mr. Bennett's geometry class in which students were working on deductive reasoning, Mr. Bennett was *dialing up* the intensity of the reasoning he was asking of them while *dialing down* the focus on expected presentation:

> Mr. Bennett: [to class] Right now I see statements but not reasons!
>
> [Student raises hand, Mr. Bennett approaches the student, inaudible dialogue, but the student seems to ask Mr. Bennett a question]
>
> Mr. Bennett: [to student] Those are the reasons for the equation, yes. Statement is what you already have written. This is a statement, what's the reason you were able to do this? It's one of these [points to the phrase bank on the student's page]. So that's the reason. We're going to be more formal about this as we go on, for right now, just make sure you have the articulation. We're going to give it a form tomorrow. (observation, Oct. 12)

Mr. Bennett's comment that students should "just make sure [they] have the articulation. We're going to give it a form tomorrow" highlights the dialing up on intensity on naming and ordering the logical steps students were using to arrive at their given answers; formal presentation of this logic was of little consequence. In this instance, then, the intensity of the logos facet was dialed

up in the teaching, while the expectations facet—in particular, *expectations for we* (see Chapter 4) which focuses on disciplinary norms—was dialed down. This does not mean that expectations were absent in this teaching. Indeed, Mr. Bennett was holding high expectations for the ways in which students were ordering their mathematical logic, but the expectations surrounding the presentation of this logic were reduced in this instance.

In the previous instance from geometry, students did not yet know the expected form of the proofs they were building, so they could not simultaneously attend to both the patterns of logic and their expected representation, but in the following instance, what is dialed down is already known to students. Here, Mr. Hanson drew on even numbers, a well-known and familiar concept for the students, as his teaching focused students on how to construct a viable argument, a Common Core standard for mathematical practice (CCSS.MATH.PRACTICE.MP3). In this lesson, Mr. Hanson used the claim-evidence-warrant structure used in the English department and adapted it for mathematics, tasking students with writing an argument to the following prompt: *David says that the number 10 is an even number. Is David correct?* The extended dialogue begins when Mr. Hanson corrected a student who had confused evidence and warrant in her response:

> Mr. Hanson: This is an awesome conversation. Now I'm gonna be very careful here. What you said is 100% correct, but what you said is an example of the WARRANT. Because the evidence here that we're trying to get at for a viable argument in math class is a universal truth. Like something that's true ... like a very general base case. So something like *all even numbers are divisible by two*, that's a very BROAD, universal case. Notice, did I say anything about the number ten yet?

Student A: No.

Mr. Hanson: No. Not yet. That's where my warrant comes in. So a warrant that I had here is *since ten is divisible by two, ten is an even number.* Notice what word I added in the front here, what word is this? Call it out.

Class: Since.

Mr. Hanson: What kind of word is that?

Class: Transition.

Mr. Hanson: It's a transition word, right? So when I'm creating a viable argument, I'm thinking about making my claim, what is the universal truth, and then what is the warrant for this specific case. Now I gave you one on purpose that was like a second-grade standard or so because I know you all know that ten's an even number. But I want us to think about the structure of a viable argument in a math class.

This is what I want us to do right now. What I want you to do is underneath your warrant you have some space. I want you to put all these sentences together. If you want to use a transition word here or there, that's fine. We're going to make a viable argument combining these three sentences.

One note I want to make. Do you have to copy these three sentences word for word?

Class: No.

Mr. Hanson: No. If you write a slightly different wording, but it was the same big idea, is that okay?

Class: Yes.

Mr. Hanson: Yes. (observation, Dec. 19)

The students were already familiar with the concept that ten was an even number, but they were less familiar with the structural patterns of mathematical arguments. As such, the teaching in this instance seemed to focus on the patterning of logic and mathematical discourse used within the discipline of mathematics. As Mr. Hanson explained, mathematical arguments contain the citation of a base case (presented to the students as a "universal truth") and how that base case relates to the specific case in the question or prompt. The teaching attended to specific words (e.g., "since"), but highlighted the "big idea" over lexis in the construction of a viable argument. The teaching emphasized the ordering of ideas, describing the elements of a mathematical argument, and helping students to construct viable arguments of their own, thereby bringing students into the disciplined way of arguing in mathematics.

Because Mr. Hanson was primarily focused on showing his students how to represent logic in expected ways, the teaching dialed up intensity on the logos and expectations facets of content while it dialed down intensity of the academics facet. Determining whether a number is even or odd is a second-grade standard (CCSS.MATH.CONTENT.2.OA.C.3), but it was used in this ninth-grade algebra teaching. Mr. Hanson knew that all his students understood even and odd numbers and could correctly identify 10 as an even number (Hanson, debriefing, Dec. 15), but he chose this example in his teaching so that the focus of the lesson could rest squarely on argument construction and the ways in which ideas were communicated, not the topic being communicated. As such, the teaching dialed down the intensity of the academics facet by using a very familiar concept and dialed up the intensity of the logos and expectations facets by focusing on mathematical argumentation. This dialing up and down in the teaching was

seemingly in service to guiding students toward a holistic and multifaceted understanding of content.

One of the additional ways in which intensity was dialed up and down in the teaching was through the use of what Mr. Hanson referred to as "kid-friendly language." Kid-friendly language was language that was comfortable and familiar to students that included slang, colloquial language, and familiar academic terms. Although students were encouraged to use their first or home languages in classrooms, kid-friendly language seemed to refer to a version of English in which mathematical concepts could be accessed, held in contrast to "high-level math language" (Hanson, debriefing, Oct. 24).

The use of kid-friendly language allowed the teaching to focus on the meaning of the academics without being encumbered by term usage. As Mr. Bennett said to his students, "I need you to put things in your own words so you can access it" (observation, Oct. 3) before his teaching could build toward the development of expectations for logos. Mr. Bennett then modeled this through his teaching, as he used kid-friendly language as his students wrestled with a series of transformations:

> Mr. Bennett: I just want you to think. What transformations, what COMPOSITE, what GROUP, what COMBINATION of transformations would I have to use to make this animation happen? [animates slide on smartboard] Let me show it again. [animates slide again] What combination would I have to use? With your groups. Go. (observation, Oct. 6)

In this example, Mr. Bennet used the mathematical term *composite*, but immediately supplied the more familiar synonyms *group* and *combination* before ultimately asking the students a question

using *combination* rather than *composite*. Contrast this with an excerpt from a lesson four days later in which Mr. Bennett was speaking to a student working with his small group:

> Mr. Bennett: I disagree. You have a composite there in 11. You're doing a reflection across both y=x and you're doing a 180 degree rotation. What you're describing, your matrix, it would be like if I took this.... [writes on nearby dry erase board] triangle, reflected it, and then rotated it to here. So you have a composite right now, so be careful. (observation, Oct. 10)

In this example, Mr. Bennett only used the term *composite* and did not provide synonyms to the student, instead modeling disciplinary language. Together, these examples indicate that the teaching used kid-friendly language to scaffold the concept of composites before using the unscaffolded, "high-level" term in his teaching.

Mr. Bennett also encouraged his students to produce kid-friendly language as they built their understanding of academics. Recall the teaching instance from the previous chapter in which Mr. Bennett encouraged students to use *faith* and *belief* in lieu of *conjecture*. Instead of introducing the concept of conjecture alongside the term *conjecture*, over the course of the unit, the teaching worked toward developing students' conceptual understanding of conjecture using *faith* and *belief* before using *conjecture* as a term. It was only two days before the unit exam that Mr. Bennett required students to use the term *conjecture* as they discussed the differences between postulates and conjectures.

The scaffolding in the above instance of Mr. Bennett's teaching unfolded over the course of several lessons, but the use of kid-friendly language as a scaffold could also occur within a single interaction, seen in the following exchange between Mr. Cruz and one of his students as the student was working on a classwork assignment on the characteristics of life:

Mr. Cruz: So, the population of wolves increased from 300 to 345 over one year. So, how does a population increase, what does it need to do?

Student: To have more babies.

Mr. Cruz: Have more babies. So, which one of these involves having more babies?

Student: This.

Mr. Cruz: Exactly. So, you put that all living things reproduce. (observation, Nov. 13)

In this teaching instance, the student answered Mr. Cruz's initial interpretation question with kid-friendly language—"to have more babies." Mr. Cruz repeated the student's answer as a way of confirming the student's correct interpretation and then repeated the kid-friendly language again in the context of another question, thereby giving the student the opportunity to 'translate' kid-friendly language into disciplinary language instead of immediately recasting the student's speech into disciplinary language. It was only after the student correctly identified the corresponding characteristic of life that Mr. Cruz transitioned out of kid-friendly language and into disciplinary language by saying "all living things reproduce."

This dialing up and dialing down of intensity indicated that teaching did not construct content for students by fully and equally attending to every facet, but by purposefully and selectively focusing student attention on a specific facet at a specific time. As students became more familiar with concepts, the attention that was initially used to build conceptual understanding was dialed down and attention to logos or term usage was dialed up. This teaching seemed to maintain rigorous demands on students, but that rigor was adjusted, reallocated, redistributed, and fine-tuned as students constructed their understanding of the whole of content.

Deconstructing academics. In addition to shifting between facets of content and dialing up and down the intensity of facets, the teaching also deconstructed the content for students so that they could construct content for themselves. In other words, the teaching was simultaneously engaged in both building and unbuilding content.

When Mr. Bennett introduced vectors in geometry class, he began by both building and un-building the concept of rays. Early in the class period, Mr. Bennett drew a line segment with an arrow at one end and asked the class:

> Mr. Bennett: In your heads, just thinking about this for a second. Why is this not a ray? Because I notice that it starts here, ends here and has an arrow on it. Why would that NOT be a ray? With your groups. Go. (observation, Oct. 6)

In this instance, the teaching is not building toward an understanding of what a ray is, but of what a ray is not. Although this instance drew on understandings of rays, the teaching was not attempting to further build understanding of rays, but to trouble students' understandings of rays in order to make space for another concept. This initial question required that students produce their understandings of non-rays when confronted with an image that had many notational characteristics of a ray, including a line, a point, and an arrow. This question required that students unpack the academics and logos of rays to identify the space that vector would later fill. Mr. Bennett walked around the classroom as students initially struggled to answer this question. Looking over one student's shoulder, he engaged with him:

> Mr. Bennett: Rays have ending points?
>
> Student A: No. But why isn't that…why isn't that a ray?
>
> Mr. Bennett: It's not a ray. Why? Why?
>
> [one minute later, class reconvenes as large group]

Student B: Because it starts at one point

Mr. Bennett: So does a ray, keep going.

Student B: The other thing we had… so with transformations, you could [inaudible] and rays.

Mr. Bennett: I would say this is NOT a ray though. It's NOT a ray. What do you say, [Student C]? (observation, Oct. 6)

The students indicated that they were following the 'rules' of rays, which included a line with a point at one end and an arrow on the other end. However, the image on the smart board was not a ray, and Mr. Bennett was pushing them to refine and narrow their definition in order to accommodate something that appeared to be a ray, but was not, thus delineating between rays and non-rays. One student found a distinction between rays and non-rays:

Mr. Bennett: I would say this is NOT a ray though. It's NOT a ray. What do you say, [Student C]?

Student C: I don't think it's a ray, the P line, because it has an end point.

Mr. Bennett: Say that again.

Student C: I don't think P is a ray because it has an end point.

Mr. Bennett: That's exactly it, yeah. This is a directed line segment, also known as a vector. (observation, Oct. 6)

Student C identified the notational difference between rays and non-rays—the image on the board had two end points and an arrow. This identification met the academics expectations for non-rays, which was immediately followed by Mr. Bennett's move to logos—naming this concept "vector."

In this example, the teaching reflected the assumption that students adequately understood rays; the objective was not to re-build understandings of rays, but to break down and deconstruct those understandings in order to make space for vectors. It was only when students had enough conceptual disequilibrium with rays that the teaching moved toward the conceptual building and naming of vectors. Importantly, the teaching did more than add the concept of vectors to a full understanding of rays—it destabilized and deconstructed that which was previously understood in order to build a more holistic understanding of mathematical content that could accommodate both rays and vectors.

Deconstructing logos. In addition to deconstructing the academics expectations, as shown in the previous example with rays and vectors, the teaching also deconstructed logos expectations. Best seen in the example of constructing viable arguments from Mr. Hanson's algebra class (observation, Dec. 15), the teaching in this lesson took apart a viable mathematical argument so that students could re-construct a similar argument on their own. Mr. Hanson had been trying to help his students create viable arguments and perceived that he was having only limited success with his suggestions of "write what you think," "be clear," and "convince a skeptic" (Hanson, observation, Oct. 24; debriefing, Oct. 24). He decided to turn the focus of his teaching away from of the effect an argument might have on a reader (i.e., that it was 'clear' or 'convincing') and toward identifying and outlining the components of an argument he already deemed to be 'clear' or 'convincing.' After identifying a claim, a base case or a universal truth, and a connection between the specific case and the base case, he used this structure in his teaching.

As part of Mr. Hanson's teaching of viable arguments, the students were similarly asked to deconstruct arguments and identify the components, as seen in this whole-class discussion:

Mr. Hanson: All right, [Student A], what's your viable argument?

Student A: [reads argument aloud] *David's statement is correct. And that ten can be divis- divisible by two. Therefore ten divided by two is a whole number.*

Mr. Hanson: I absolutely loved it and thank you so much for sharing. Can you read your second sentence one more time?

Student A: *And that ten can be divisible by two.*

Mr. Hanson: So I have a question. *Ten can be divisible by two.* Is that an example of the universal truth or this specific case?

[other students in the class raise their hands]

Mr. Hanson: I'm asking [Student A].

Student A: [shakes head]

Mr. Hanson: That's okay. We're going to go one more. Does anyone want to share their viable argument?

[several hands go up]

Mr. Hanson: [Student B], what do you have, nice and loud.

Student B: I said *David said that ten is even and he is correct. Since all even numbers are divisible by two, and ten is divisible by two.*

Mr. Hanson: Ah, interesting. Can you read it again a little bit slower?

Student B: *David said that ten is even and he is correct.*

Mr. Hanson: Stop for one second. Was that the claim, the evidence [base case/universal truth], or the warrant [specific case]? Call it out.

Class: Claim!

Mr. Hanson: Claim. Keep going, [Student B], I'm going to stop you in another second.

Student B: *Since all even numbers are divisible by two-*

Mr. Hanson: Time out. What was that?

Class: Evidence!

Mr. Hanson: Evidence. Keep going.

Student: *And ten is divisible by two.*

Mr. Hanson: What was that?

Class: Warrant!

Mr. Hanson: Warrant. Okay, claim, evidence, warrant. Claim, universal truth, specific case. Thumbs up, thumbs down, thumbs sideways. How are we feeling with this idea? (observation, Dec. 15)

In this example, the teaching had already addressed the claim, base case, specific case structure of mathematical arguments and related it to the claim, evidence, warrant structure with which students were already familiar from their English class. In this instance, the teaching focused on deconstructing and labeling the components of the arguments the students had just created. The teaching leveraged Student A's error of not including a base case by identifying the sentence in question (i.e., ten is divisible by two), and asking students to name the structural component it fulfilled. Although Student A shook her head, indicating that she didn't know the answer, Mr. Hanson's teaching drew students' attention to this component as an essential part of viable argument construction within the discipline of mathematics. The stop-and-go exchange in which Mr. Hanson interrupted Student B to ask the class to label or name the mathematical argument component associated with each sentence served to deconstruct a viable mathematical argument and allow all students to notice the components of an argument one of their peers had produced.

Using his holistic knowledge of mathematics and mathematical argumentation, Mr. Hanson was able to disassemble his fuller version of argumentation so that students could more successfully assemble and construct arguments on their own. Through his teaching, Mr. Hanson was able to break down a mathematical argument into its component parts, give a name to those component parts, associate meaning with each part, show how it is used in a larger communicative context, and help students to reconstruct that argument for themselves.

This deconstruction and breaking down of a whole into parts, seen in the examples of deconstructing above, resonates with the "focus on form" (Long, 1991; Swain, 1998; Valeo & Spada, 2016) incorporated into communicative language teaching, discussed in the previous chapter. In communicative language teaching, language is similarly deconstructed and broken down so that language learners can attend to specific structural elements. Like in the examples above, these structures are based in meaning that serve to organize communication within a given context, such as mathematics or science. Within the teaching observed in this study, content was broken down and students attended to the structures in a similar way that a second language might be broken down and attended to by a learner within communicative language teaching. For example, attending to word order within communicative language teaching could be seen as parallel to attending to the claim, base case, specific case structure seen in Mr. Hanson's teaching as well as the restate, response, evidence, evaluation structure seen in Mr. Cruz's teaching, which were then used to construct meaningful communication within mathematical or scientific contexts.

Also similar to the teaching observed in this study, communicative language teaching purposefully attends to different aspects or facets of language, sometimes focusing on vocabulary, syntactic structures, or cultural context, for example, as it works to build

communicative competence, or the knowledge and skills needed to appropriately communicate in a given context. In both communicative language teaching and the teaching observed in this study, the content (e.g., mathematics, science, English, Spanish) is deconstructed, analyzed, and strategically presented to students so that they can reconstruct that content and effectively and appropriately communicate it on their own.

PARALEXICAL

The teaching observed in this study seemed to approach content as a language. In Chapters 4 and 5, in which I presented my findings, I have deconstructed the acronym PARALEXICAL to show how the teaching observed in this study broke down content through purposeful attention and facilitated students in realizing different facets of content. This chapter introduced what I refer to as PAR—purposeful attention to realizing—and the previous chapter introduced what I call ALEX—academics, logos, and expectations of the content that was constructed and deconstructed in the teaching. This purposeful attention, construction, and deconstruction of content are integral to content as a language, or ICAL. Together, these parts create what I see as a useful acronym—PARALEXICAL—which collectively captures key elements of the type of teaching observed in this study. PARALEXICAL teaching is not a checklist of practices, but the features of the teaching, as revealed in the data, that seemed to move students from a partial or deconstructed understanding of content to a holistic understanding of content to be used in school and disciplinary contexts. As seen through the data, PARALEXICAL teaching extends beyond the teaching of content-area terms, 'academic language,' or 'English' and works to prepare every student in the class to enter and meaningfully participate in disciplinary spaces.

PARALEXICAL teaching, as I have attempted to convey it, is in many ways consistent with responsive teaching; in fact, I argue that PARALEXICAL teaching can extend and broaden ideas of what responsive teaching means. Whereas culturally and linguistically responsive teaching as described in the literature responds to student home cultures and languages and bridges them to school culture and language, PARALEXICAL teaching responds to the culture and language of a given discipline, seemingly bridging school language and culture to disciplinary language and culture. In essence, PARALEXICAL teaching sees disciplines as cultures—inclusive of the accepted and expected social practices of thinking and speaking used by those people within those disciplinary cultures, which all students, including ELLs, can be taught and apprenticed into.

If a culture, as Hofstede and McCrae (2004) asserted, is a collective social value system "that distinguishes one group or category of people from another" (p. 58), it is not difficult to see any given discipline as a culture itself, especially given the siloed and departmentalized natures of schools and universities. This interpretation of culture is different from how it is traditionally understood within the literature surrounding culturally and linguistically responsive teaching, where it is often associated with nationality, ethnicity, race, and first languages and typically located within communities and individual students who belong to those communities. These communities (comprised of other individuals) share social practices, such as ways of thinking and communicating, that serve to identify members and bind them to each other. In the same way that people who belong to specific cultural groups share specific social practices, so too do people who belong to a specific discipline. As the examples presented showed, mathematics and science have specific social practices surrounding culture (i.e., ways of thinking) and language

(i.e., ways of communicating) that parallel the social practices of culture commonly associated with culturally and linguistically responsive teaching.

Viewing a discipline as a culture, inclusive of specific values and patterns of communicating and acting, it is not difficult to see PARALEXICAL teaching as a version of teaching that is responsive to disciplinary culture and seeks to apprentice all students into and give all students access to that disciplinary culture. Within that culture, language plays a prominent role in defining, shaping, and identifying others as belonging (or not) to that culture, which means that teaching must account for this disciplinary culture. Culturally and linguistically responsive teaching, as defined in the literature, responds to the cultures and languages of students, creating a bridge for them between home and school; PARALEXICAL teaching extends this idea and responds to the cultures and languages of disciplines in order to create a bridge for students between school and society—bridging graduation from high school and entry into college study or a 21st century career.

In the same way that culturally and linguistically responsive teaching begins with sociocultural and sociolinguistic consciousness, I argue that PARALEXICAL teaching begins with what I call socio*disciplinary* consciousness. This includes knowledge of the worldview of the discipline as shaped by the ways of thinking and communicating used within it. Following this logic, as teachers become more versed in enacting PARALEXICAL teaching, the more they develop sociodisciplinary consciousness. PARALEXICAL teaching can thus serve as a model and scaffold to bring teachers into a sociodisciplinarily-informed way of viewing and teaching content by helping them focus on the different facets of content or unpacking often-implicit disciplinary assumptions and expectations. As teachers become more aware of the language and culture of their discipline and develop fluency in their teaching practice, these scaffolds that

PARALEXICAL teaching provided may eventually be replaced by a sociodisciplinary cultural and linguistic consciousness.

PARALEXICAL is also a useful acronym for teacher educators as a way to see and understand existing content area knowledge and skills in preservice and inservice teachers. PARALEXICAL teaching assumes that successful content area teachers are already acting as language experts in that they can appropriately and fluently use the language of their discipline. Indeed, my study started with a focus on teaching ELLs, but after I analyzed the data it became apparent that the teaching I observed was helping all students access the disciplinary language needed to enter and participate in college study or a career in a discipline.

CHAPTER 6: DISCUSSION

This study originally set out to explore the concept of integrative teaching, that is, teaching that attends to a holistic vision of content, including how it was enacted by successful teachers of ELLs and the teacher knowledge that seemed to support it. As the study unfolded, it became clear to me that although I had intended to look for successful teaching of ELLs, the teaching I found focused as much on making disciplinary expectations of language and culture explicit to students (as described in Chapters 4 and 5), as it did on tailoring instruction to students based on their language and culture (as the literature on culturally and linguistically responsive teaching generally focuses on). More specifically, I found teaching that is characterized by Purposeful Attention to Realizing the Academics, Logos, and Expectations Integral to Content As a Language, or what I call PARALEXICAL teaching—an enactment of integrative teaching that recognized multiple facets of content and was attentive to the language and culture of a given discipline.

The findings presented in the previous chapters do not contradict extant literature or fill a 'gap'; instead they harmonize with literature that advocates for ELLs, supports content area teachers, and ponders what it means to know and teach language and content. These existing bodies of literature are like different sections of a choir; some sections may be singing different notes from other sections, but all are working together and singing the same song. Findings from this study simply reveal another voice in the choir.

As the study progressed, so too did my understanding of integrative teaching, or teaching that speaks to the whole of content as it was conceptualized in Chapter 2. This abstract construct seems to be a vision of 'good teaching' that we, as educators and teacher educators, are always chasing. This vision of good teaching is much like an unattainable horizon that we consistently

strive for, but never actually reach—an aspirational goal rather than a set of conditions or practices. 'Good teaching' is not a static concept, but a dynamic one that reflects our changing world and society.

Culturally and linguistically responsive teaching developed largely in response to changing student demographics, in particular, the increase and spread of students of color and students for whom English was not spoken at home (Lucas & Villegas, 2011, 2013; Villegas & Lucas, 2002a). This moved the vision of and standard for good teaching to include students of color and English language learners in schools and to ensure that they could meaningfully access classroom tasks and school curricula. This was an important and necessary step forward toward making education more equitable for and accessible to all students, but as educators and teacher educators, we must continue to take steps forward.

Inclusion of all students into learning spaces and ensuring that they have access to classroom learning activities remains essential to good teaching, but the bar for good teaching has risen. The notions of inclusion and access need to be expanded from schools and classrooms to college and career—in the same way that past forms of teaching now considered obsolete were not designated as such because they were insufficient or inadequate, but simply because society changed and education needed to move on to change with it. PARALEXICAL teaching is one way we as teachers and teacher educators can continue to strive for a vision of integrative teaching that more fully ensures that all students can have meaningful access to classroom tasks, as well as to all of content and are prepared to participate in knowledge-building spaces beyond elementary and secondary schools. Society is changing, and education must, once again, change with it.

Teaching for Social Justice

As I mentioned in Chapter 1, the purpose of school is not to finish school, but to access and to participate in society. The recent rise in high school graduation rates for ELLs is encouraging in that more students are able to access and finish school, but more work has yet to be done to also ensure that all students, including ELLs, can also meaningfully access society. Preparing students for today's knowledge-based society means equipping them with the skills and knowhow to enter and participate in spaces in which knowledge is created and contested. I argue that PARALEXICAL teaching—through its overt attention to the ways of thinking and communicating within disciplinary spaces—is one way in which education can take another step toward ensuring that all students, including English language learners, can equitably access today's knowledge-based society.

PARALEXICAL teaching, as it was seen in the data, did not appear to be an overtly critical pedagogy, as it made no direct references to power and did not explicitly question or contest disciplinary ways of thinking or ways or communicating. Nonetheless, PARALEXICAL teaching works toward revealing the hidden curriculum of language and allowing students to access the ways of thinking and communicating used within disciplinary spaces; as such, it is a form of social justice teaching. The explicitness with which PARALEXICAL teaching addresses these disciplinary ways of thinking and communicating and works to apprentice students into these social practices of knowledge building reveals aspects of curricula often untaught—aspects that only some students can implicitly 'pick up' on their own.

If all students, inclusive of English language learners and other linguistically diverse students (e.g., speakers of African American Vernacular English), learn the disciplinary ways of thinking and communicating, they have the potential to pass through gates and enter disciplinary

spaces. Once in those spaces, they then have opportunities not only to create knowledge, but to contest it—including the ways knowledge is represented, the established ways of thinking, and the implicit disciplinary expectations. Thus, PARALEXICAL teaching advances social justice not only because it can increase opportunities for all students to access disciplinary spaces, but also because it can further diversify those disciplinary spaces by ensuring that more and different types of voices can be heard within them. As discussed in Chapter 1, scholars such as John Bohannon and H. Sammy Alim, have successfully pushed against disciplinary status quos of thought and language, but have done so after passing through traditional disciplinary gates and meeting traditional disciplinary expectations.

PARALEXICAL teaching can play a role in ensuring that all students have the opportunity to access a holistic vision of content that includes the topics and concepts of the curriculum as well as the ways of thinking and communicating needed to enter and participate in disciplinary spaces. This type of teaching can equip more students to become scholars, professionals, and experts who can speak out as well as speak with—those who can communicate in the accepted and expected disciplinary ways while also being agents of change within disciplinary spaces

Because this study was not longitudinal in its design, and no data were collected to determine whether or not PARALEXICAL teaching led to higher rates of college or career entry, empirical determinations of whether or not PARALEXICAL teaching increases the likelihood of any students to enter college or a career are beyond the scope and findings of this study. However, PARALEXICAL teaching, as it is presented here, is consistent with teaching for social justice in that it overtly attends to content-area language instead of relegating it to a hidden curriculum. Future research focused on students and student learning, especially English

language learners and other linguistically diverse students, might shed further light on the effects of PARALEXICAL teaching on student learning and student entry into disciplinary spaces.

Beyond BICS and CALP

PARALEXICAL teaching's focus on disciplinary language sheds new light on 'academic' language and its teaching in content area contexts, a historically pertinent issue in second language teaching and learning. The conflation of the languages and cultures of multiple disciplines subsumed into one monolithic language is one of the reasons conceptualizations of academic language have been notoriously hard to pin down. This conflation carries the assumption that what is 'academic' is 'general,' 'common,' or 'universal' across all disciplines, an assumption that stands in contrast to the findings of this study.

There is certainly a school-based language used across disciplines, but this language is not the exact same language used within a specific discipline. Many educational linguists (e.g., Bunch, Aguirre, & Téllez, 2015; Lee, Quinn, & Valdes, 2013; Scarcella, 2003; Schleppegrell, 2001, 2004; Schleppegrell & de Oliveira, 2006; C. E. Snow, 2010) acknowledge that the English used within specific academic disciplines has some distinct features, but PARALEXICAL teaching, seen particularly through the expectations facet, is less about identifying features of 'academic English' (e.g., the use of passive voice in science) and more about teaching students the social practices of how knowledge is communicated and recognized within disciplinary spaces; that is, realizing *expectations for we* as well as *expectations for being understood*. The language and language practices used within disciplinary spaces are different from the language and language practices used within schools, and PARALEXICAL teaching works toward bridging this divide.

Cummins' (1979a, 1981a) BICS/CALP distinction is often cited in the literature related to academic language and teaching of ELLs. Cummins distinguished between basic interpersonal communication skills, or BICS, and cognitive academic language proficiency, or CALP. Findings from this study suggest that the "academic language" of CALP might be further divided into scholastic—or school-based language—and disciplinary—or discipline-based—language, seen through the distinction between *expectations for us* and *expectations for we* and related to differing expectations for *logos*. It is possible that the "kid friendly language" used in the teaching was not actually BICS, but a common scholastic language used to convey academic concepts before appropriate disciplinary language was taught and/or learned. The distinction between scholastic and disciplinary language might aid in future conceptualizations of the elusive construct of academic language by providing greater specificity around the "academic" part of academic language by further subdividing it into scholastic language and disciplinary language.

It must be noted that the vast majority of the classified English language learners taught by the teachers in this study, by my own estimation, had at least an intermediate level of English proficiency at the time of the study. Many students across all four of the classrooms observed exhibited mispronunciations, syntactic errors, and disfluencies characteristic of still-developing English proficiencies; save three relative newcomers in Mr. Cruz's class, all students could communicate with their peers and teachers in English. In short, generally speaking, the students seemed to have developed BICS, but had not yet developed CALP (Cummins, 1979a, 1981a). It is possible, if not probable, that the disciplinary responsiveness seen in PARALEXICAL teaching is most applicable to content area teachers of students who, like the students in this

study, are specifically focusing on developing student proficiency in academic and disciplinary varieties of language after developing BICS.

Related to this idea, this study also draws attention to the diversity of English proficiency among students identified as "English language learners." In the same way that I argue that "academic language" is not a monolith, neither is "English language learner"—there is considerable diversity within this demographic, not just in terms of languages and cultures of the students, but also in terms of proficiency levels. "ELLs" is often undefined or ill-defined in the literature, with this term frequently functioning as a catch-all for any student whose first language is not English. Within the literature, studies focused on teaching "ELLs" often have an implied focus on students who are at beginning and intermediate levels of proficiency that, together with ambiguous definitions of ELLs, has created somewhat of a one-size-fits-all approach to "teaching ELLs." PARALEXICAL teaching calls this generic approach to teaching ELLs into question and addresses a need specific to advanced proficiency English language learners—the need to progress beyond simply 'speaking English' to using the disciplinary varieties of language of a knowledge-based society. PARALEXICAL teaching focuses on a different type of language proficiency and works toward bringing students from school-based varieties of language and into discipline-based varieties of language. This type of teaching is likely beneficial for all students, which has implications for what teachers need to know and be able to do in order to teach all of content (that is, teach content holistically) to all students, including ELLs, as discussed next.

Knowledge Bases for Teaching

The results of this study trouble existing ideas of what it means to know and be able to teach content, to know and be able to teach linguistically diverse students, and to know and be

able to teach language. The four teachers in this study knew their content in a very complex way. Their knowledge was multifaceted and included not only the facts and procedures associated with each content area, but also the ways in which ideas were represented within the discipline and knowledge of how to teach those facts and representations to students.

As reviewed in Chapter 2, literature drawn from linguistics and second language learning suggests that mainstream, content area teachers of ELLs need language-related knowledge and skills. The implicit assumption within much of this literature is that teachers need these language-related knowledge and skills in addition to their content area knowledge and skills, either adding linguistics or language-oriented knowledge to existing knowledge of content (e.g., Achugar et al., 2007; Aguirre-Muñoz, Park, Amabisca, & Boscardin, 2008; Fillmore & Snow, 2003; Schleppegrell et al., 2004; Turkan et al., 2014), or adding ELL-specific practices to existing content-area pedagogy (e.g., Cervetti, Kulikowich, & Bravo, 2015; Echevarría et al., 2010). As de Jong and Harper (2005) note, "just good teaching" is not enough to teach ELLs; teachers of ELLs need more—more than their existing content knowledge. Findings from this study question these assumptions and ask whether teachers need to know 'more,' or need to know 'differently'—perhaps in a more integrative or multifaceted way.

The teachers in this study knew relatively little about language and language learning, at least from a linguistics perspective. They had few ELL-specific pedagogical strategies and limited knowledge of second language learning processes or linguistics metalanguage; instead, they deeply knew their content and deeply knew their discipline. They did not know language in the abstract, nor did they have the structural sense of language, which linguists and language specialists possess. However, they knew how their discipline used language to convey thinking and which language would be needed to enter disciplinary spaces. Therefore, the knowledge for

PARALEXICAL teaching was rooted in teachers' disciplines and content, not in linguistics or second language learning. Although the content knowledge needed to teach definitely included language, it did not seem to be an additive knowledge from another discipline or content area, but part of disciplinary knowledge itself. The findings of this study indicate the teachers' knowledge was not a linguistic knowledge of the discipline, but a knowledge of the ways in which a discipline uses language, seen especially through the expectations and logos facets of content.

In this section I discuss PARALEXICAL teaching in relation to knowledge bases for teaching, including both the teaching of ELLs, addressed through pedagogical language knowledge (Bunch, 2013) and disciplinary linguistic knowledge (Turkan et al., 2014), as well as the teaching of content, addressed through content knowledge for teaching (Ball et al., 2008), all previously described in Chapter 2. Overall, the findings of this study are consistent with these three conceptualizations in that they emphasize the importance that teachers understand their content area and the disciplinary discourses and ways of using language within them. However, I argue that PARALEXICAL teaching stretches the conceptualization for disciplinary linguistic knowledge advanced by Turkan and colleagues (2014). As detailed already, PARALEXICAL teaching focuses on 'language' over 'linguistics.' That is, the teachers in this study exhibited relatively little understanding of linguistics and tended to ignore errors of English, but they did exhibit strong understanding of the ways in which knowledge was built within content area contexts and tended to address errors of science or math. This suggests that the knowledge base for PARALEXICAL teaching is primarily located within knowledge of content, rather than in knowledge of linguistics—where disciplinary linguistic knowledge seems to be located.

This distinction between ‘language’ and ‘linguistics’ also shows the value that language specialists, such as ESL teachers, have within PARALEXICAL teaching. The teachers in this study only rarely addressed students’ use of English; instead, they emphasized the disciplinary variety of language appropriate to the context. This implies that students’ use of English is (or should be) taught elsewhere by experts in linguistics or English—experts who are still necessary because they teach a different type of language than the disciplinary variety taught by content area teachers. As previously discussed, most of the students seemed to have general proficiency in ‘English,’ likely thanks to language specialists such as ESL teachers. PARALEXICAL teaching can then extend this more general language proficiency by attending to the specific variety of language used in a particular disciplinary context.

An important point of consistency between disciplinary linguistic knowledge and the knowledge base for PARALEXICAL teaching is the shared focus on disciplinary discourse. As Turkan and colleagues noted, “Knowing the discourse of a discipline… is a form of socialization into the ways the members of a discipline talk, write, and participate in the knowledge construction by making the appropriate linguistic choices to convey the meaning” (2014, p. 8). This seems to be a similar purpose of PARALEXICAL teaching, seen most clearly in the data in *expectations for we* and *expectations for being understood*. In this way, PARALEXICAL teaching and disciplinary linguistic knowledge in practice both focus on preparing students to enter into and participate in the knowledge-building practices within a given disciplinary space.

PARALEXICAL teaching is also consistent with pedagogical language knowledge (Bunch, 2013) because of its focus on language over linguistics. As Bunch noted, pedagogical language knowledge:

> [equips teachers] not to 'teach English' in the way that most mainstream teachers may initially conceive of (and resist) the notion, but to purposefully enact opportunities for the development of language and literacy in and through teaching the core curricular content, understandings and activities that teachers are responsible for (and hopefully excited about) teaching in the first place (p. 298).

This theoretical construct is consistent with PARALEXICAL teaching, especially as it relates to the purposeful enacting of opportunities, what I call purposeful attention to realizing (PAR). Additionally, like PARALEXICAL teaching, pedagogical language knowledge (Bunch, 2013) locates the knowledge base for teaching ELLs in content area contexts close to or within content knowledge, as opposed to disciplinary linguistic knowledge (Turkan et al., 2014), which locates the knowledge base for teaching ELLs in content area contexts within linguistics.

Bunch (2013) noted that that much of the literature on the language-related knowledge base for teachers of ELLs has been generated by the field of Second Language Acquisition (SLA), and he questioned whether or not SLA was "the most appropriate foundational knowledge base for mainstream teachers to begin with" (p. 306). I echo Bunch's questioning in light of the findings of this study and suggest content as an appropriate foundational knowledge base. Whereas Bunch connected the construct of pedagogical language knowledge to Shulman's (1987) pedagogical content knowledge, he emphasized the tie to pedagogical knowledge over the tie to content knowledge as he argued for pedagogical language knowledge, thereby implicitly locating his construct closer to pedagogy than to content. I locate PARALEXICAL teaching and the knowledge needed to enact it closer to content, though I still emphasize the necessity of pedagogical knowledge.

Although I position the knowledge base for teaching ELLs in content area contexts within content knowledge, this is not at all to say that knowledge outside of content knowledge is unnecessary to successfully teach ELLs. It is certainly possible that knowledge of additional pedagogical strategies, second language learning processes, or linguistic metalanguage could have improved the teaching of these teachers who were already considered successful with ELLs. The findings from this study instead point to the idea that teaching that is responsive to the content—both the curricular contents as well as the language that binds and contains them—and the discipline attends to content in a complex, multifaceted way that reflects a deep understanding of content. Additional knowledge related to language and language learning may still be helpful, especially in also responding to students, but understanding the multifacetedness of content seemed to facilitate the disciplinary responsiveness of the teaching.

This multifaceted understanding of content, described in detail in Chapter 4, seemed consistent with the framework of content knowledge for teaching (CKT; Ball et al., 2008), but findings from this study reveal a new angle or perspective on CKT that includes the disciplinary language and culture integral to content. The established domains of CKT (Ball, et al., 2008; i.e., common content knowledge, specialized content knowledge, horizon content knowledge, knowledge of content and students, knowledge of content and teaching, and knowledge of content and curriculum), as described in Chapter 2, were seen throughout the data. For example, Mr. Cruz corrected a student who said that both plant and animal cells had cell walls (observation, Nov. 17), showing his common content knowledge. Mr. Hanson's specialized content knowledge could be seen when he described how he found that using algebra tiles best introduced the concept of linear growth (initial interview, Oct. 3). Ms. Desanne offered the mnemonic device "Please Make A Taco" (observation, Dec. 7) because students often

misordered the stages of mitosis, displaying her knowledge of content and students. Mr. Bennett's knowledge of content and teaching could be seen as he re-prioritized time on certain activities based on the conceptual emphasis of lessons later in the unit (observation, Dec. 7). All the teachers connected new topics to what those students had learned in previous years and frequently pushed students beyond correct answers to the reasons a given mathematical or scientific concept was important, relevant, or functional. However, the content constructed in the teaching within this study, depicted through the facets of *academics*, *logos*, and *expectations* described in detail in Chapter 4, sheds new light on these domains, especially common content knowledge, specialized content knowledge, and horizon content knowledge.

Teachers in this study not only possessed common content knowledge, or the mathematical knowledge and skill needed to do mathematical work outside the context of teaching, but also used this knowledge to direct their pedagogy in ways that prepared their students to be judged by those who possess only this type of mathematical knowledge. The teachers who informed students they were completely correct, but had produced nonstandard answers (e.g., writing slope as $\frac{2}{1}$) seemed to be using their specialized content knowledge to identify academics expectations that students met (i.e., recognition of 'accurate' mathematical thinking), and using common content knowledge to identify unmet logos expectations (i.e., recognition of 'inaccurate' mathematical presentation) that were not met. By using both of these knowledge bases concurrently, their teaching was preparing students for the scientists, architects, or engineers who may serve as gatekeepers into these disciplines—gatekeepers who might hear "*a* to the power of two" or "slope of two over one" and conclude that the student 'doesn't know math.'

Specialized content knowledge likely allowed teachers to interpret student answers, diagnose student errors, and gauge student mastery in their teaching, but common content knowledge seemed to provide a frame of reference for the possible disciplinary gates ahead, prompting the teachers to respond pedagogically in the ways they did, such as by unpacking the disciplinary expectations for logos. Consequently, common content knowledge may be more valuable to teaching than just as an implicit 'prerequisite' for specialized content knowledge. My study findings suggest that this distinction between common and specialized content knowledge could be a useful guide for teachers that can be used to separate 'what I can understand' (specialized content knowledge) from 'what anybody in the discipline can understand' (common content knowledge), thereby allowing them to function as proxies for disciplinary gatekeepers in the context of a P-12 classroom. Common content knowledge then can be a powerful asset for teachers in assessing students according to disciplinary expectations, simulating disciplinary gatekeeping, and ultimately helping students meet these expectations necessary to enter and participate in disciplinary spaces.

The teachers in this study used their specialized content knowledge combined with pedagogical content knowledge to prepare students to enter spaces bounded by common content knowledge. In doing so, issues of what was "OK for now" emerged, pointing to the third component of what Ball and colleagues (2008) described as subject matter knowledge—horizon knowledge. Although Ball and her colleagues identified horizon knowledge, or knowledge of how topics over the span of P-12 education relate to each other, as a provisional category of content knowledge, horizon knowledge seemed especially important in PARALEXICAL teaching. Horizon knowledge can account for a teacher knowing the full range of the content needed to pass through and complete schooling and into college or a career in the discipline.

Also drawing on common content knowledge, horizon content knowledge can allow teachers to recognize where students are within a wide range of education that includes, but is not limited to, P-12 education. In a sense, horizon and common content knowledge provide teachers with a reference and desired end point for students that, alongside curricula, can inform pedagogical decisions to move students toward that point.

In sum, PARALEXICAL teaching is consistent with the categories of content knowledge for teaching, but it adds depth and more multidimensionality to those categories. Like the facets of academics, logos, and expectations, common content knowledge, specialized content knowledge, and horizon knowledge seem interconnected and interdependent, reflecting the knowledge specific to teaching as well as the knowledge specific to the discipline.

The findings of this study speak most directly to single-subject content area teachers; however, PARALEXICAL teaching may still be relevant to multiple-subject teachers and teacher educators. As the designation affirms, multiple-subject teachers teach multiple subjects—they are not 'non-subject-area teachers' or 'teachers of no subject areas.' This designation means that multiple-subject teachers must be able to teach many, or multiple, subjects; therefore, they must have some knowledge and understanding of the different varieties of language used within each of the subject areas they teach.

In the same way that the content knowledge necessary to teach differs for single-subject and multiple-subject teachers, it is likely that the understanding of the disciplinary ways of thinking and communicating necessary to teach for single-subject teachers differs from those for multiple-subject teachers as well. This does not mean that single-subject teachers are functionally excused from understanding the nuances of disciplinary discourse; instead, it likely means that multiple-subject teachers are responsible for teaching the whole of content

appropriate for the grade they teach. Students begin learning different varieties of language in schools when they are in lower grades, well before they are ever taught by a single-subject teacher. For example, Common Core State Standards specify that kindergarten students should be exposed to both literature and informational texts, which indicates that students in kindergarten can be learning the differences between stories and informational texts, including how language is used within each. The nuances of the mathematical and scientific arguments seen in the data would likely be inappropriate for a kindergarten class, but the idea of teaching students how language is used differently in different contexts seems consistent between both single-subject and multiple-subject teachers.

Un-hiding the Hidden Curriculum

Findings from this study indicate that we need to recognize and re-cognize, or see and re-think, what it means to know and teach content. PARALEXICAL teaching allows us as educators and teacher educators to see the teaching of content as a language-informed and culturally-informed practice that works to bring students into the disciplinary ways of thinking and communicating and could potentially un-hide parts of the "hidden curriculum" present in schools (Schleppegrell, 2004). Based on the findings of this study, which showed that teachers had a complex view of the content they taught and could unpack that content for students, this section speaks to two ways in which teacher educators can begin to prepare teachers for PARALEXICAL teaching—developing sociodisciplinary consciousness and deconstructing content—and how preparing teachers with these skills could work toward un-hiding the hidden curriculum present in schools.

Developing Sociodisciplinary Consciousness

Whether or not they are aware of it, teachers and teacher educators socialize students (Bowers & Flinders, 1990). Sometimes this socialization can occur in subtle and unintentional ways that implicitly preserve the status quo and uphold hegemonic norms through "hidden" curricula (Anyon, 1980; Apple, 1971; Giroux & Purpel, 1983; Jackson, 1968; Schleppegrell, 2004). Like all teaching, the teaching documented in this study was based on values and expectations, but instead of ignoring those values and expectations and implicitly relegating them to the hidden curriculum and out of everyone's consciousness—both teachers and students alike—the teaching I observed made the hidden curriculum of disciplinary language explicit for students to see. Teachers demonstrated their sociodisciplinary consciousness by making their expectations explicit and deconstructing the content of the discipline to help socialize all students into the disciplinary norms. We as teacher educators need to begin to foster this consciousness within teacher education.

Sociodisciplinary consciousness, in light of study findings, means that teachers must have a developed awareness of the ways in which their disciplines use language and construct meaning, and how that is manifest in the content they teach. It is important to note that the sociodisciplinary consciousness called for in light of study findings does not replace the need to understand the languages and cultures of the students we teach. On the contrary, understanding student language and culture remains essential to culturally and linguistically responsive teaching, but these are not the only languages and cultures at play in content area teaching; PARALEXICAL teaching additionally recognizes the scholastic and disciplinary languages and cultures present in content area teaching.

To develop sociodisciplinary consciousness, teachers must recognize and be aware that one's perspective on a discipline is not neutral, but has been constructed and shaped by myriad factors, including language (Villegas & Lucas, 2002a). Language is intimately connected to culture, as it is one of the primary ways in which norms and values are expressed and imparted; as the philosopher Heidegger pointed out, we speak language, but language also "speaks us" (1976). Within PARALEXICAL teaching, sociodisciplinary consciousness seems to include an awareness of how a given discipline uses language and how that use of language fundamentally constitutes what that discipline values or perceives to be 'clear' and 'logical.' In short, this sociodisciplinary consciousness can allow teachers to see their disciplines not as neutral or universal, but as constructed ways of thinking and communicating specific to the culture they are working to prepare students to enter.

Like the adage that fish are unaware of the water in which they swim, culture is often unnoticed and unseen by those who practice it, making it particularly difficult for those within a culture to describe or identify what the culture entails. Hall (1989) referred to this as "the cultural unconscious," that "functions below the level of conscious awareness," guiding behavior while allowing people to accept their own cultures as "innate" and all others as "improper" (p. 43). There is likely a similar 'disciplinary unconscious' that guides how we speak and act within a given discipline. This could be the same unconsciousness that allows teachers to detect and identify student work as 'improper' (e.g., 'unclear,' 'off,' or 'not quite right').

For those of us who are language specialists, one of our roles within teacher education and teacher development could be to help content area teachers and specialists build a sociodisciplinary consciousness and recognize their own disciplinary expertise and the language expertise within it. We language specialists can 'see' language especially well; as fish who are

more aware of the water in which we swim, our task, then, could be helping content area teachers better see their own waters, allowing them to look at their content anew and develop the language to talk about the expectations their discipline holds. This might involve helping content area specialists develop a meaningful metalanguage for mathematics and science, which would likely involve deconstructing the language that is already used in those disciplines, rather than overlaying English, language arts, or linguistics metalanguage onto mathematics or science. For instance, Mr. Hanson's references to base cases and universal truths could be an example of this mathematical metalanguage developed by those within the discipline. It could also involve helping content area teachers unpack what it means to communicate competently in a given disciplinary space. Research in second language teaching and learning has a rich history in understanding and describing communicative competence (discussed in Chapter 2) that can be leveraged to help content area teachers understand and describe communicative disciplinary competence in their particular discipline.

Those of us who are teacher educators with language expertise need to recognize disciplinary differences, not just in how English is used within a given discipline, but in the cultural values and norms it holds. For teacher educators and teacher developers, cultivating this sociodisciplinary consciousness in content area teachers does not seem to necessarily involve adding disciplinary knowledge of linguistics to existing content knowledge. Instead, it likely involves helping content area teachers to recognize their own language expertise and the disciplinary language and culture that they likely already know, even if implicitly, and even if this disciplinary language is still developing.

Researchers and teacher educators with language expertise often enter content area classrooms as authorities, assessing the ways in which our language-related expertise could be

added to the existing practice of content area teachers. After reading some of my own field notes early in data collection, I realized that I had inadvertently begun my research from this perspective. I noticed practices that were consistent with second language teaching and where their knowledge and skills seemed to overlay with mine, but also noticed missed opportunities where I thought more linguistic-oriented knowledge or skill could have led to 'better' teaching. However, as I adjusted my thinking and approached teachers from an assets-based perspective, I came to recognize their existing language expertise. In the same way that content area teachers need to look anew at their content, we as researchers and teacher educators with language expertise need to look anew at language and see the disciplinary languages and expertise needed for PARALEXICAL teaching.

Tools like systemic functional linguistics (SFL; Halliday, 1994) and sheltered instruction observation protocol (SIOP; Echevarría et al., 2010) allow content area teachers to step into linguistics, but we need different tools that can better allow linguists and language specialists to step into content areas. Those of us who are researchers and teacher educators with language expertise need to learn about the disciplinary languages and expectations of science and mathematics from those who are already experts in it, asking what we can learn about the content taught by content-area experts rather than evaluating where their knowledge of second language acquisition, linguistic metalanguage, or structure of English is 'lacking.' This means looking at language and content from a disciplinary perspective, rather than a linguistic perspective.

Deconstructing Content

To reiterate, the findings of this study suggest that the knowledge teachers seemed to draw on as they enacted PARALEXICAL teaching was located within content knowledge. However, this does not imply that teachers can be prepared to teach solely through the teaching

of content knowledge. Pedagogical knowledge, as emphasized through content knowledge for teaching (Ball et al., 2008), pedagogical content knowledge (Shulman, 1987), and pedagogical language knowledge (Bunch, 2013) remain absolutely necessary for the preparation and development of teachers. This is consistent with the findings of this study, seen through the content that was taught (see Chapter 4) as well as the way in which that content was taught (see Chapter 5). The findings from this study point to the idea that teachers and teacher educators need a multifaceted understanding of their content, a complex knowledge of their disciplinary culture, and the skills to deconstruct that understanding and knowledge for their students. It is this last piece—the skills to deconstruct that understanding and knowledge for their students—that is especially salient for teacher educators.

Content area teachers need to be skilled at metaphorically walking their students around the prism of content in order to un-hide the hidden curriculum of language in their practice. In addition to developing sociodisciplinary consciousness and a deep and multifaceted knowledge of their content area, teachers also need the skills to deconstruct their own disciplinary language.

Within and across education, constructivist views of teaching and learning are embraced. At face value it seems as though the deconstruction of content seen in the teaching I observed stands in contrast to this constructivist ideal. On the contrary, deconstructivist teaching works toward the same goal of constructivist learning and is another way in which teaching can help students build their own knowledge.

Constructivism in education was one response to traditional transmission or 'banking' models of education, in which the teacher's role is to transmit information to students and students are considered empty vessels into which information is deposited. Constructivist learning theory, greatly influenced by the work of Piaget, Vygotsky, and Dewey, suggests that

people build or construct knowledge based on their experiences. From a constructivist perspective, knowledge is a human construction with a strong social and interpersonal dimension (Vygotsky, 1978); learners function as active builders, constructing meaning and knowledge as they interact with other knowers and builders.

Constructivism, however, is a learning theory, not a pedagogical theory. Teachers already have a constructed understanding of content, even if this understanding is still growing and malleable, as would likely be the case with any life-long learner. However, from a pedagogical perspective, the work of teaching is breaking apart what has already been constructed and strategically showing those parts to students so that they may construct knowledge themselves. Deconstructivist teaching, as I call it, involves working backwards from a known destination and then helping students move forward to construct their own understanding. In PARALEXICAL teaching, this involves reconstructing all that content entails, inclusive of the curricular contents as well as the ways of thinking and communicating used within the discipline.

Deconstructivist teaching principles are already well used within teaching, even if not called as such. As I see it, teaching that emphasizes backwards design, in which lessons and curricula are formed as working toward a desired goal or end point use deconstructivist teaching principles. Similarly, the Standards themselves promote deconstructivist teaching principles as lessons are often built in response to an overall goal guided by the Standards. It is important to note that as I use the term here, ‘deconstruction’ does not mean ‘destruction.’ Those of us familiar with Romance languages likely know that *de* often means *of*; in the same vein, *deconstruction* means *of construction*, or the understanding of how and with what something was constructed, rather than destroying, decrying, or dissolving that which has been made.

Teaching in this way requires not only knowledge of content, but also a deconstructed knowledge of content. Returning to content knowledge for teaching (Ball et al., 2008), this deconstructed understanding of content could be part of what comprises specialized content knowledge. If teachers have a full understanding of the content they teach, then they have a full understanding of both the expectations for logos and the expectations for academics. To bring students into a similar understanding, they must deconstruct those expectations, and purposefully and deliberately scaffold their instruction to guide students on a path toward that goal. Relating this idea to the language and linguistics literature, content area teachers need to have more than disciplinary communicative competence (cf. Canale & Swain, 1980; Hymes, 1972) or to be a 'native speaker' of a given discipline, they need a deeper, more complex, and deconstructed understanding to teach that understanding to students, thereby un-hiding aspects of the hidden curriculum.

Consider an exploded diagram—a three-dimensional drawing or picture of an object that shows the relationship between the assembled parts in relationship to the whole object—which is often included in kits alongside step-by-step assembly instructions. Teachers adept at PARALEXICAL teaching have a content knowledge base similar to that of an exploded diagram; they possess an understanding of all the pieces, how they fit together, the purpose individual pieces serve, and what the overall product should look like and do. The task of PARALEXICAL teaching—and likely of integrative teaching as well—is not repeated building of the same object, but repeated deconstruction and working backwards from the whole to the parts. This requires not only a deconstructed knowledge of content, but also the knowledge of how to foster realization—both noticing and producing—in students.

The teachers in this study were skilled at deconstructing their content. This deconstruction, or the taking apart of content in order to show it to students, was done in myriad ways, revealing a complexity that simply could not be reduced to a set of individual practices. To assume that each individual practice or strategy had a single corresponding purpose or objective would be to greatly underestimate the complexity of PARALEXICAL teaching and the practice of deconstructivist teaching for constructivist learning.

The practice of explaining tasks, for instance, might be included in a list of necessary teaching practices, but this practice can be done in a variety of ways, as seen in the data from the ways in which teachers drew from student experiences, history, or previous lessons in order to focus on expectations for either academics or logos. Concepts were explained as what they were, as what they were not, or by the function they held; however, all involved explaining. Similarly, not every discrete practice seemed to have the same purpose; a simple yes/no question could serve to assess student understanding, remind students of classroom expectations, or push students to extend their thinking.

PARALEXICAL teaching is not a codified set of knowledge and skills that can be neatly packaged and passed on to preservice teachers. As Lortie astutely mentioned, "no way has been found to record and crystallize teaching for the benefit of beginners" (1975, p. 58). Although the "crystallization" of successful teaching may be elusive to preservice teachers, we as teacher educators need to begin by helping preservice teachers develop sociodisciplinary consciousness, see all of what content entails, and consider how to reveal all of that content to their students.

Rather than codifying the practices of successful teachers and rigidly defining the profession for new teachers, perhaps preservice teacher education is about developing the ability to see content and teaching in a crystallized, multifaceted, and deconstructed way. It is possible

that this type of teacher education could obviate the need for packaged or scripted curricula—including those oriented toward the teaching of ELLs—and that teaching and teacher education may even further distance themselves from transmission and banking models and toward a way of inclusively teaching content to all students.

Directions for Future Research

As previously mentioned, this study examined teaching rather than learning, so any effectiveness of PARALEXICAL teaching on student learning of disciplinary varieties of language remains unknown. Future research could examine this specific type of language development in students and contribute to better understanding how students learn scholastic and disciplinary varieties of language over the course of P-12 education. This research may be especially salient for teachers of students who have been historically marginalized or underrepresented in disciplinary spaces, including classified and formerly classified English language learners, non-standard dialect speakers, students of color, and first-generation college students. Furthermore, although I propose developing sociodisciplinary consciousness and the skills for deconstructivist teaching as likely relevant for preparing content area teachers for PARALEXICAL teaching, additional research could be done to determine if more or different skills, consciousnesses, knowledge, or knowhow could prepare or develop teachers for PARALEXICAL teaching.

This study focused on the teaching of content, but another analysis with these data could focus more specifically on ELL students, both how the teachers interacted specifically with ELLs as well as how the teachers structured their mainstream classrooms to specifically include ELLs and invite ELL participation. Such analyses would likely resonate with the literature on culturally and linguistically responsive teaching in that it would focus on teachers responding to

students, somewhat paralleling the findings of the analysis of this study that focused on teaching responding to disciplines.

This study questioned what it means to know the content of mathematics and science, and further research is needed to understand how PARALEXICAL teaching is relevant to different disciplinary spaces; that is, how PARALEXICAL teaching might be relevant to those in other disciplines such as history, English language arts, music, foreign languages, or computer science could be a viable avenue of research. This work can be influenced by work in classroom discourse, genre studies, and new literacies, which can provide insight into ways in which a specific discipline uses discourse to convey meaning, and what kind of literacies are needed to generate knowledge, communicate ideas, meet disciplinary expectations, pass through disciplinary gates, and become knowledge builders in tomorrow's society.

Future research could also examine the distinction between scholastic language and disciplinary language. Such research could provide greater clarity regarding the elusive construct of 'academic language' by further delineating the distinction between academic and colloquial language. The teachers in this study focused primarily on disciplinary varieties of language, which raises questions about when students—particularly English language learners—explicitly learn the more general, scholastic version of academic language.

This study focused on ELLs with higher levels of English proficiency and pushed against 'one-size-fits-all' approaches to teaching ELLs. Given that much research is implicitly focused on teaching ELLs at beginning and intermediate levels of proficiency, future studies could specifically focus on ELLs with advanced levels of language proficiency and the unique aspects of teaching ELLs at these higher levels. Furthermore, this study highlights the need to be more transparent about the proficiency levels of the ELLs in reports of empirical research to bring

greater specificity to pedagogical differences in teaching ELLs at various levels of proficiency and to avoid the perception that the 'teaching ELLs' is a generic practice.

Additionally, this study suggests that future research might attend to the term *English language learner* itself and how it is used in studies of linguistically diverse students. As discussed in Chapter 3, the teacher participants in this study paid little attention to the school's designation of a student as an English language learner and implied that this was an unhelpful designation since students they considered to be actively learning English and/or students who they considered to be vulnerable in terms of expressing themselves linguistically may or may not have been formerly classified as English language learners. It is possible that these teacher participants intuitively know something that has yet to be reflected in the empirical research—that English language learner is not the useful term it once was. In the same way that the term "limited English proficiency," seen in *Lau v. Nichols* (1974), has since given way to terms such as *English language learners*, *emergent bilinguals*, and *linguistically diverse students*, perhaps additional terminology is necessary to describe students such as those taught in this study. In other words, a more accurate description of students who were recognized by their teachers to still be learning English and in need of further language development—either in a scholastic or disciplinary capacity—but who may or may not be currently labelled as an "English language learner" according to the school might be necessary in future research.

The teachers in this study seemed to move fluidly between different varieties of language, sometimes using colloquial or general academic varieties to focus on academic ideas and concepts and sometimes using disciplinary varieties to focus on the language used to represent those ideas and concepts. This fluidity between language varieties reminded me of the ways that bilingual speakers often style shift, code switch, or translanguage when communicating. This

raises questions for what research in these areas can teach us about how content area teaching might leverage colloquial and scholastic language as it scaffolds disciplinary language.

Lastly, within teacher education contexts, future projects could focus on collaboration between faculty members who teach preservice content area teachers. Teacher education curricula are already quite packed, so interdepartmental discussions of how to best prepare preservice content area teachers could shed insight into where there could be space for developing sociodisciplinary consciousness and the skills for deconstructivist teaching within teacher education.

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