

11-2012

The Metalinguistic Protocol: Making Disciplinary Literacies Visible in Secondary Teaching and Learning

Kerry G. McArthur
University of Texas at Brownsville

Follow this and additional works at: https://scholarworks.wmich.edu/reading_horizons

 Part of the Education Commons

Recommended Citation

McArthur, K. G. (2012). The Metalinguistic Protocol: Making Disciplinary Literacies Visible in Secondary Teaching and Learning. *Reading Horizons: A Journal of Literacy and Language Arts*, 52 (1). Retrieved from https://scholarworks.wmich.edu/reading_horizons/vol52/iss1/3

This Article is brought to you for free and open access by the Special Education and Literacy Studies at ScholarWorks at WMU. It has been accepted for inclusion in Reading Horizons: A Journal of Literacy and Language Arts by an authorized editor of ScholarWorks at WMU. For more information, please contact wmu-scholarworks@wmich.edu.



The Metalinguistic Protocol: Making Disciplinary Literacies Visible in Secondary Teaching and Learning

Kerry G. McArthur, Ph.D.
University of Texas at Brownsville

Abstract

Concerns about adolescent literacy continue to be highlighted in regards to the challenges of reading and learning from academic text. Recent efforts to address these concerns have led to an examination of the disciplines and their specialized ways of thinking and using language. In this article I discuss a metalinguistic protocol in a think-aloud process as a framework to use in university content area literacy courses with secondary preservice teachers to examine the language and thinking as it is used in the disciplines of knowledge and to address the implications of disciplinary literacies for teaching and learning in secondary schooling.

Introduction

This activity really showed me the importance of prior knowledge and experience when approaching a text. The ability to access meaning, in certain cases, may be no more than a question of learning a bit about what you are about to read.

—Ashley, Spanish major

Recent conversations about disciplinary literacies (McArthur, 2007; Draper, Broomhead, Petersen Jensen, Nokes, & Siebert, 2010; Lee & Spratley, 2010; Moje,

2008; Shanahan & Shanahan, 2008) have sparked an interest in issues related to secondary teaching and learning including the improvement of content area literacy instruction at the university level. As new perspectives emerge and we seek to “foreground” the field (Moje, p. 96) by recognizing the unique literacies of the disciplines inclusive of the knowledge, discourses, and social practices that contribute to professional identity, consideration of instructional approaches to make this visible are part of the next step.

I have used a metalinguistic protocol in a think-aloud process as an instructional approach with secondary preservice teachers in university content area literacy courses that I have taught for the last five years in order to raise awareness and begin conversations about disciplinary literacies. The metalinguistic protocol serves as a framework to help preservice teachers think about language and thinking as it is used in disciplinary texts and includes discussion about the implications for their future teaching with adolescent students in secondary schools. Preservice teachers bring a great deal of knowledge and expertise in their disciplines along with professional identities that have been integrated, over time into their daily lives and work. Because of this expertise, they often take for granted what they know, how they think, as well as how they navigate text in their field. In the course, I use the metalinguistic protocol and think-aloud process to open up conversations about socially situated literacies (Gee, 1999) which includes disciplinary literacies and the complexities involved in reading disciplinary texts.

Using think-alouds as a tool for exploring cognitive processes related to language and thinking is not new. They can, in fact, be traced back to the time of Socrates. Think-aloud protocols have been used in reading (Afflerbach, 2002; Pressley & Afflerbach, 1995) as well as disciplinary studies (Wineburg, 1991, 2001). Braunger, Donahue, Evans and Galguera (2005) used a think-aloud protocol in a reading apprenticeship assignment in their secondary teacher preparation courses to examine the challenges of reading and learning from academic texts. I have adapted the metalinguistic protocol using the work of the forenamed researchers for the purpose of making explicit the unique language and thinking of the different disciplines.

It is generally accepted that the disciplines consist of four broad academic areas of study: science, mathematics, social sciences and the arts and humanities. Each of the disciplines has its own unique knowledge structure and ways of thinking; use of language or discourse; and ways of looking at or reading the world. Woolman (2000) suggests science as an empirical way of knowing using logic to think with the scientific method; mathematics as a logical way of knowing using

mathematical methods for thinking; social sciences, such as history, as a factual way of knowing pre-determined by authority with cause and effect thinking about how the past informs the present; and the arts and humanities as aesthetic ways of knowing and communicating thinking through the language of the sign systems such as literature, art, music, and dance or athletics. In schooling, the disciplines are considered from these four broad academic areas of study and are typically termed “content areas” or “subjects.”

Along with the ways of knowing, each discipline has its own way to mediate inquiry (Vygotsky, 1986). As Pontecorvo (1993) further explains: “forms of discourse become forms of thinking. Indeed methodologies of the specific domain are enacted through appropriate discourse practices that respond to the epistemic needs of a disciplinary topic” (p. 191). For example, the social studies specialist knows the importance of primary sources in the field, incorporates mathematical knowledge of scale when reading maps, and may contextualize events within a historical time frame to evaluate authenticity. The English specialist must understand the elements of story, genres of literature, and the structure or grammar of language in writing. Eisner (1985/1995; 1994) suggests multiple forms of representing thinking in the disciplines as appropriate to teaching and learning in the classroom.

The metalinguistic protocol becomes a tool for making disciplinary literacies visible for teaching and learning when used in university content area literacy courses with secondary preservice content area teachers. In turn, preservice teachers in the course recognize the difficulty their often less experienced adolescent students may face in navigating the language and thinking while reading to learn from disciplinary texts.

In this article I explore some of the challenges of reading disciplinary texts, explain how I use the metalinguistic protocol in the university content area literacy course, present an overview of the metalinguistic protocol and conclude with several examples of the protocol from preservice content area teachers.

Challenges of Reading Disciplinary Texts

Along with the multiple discourse practices, methodologies and genres used by the disciplines to represent thinking, the disciplines lend themselves to written formats and text structures and features that can be considered as unique to that discipline (Bazerman, 1998; Coffin, 1997; Geisler, 1994; Lemke, 1990; Schlepppegrell, 2004). For example, the way of thinking in history, one of the social sciences includes examining the past in terms of the present and lends itself to both time/sequence and cause and effect text structures and often includes text features such

as maps and photographs. Due to the nature of text structure a historian reading a document in the field would know to look for dates, time periods, and other references to time/sequence as well as for causes or factors in their analysis of historical events presented by the author in the text. In other examples, someone from the field of English would be familiar with narrative text and the descriptive text structure often used in the discipline of the humanities and make use of text features such as chapter headings; while the way of thinking in science often contributes to a problem/solution text structure and might include text features such as charts and graphs instead of narrative explanations. While these examples are oversimplified and an in-depth discussion is beyond the scope of this article, they demonstrate nonetheless the types of expertise and background knowledge that develop from reading written text in a discipline.

In addition to the expertise outlined above, the disciplines employ technical vocabulary often with origins in Greek and Latin roots and use language in specialized ways. Technical vocabulary can be defined as “terms or expressions. . . with a specialized field-specific meaning” (Wignell, Martin, & Eggins, 1993, p. 144). Technical vocabulary can be challenging in itself with knowledge of such discourse usually learned through much experience and opportunities to participate in a disciplinary community (Gee, 1999; Lave & Wenger, 1991). However, technical terms can also be deceptive for the novice as they can be derived from common uses of everyday language yet become “technical or specialized” according to the specific nature of the discipline. The word *field*, for example can commonly mean a piece of land or also have a specialized meaning when broadly referring to a realm of knowledge. In science, *field* can be used to define a space where magnetic forces are active. In mathematics, *field* is defined by Merriam-Webster (2004) as “a set of mathematical elements that is subject to two binary operations the second of which is distributive relative to the first and that constitutes a commutative group under the first operation and also under the second if the zero or unit element under the first is omitted” (p. 466). Another challenge related to technical vocabulary and specialized use of language is the metaphoric language found in literary analysis in English or in references to historical time periods, for example “the Dark Ages.” Compound the specialized use of language in English and history with the variations of Old English in Shakespeare and dialect in Mark Twain’s *Tom Sawyer*, two examples of classics common in the study of literature.

Another challenge of disciplinary text is the unique grammatical functions of language that can impede comprehension for the novice reader. One such

complexity is *nominalization*, a linguistic device that transforms a verb or adjective into a noun or noun phrase (Halliday & Martin, 1993). In science text, for example, nominalization serves to condense dense concepts into abstract specialized terms. As Fang (2004) elaborates in one example where a scientific concept in one text clause “the respiratory passages narrow significantly” becomes the abstract noun “*this narrowing*” and thus “enables the author to continue discussion on the topic” (p. 339). In an example from history text, Schleppegrell (2004) notes that nominalizations are often used in more general ways such as historic events condensed into the nominalized terms periods and eras (p. 126). Mathematical word problems also commonly contain nominalizations (Fang & Schleppegrell, 2009). As used in academic text, “nominalization can, therefore create problems for readers, because it tends to neutralize or obscure meanings and construct an ideology that is often not transparent to naïve readers” (Fang, 2004, p. 340).

An additional complexity of disciplinary text is lexical density which Halliday and Martin (1993) define as “a measure of the density of information in any passage of text, according to how tightly the lexical items (content words) have been packed into the grammatical structure” (p. 76). While all academic texts can pack a great deal of lexical items in a short space, some texts, science and history, for example have a higher lexical number and cognitive load. The cognitive demand made on the reader can contribute to overload, frustration and shut-down.

The challenges of reading disciplinary texts as outlined in the section above demonstrate how inexperienced or novice readers, in this case adolescent students, face multiple cognitive complexities when reading and learning from different types of academic texts. However, as Shanahan and Shanahan (2008) note:

These text differences, however, are not often within the purview of literacy courses in teacher-preparation institutions, nor are they the subject of discipline-based methods course work; for that matter, they are not usually discussed in the basic content courses teachers take within their discipline. As a result, teachers are not prepared to address the challenges posed by the special demands of texts across the various disciplines. Yet, adolescent students engage in a daily struggle to learn the content of the various disciplines – content that is instantiated in the academic discourse that is an outgrowth of the differences in the disciplines themselves (p.53-54).

Thus the expertise that secondary preservice content area teachers have about how to read and learn from written text in their discipline becomes an important resource for their teaching and can in turn address the challenges adolescents often face when reading to learn in secondary schooling. While some would argue that the academic texts or textbooks used in schooling are not accurately reflective of the disciplines, Schleppegrell (2004) states that “the recontextualization of the discourses for pedagogical purposes does reflect the values and ways of thinking of the disciplinary communities” (p. 114).

Using the Metalinguistic Protocol in the Course

The university content area literacy course is generally a requirement for secondary education majors and enrolls preservice teachers from across the disciplines (Farrell & Cirrincione, 1984). Classes consist of a variety of English, social studies, science, mathematics, music, art, kinesiology, and foreign language majors who usually take the course during the senior year of their program and after multiple content and methods courses in their specialization. I have taught one or two sections of the content area literacy course at a university located in the south each semester for the last five years. I plan curriculum for the course around the big idea of “many ways of knowing and the tools to learn” using backward design (McTighe & Wiggins, 1998). “Tools” in this case refer to disciplinary practices that promote literacy as unique to the discipline. Planning the course from a semiotic perspective or “many ways of knowing” recognizes the value of all disciplines and helps support community building across content areas early in the course. Recognizing “many ways of knowing” also serves to defuse the elitism that is sometimes prevalent in the content area subcultures in secondary schools (Grossman & Stodolsky, 1995; O’Brien, Stewart & Moje, 1995). In addition I ground the course in sociocultural learning theory (Gee, 1999; Lave & Wenger, 1991; Vygotsky, 1986) and sociopsycholinguistic theories of reading (Goodman, 1996; Smith, 1997).

I use the metalinguistic protocol experience almost mid-way through the content area literacy course. Two important foundational concepts established at this point in the course are: 1) a broad definition of literacy which includes socially situated literacies such as disciplinary communities and 2) the language and culture of the disciplines including the ways of knowing, thinking and using language as well as the work of the discipline. Through readings, discussion and other course experiences the preservice teachers have examined membership and participation in their disciplines as a secondary discourse (Gee, 1999) acquired over time and

as having unique literacies according to the discipline. When we transition in the course to examine written texts in the disciplines and how they are used, ideas are being explored about the reading process and reading to learn. At this point in the semester I want to make disciplinary literacy even more visible through an examination of written text and reading to learn.

Preservice teachers often enter the content area literacy course with a prevalent view of reading as a basic skill that should have been learned at the elementary school and then “used generically to learn from text across the curriculum” (Braunger, Donahue, Evans & Galguera, 2005, p. 11). The belief being that once you learn to read, you should be able to read anything. To augment this misconception (Kintsch, 1986) I initially focus course readings, discussions and experiences on examining the reading process and the cognitive strategies such as predicting, inferring, sampling, confirming/disconfirming; integrating, etc. or the “universals” as Ken Goodman (1996) terms them that good readers use to make meaning or comprehend written texts. Along with discussion we address the role of background knowledge in reading comprehension and learning from text. I then transition to the challenges embedded in academic texts due to the nature of the disciplines. For example, in one augmented experience I assign the preservice teachers a text to read in class that is not particularly difficult to read at the surface level but is extremely difficult to comprehend due to the specialized knowledge, technical vocabulary and lexical density of the text. When literal level questions are added to the assignment it is particularly eye-opening in regards to typical school practices in using text for reading to learn. Text assignments such as answering literal type questions or filling in the blank worksheets are not too uncommon in secondary schooling and lend themselves to memorization rather than conceptual understandings of disciplinary knowledge and can impede the development of background knowledge a novice in the field needs in order to develop a level of expertise to navigate additional text.

Key concepts we explore next in the course include the different academic text structures and text features as well as the specialized language used by the disciplines. To further understand text patterns such as definition/example; cause and effect; compare/contrast; time/sequence, problem/solution we explore how the nature of thinking according to the discipline can lend themselves to particular structures and features. We also examine and question how textbooks used in school are reflective of the discipline. The secondary preservice teachers are then prepared to examine their own use of reading to learn strategies and their unique disciplinary literacy in the metalinguistic protocol experience.

Overview of the Metalinguistic Protocol

The metalinguistic protocol is a three-part assignment in the content area literacy course that includes a metalinguistic think-aloud journal homework assignment; an in-class partner trade and discussion; and an individual reflection of the experience. To set the stage for the first part of the experience, the metalinguistic journal homework assignment, I bring in a journal article or book chapter from my field of language and literacy that I have not read before and model in class the thinking I do while reading it. Using an article or book chapter that I have not read before adds depth to the experience that would not be the same if I was familiar with the text. The think-aloud I do includes background knowledge from my field, recognition of disciplinary language, and the thinking needed to comprehend the literacy concepts presented in the article. During the think-aloud I make a record of both the text and the corresponding thinking I do on an ELMO or overhead transparency in a format similar to Wineburg (1991) as exemplified in figure 1 below:

Figure 1. *The Think-Aloud Journal Homework Assignment*

The Text says...	My Thinking is...

After the in-class demonstration the preservice teachers are given a think-aloud journal homework assignment in which they are to first choose a text they might read in their discipline. For example, a science major might choose an article from a science journal while a history major might choose a primary source document or book from their field. Some preservice teachers choose to read from a content area textbook from the secondary school. I don't exclude this choice as it adds another layer to our discussions. After the text selection is made the next step in the metalinguistic protocol assignment is to complete a think-aloud journal as modeled in class. The journal includes what the text says and the think-aloud process captured and recorded while reading the text. I ask the preservice teachers to read at least 2 pages of text, depending on the content and to prepare at least 3-4 think-aloud journal pages. This allows for adequate attention to both content and

process. The think-aloud journal homework can be both tedious and timely so I warn the preservice teachers in advance and also relay comments from past students in the course who have found the metalinguistic protocol experience extremely valuable. For the next class period the preservice teachers bring a photocopy of the text they read and the think-aloud journal they prepared for the second part of the metalinguistic protocol.

In-Class Partner Trade and Discussion

The second part of the metalinguistic think-aloud journal assignment occurs during the next class period. To begin this step in the metalinguistic protocol experience, the preservice teachers partner with someone outside their discipline. This type of partnering fosters a novice experience, to some degree, as the preservice teachers may not have the depth of knowledge and expertise in navigating disciplinary text outside their content area. Setting the metalinguistic protocol experience up this way allows for the unique discipline literacy, including ways of thinking, background knowledge, text structures and text features, and specialized language, and cognitive reading strategies to be made visible. Once the partners are chosen they trade the photocopies of the texts while setting aside the think-aloud journals to use later. Each of the partners first reads the unfamiliar disciplinary text making annotations of their thought processes on the hard copy. For example, partners may note their use or lack of discipline specific background knowledge and thinking, unfamiliar language, and places of confusion. When both partners are finished reading the text outside their discipline, the think-aloud journals are used as a guide alongside the text for a second read. The preservice teachers add any additional thoughts to their notes. After the discipline specific texts and think-aloud journals are read, the partners engage in a discussion about the experience, including talk about what it was like to be a reader of unfamiliar content, and share their insights and questions. For this second part of the assignment a partner discussion sheet is used to make notes as shown in figure 2 below.

Figure 2. *The Metalinguistic Protocol Partner Discussion Sheet*

Reading Processes	Discipline Specific Knowing and Thinking	Text Structure and Text Features	Confusions	Other Thoughts

After the partner discussion whole class debriefing takes place. Conversations among the class are engaging as the preservice teachers share insights they've had during the experience. Almost without fail, the importance of background knowledge in a field is highlighted in the discussions. Another key insight is the discipline specific language that is needed to understand a text. Others students note common reading strategies, such as predicting, that they use as readers. Conversations then shift to strategies that might be used more often due to the nature of the discipline. In one example, Frank, a mathematics major talked about the importance of visualizing in his discipline. While Angela, a history major, stated that she knows to always begin reading in history by finding out who the author of the text is first. Often confusions about reading strategies and discipline specific thinking are discovered.

Related conversations we have while reflecting on the experience with the metalinguistic protocol includes the role of apprenticeships, identity development, and social practices in professional communities. These conversations often reveal and focus on the multiple opportunities that have fostered the preservice teachers' disciplinary literacy including those that allow them to work with experts or "masters" in their field over time, to learn the work. Michael, a history major noted "I realize that I cannot expect students to all be naturally able to read as I do, not that they are incapable of doing so, but the fact is that I have had more experience and training". Here again, insights are gained into needed instructional practices and strategic decisions to support the disciplinary literacy development of their future adolescent students in order to help them develop some level of expertise for school success.

Individual Reflection of the Experience

For the final portion of the assignment the preservice teachers write a reflection of the metalinguistic protocol experience as a follow-up to the in-class activities. This final part of the framework requires each preservice teacher to think deeper about disciplinary literacy and the implications for teaching. The directions for the homework assignment and the questions that guide the individual reflection and response are included below:

As you think about and reflect on the Metalinguistic Journal experience use the following questions as a guide to write a 3-4 page response about what you learned and use the implications for your teaching:

1. What reading strategies were visible as you read?
2. What strategies did you use as a reader to comprehend text in your discipline? Out of your discipline? Were your partners' strategies different? The same? Why, why not?
3. How did the text features and/or text structures influence your reading in your discipline? Out of your discipline?
4. What specialized vocabulary or use of language did you encounter in your discipline? Out of your discipline?
5. What discipline specific knowledge and thinking provided background knowledge for comprehending the text in your content area? Out of your content area?
6. What did you learn about yourself as a reader of academic text?
7. What did you learn about reading to learn from disciplinary text?
8. What are the implications for your teaching?

As one preservice teacher summarized:

This activity showed me the importance of prior knowledge and experience when approaching a text. Nothing about the words or concepts in the history text I read was too difficult for me to grasp. I also learned that when reading history text you have to recognize the time period you are reading about. You also have to know who's [sic] perspective you are reading from, who the author is (Dolores, English Major).

Classroom Examples of the Metalinguistic Protocol

In this section of the article I include classroom examples of the metalinguistic protocol experience from preservice teachers who have taken the university content area literacy course. In the first example, a science and history major have partnered. In the second example, a math and English major have partnered. With both examples I begin first with a discussion of the think-aloud journal of each partner individually, next I discuss each partner discussion sheet individually and lastly I include selective comments from the reflections of each partner.

Partner Example 1: Science and History

The first partner example is with preservice teachers who are science and history majors, respectively. Figure 3 below shows Tony, the science major's metalinguistic think-aloud journal with the science text recorded on the left hand side in "The text says" column and Tony's thinking recorded in the "My thinking is" right hand column. He has chosen to read from a middle school science textbook. Tony's reading process reveals strategies such as predicting, "The title leads me to believe" and "They are going to discuss". His think-aloud demonstrates a use of his background knowledge in science with an attention to terms like "mass" and "weight," the technical vocabulary of the field. He notes the inclusion of the sunken ship scenario as a feature of science textbooks and their efforts to make real-world applications of science for secondary students. Tony refers to text features such as sub-headings when he reads from the text: "What is matter?" and a familiarity of text organization "...most textbooks try to distinguish the difference between..." In addition, Tony's disciplinary thinking elaborates on the concepts of gases as "a little more difficult to visualize as matter" and definitions of mass and weight. Much of Tony's disciplinary thinking is invaluable for helping the novice scientist understand the concepts in the text selection as later seen in Figure 6 with his partner Michael's discussion sheet.

Figure 3. *Science Major Think-Aloud Journal*

The text says:	My thinking is:
The chapter title is <i>General Properties of Matter</i>	The title leads me to believe that they will be discussing topics like density, mass, volume. Also, since most textbooks try to distinguish the difference between mass and weight, I'm thinking that they will be talking about weight and gravity.
On July 19, 1545, a fleet of British warships sailed slowly out of Portsmouth Harbor, England, on its way to battle the French fleet. One ship, the <i>Mary Rose</i> , carried a crew of 415 sailors, 285 soldiers, and a number of very new and heavy, bronze cannons.	Most science texts like to begin by giving a real life scenario of how the concepts that are about to be introduced can be used in 'real life' situations. I would think the ship is going to sink and they will discuss how the mass of the cargo caused the ship to sink.
Some of the divers wore heavy weights on their belts so that they could hover above the sandy ocean bottom.	They are going to discuss how the properties of matter can have different effects on things. Why the heavy ship sank and why the divers wearing heavy weights are not walking on the ocean floor but are hovering just above it.
What is matter?	The text should explain what matter is. It should do this by describing matter as what the entire universe is made of, and then list specific examples.
Through your senses of smell, sight, taste, and touch, you are familiar with matter.	Your five senses are used to describe physical properties of matter, but some that might not come very easily to mind are things that you can not see, taste or hear. Gases are a little more difficult to visualize as matter since we can't perceive oxygen as a physical substance.
Some kinds of matter are easily recognized. Wood, water, salt, clay, glass, gold, plants, animals – even a piece of the moon – are examples of matter that are easily observed.	This makes me think of a fun and effective lab that is used to reinforce the idea of physical properties. Once the concept has been introduced, you can do a lab in which the students are given 10 random items and they need to list at least 5 physical properties of each item.
Properties describe an object. Color, odor, size, shape, texture, and hardness are properties of matter.	These examples are very specific, they should begin distinguishing the difference between these examples and general properties of mass, volume, density, et.
All matter has the general properties of mass, weight, volume, and density.	Now begins the meat and potatoes of the chapter. They should begin by discussing mass, and distinguishing the difference between mass and weight. Mass is the same whether you are on Earth or the moon. Weight is dependent on gravity.

McDougal Littell, (2005). *McDougal Littell middle school science*. Chicago, IL: McDougal Little/Houghton Mifflin.

Tony partnered with Michael, a preservice teacher from the discipline of history. Figure 4 below shows Michael's metalinguistic think-aloud journal. Michael chose to read from an academic text in his field of history. His reading process shows use of strategies such as activating background knowledge, predicting, inferring, confirming/disconfirming as he integrates across the reading of the text. Michael uses the title as a text feature to predict what the chapter might be about and later seems to make reference to the lexical density often found in history text when he comments on the author, "I like how Marks sets forth his chapter agenda very clearly and succinctly. This is great when one takes into account that historians generally tend to be very verbose." Michael then references historical ways of thinking, "It is nice being able to quickly identify the author's main points and move on to critical analysis of the information." This statement also reflects Michael's experience and expertise in reading history which is further demonstrated in his think-aloud journal by his ability to synthesize across the text while he is reading. Michael's disciplinary literacy and historical way of thinking are further exemplified in these think-aloud statements he makes, "historians have seen world history and the development of industrialized societies from a non-Eurocentric viewpoint" and "like anything else in history, European contributions and achievements must be placed in broader context".

Figure 4. History Major Think-Aloud Journal

The text says:	My thinking is:
<p>Title of the book: <i>The Origins of the Modern World: A Global and Ecological Narrative from the Fifteenth to the Twenty-First Century</i> by Robert B. Marks; the chapter I am reading is entitled "The Gap"</p>	<p>The titles that I have listed bring forth in me feelings of familiarity and confusion simultaneously. From the main title, I know what the book is going to be about, and because I have studied this period in world history before, I feel that I am going to be able to understand the contents. The chapter title, on-the-other-hand, leaves me guessing a little about what to expect in the chapter.</p>
<p>In the 18th century, China, India, and Europe... were broadly comparable in terms of the level of economic development, standard of living, and people's life expectancies... those three parts of the world thus accounted for 70 percent of the economic activity in the world in 1700.</p>	<p>This echoes the point that we have been discussing in class since the beginning of the semester. Europe was not the begin-all, end-all in terms of advanced world civilizations. We need to look beyond a Eurocentric view of world history.</p>
<p>In 1900, Europe and the United States together account for 80 percent of all manufacturing activity.</p>	<p>At this point, Europe was still dominating the world in several ways, but the U.S. was at a point where it would soon be thrust forward, eventually emerging a true world superpower.</p>
<p>... a great reversal of world history... Chinese and Indians became relatively poorer over the course of the nineteenth century... they were not industrializing... cities were not developing, so they could not accommodate rising populations, leading to greater rural poverty. (paraphrased)</p>	<p>Helps to explain why roles were reversed. This ties in with what we know about wealth being linked with cities. With the rise of great cities throughout history, there also arose completely different groups of people whose lives were not tied to agriculture, thus allowing specialization of labor, a diversified economy, and eventually, industrialized societies. Unfortunately, although China and India were home to several great cities and ports, the fact that they were not industrializing on-par with their European and American counterparts speaks volumes about why their economies were stunted or reversed. Most likely, this had to do with the forms of government in place within these countries during the time.</p>
<p>The charts thus show the emergence during the nineteenth century of a large and growing gap between the West and the rest of the world, here epitomized by India and China.</p>	<p>The gap that the chapter title refers to is this one. There was a growing economic and social gap between people of the East and West, with the West overcoming the East. This was something in stark contrast to historical truths.</p>

Marks, R. B. (2007). *The origins of the modern world: A global and ecological*

narrative of the fifteenth to the twenty-first century. Lanham, MD: Rowman and

Littlefield Publishers, Inc.

On the partner discussion sheet as seen in Figure 5 Tony notes several reading strategies that he uses such as activating prior knowledge, read ahead, synthesize, and indicates that Michael's background knowledge and historical thinking were needed to support his own comprehension of the history text. Tony also states he "had to re-read" and references "rationalization of market economy" a nominalization which is a grammatical feature discussed earlier in this article that can create ambiguity and that is often used in history text.

Figure 5. *Metalinguistic Journal Partner Discussion - Science Major*

Metalinguistic Journal Partner Discussion				
Reader: Antonio Discipline: Science Title of Text Read: <i>The GNP</i>		Partner: Mike Discipline: History		
Reading Processes I use these strategies too when I read...	Discipline Specific Knowing and Thinking This was helpful background knowledge and disciplinary thinking...	Text Structure and Text Features The text structure and text features were a guide here...	Confusions I got confused here... ...because....	Other Thoughts I Have
Activate prior knowledge Read ahead Synthesize Summarize	Idea of world being linked to great cities is something that I had never thought of but after reading makes sense. uses a lot of background knowledge his previous texts.	Summarizes most of chapter clearly & shows us what to expect.	Had to reread "rationalization of" market economy. Didn't understand it at first & had to reread it	

Michael's partner discussion sheet as seen in Figure 6 makes reference to the strategies he used while reading from Tony's chosen science text as being predicting, inferencing, confirming/disconfirming, and activating prior knowledge. He further notes that the text organization helped guide his thinking while reading from the science chapter and that "it was orderly from the beginning". This would confirm Tony's helpful entry earlier stating that "most science texts..."

Figure 6. Metalinguistic Journal Partner Discussion – History Major

Metalinguistic Journal Partner Discussion				
Reader: <i>Michael</i> Discipline: <i>History, Social Studies</i> Title of Text Read: <i>General Properties of Matter</i>		Partner: <i>Antonio</i> Discipline: <i>Science</i>		
Reading Processes	Discipline Specific Knowing and Thinking	Text Structure and Text Features	Confusions	Other Thoughts I Have
I use these strategies too when I read...	This was helpful background knowledge and disciplinary thinking...	The text structure and text features were a guide here...	I got confused here... ...because....	
<ul style="list-style-type: none"> • prediction • inference • confirm/disconfirm • activate prior knowledge 	<ul style="list-style-type: none"> • Met Science texts... 	<ul style="list-style-type: none"> • It was orderly from the beginning • Great attention getter 	<ul style="list-style-type: none"> • I really didn't too confused. 	<ul style="list-style-type: none"> • I think we both read for context, looking beyond the obvious in the text & picking up on the cues.

Excerpts from Tony's and then Michael's individual reflections, along with a discussion are included below:

Tony's individual reflection of the metalinguistic protocol notes his learning. He states "this assignment has taught me a lot". Tony obviously recognizes the expertise and disciplinary literacy he has acquired as he elaborates in the section of his response included here:

After this assignment I took away two different things. The first is that prior or background knowledge is extremely important in being able to not only understand but being able to predict and analyze the text. While Michael and I were both able to comprehend the text, Michael did a far better job of critically analyzing the text and drawing more meaning from it than I was able to. If I were to write out a journal of my own over the History text, it would state the basic information found in the text, but it would in no way be able to compare to the insight that Michael was able to draw from the same material. His previous experience in History has a great deal to do with this ability.

While here Tony makes reference to Michael's use of background knowledge he is also referring to the critical analysis or reasoning that Michael has gained and uses

well as a way to think as a historian. Tony continues on what he took away from the experience:

The second thing that is obvious is that reading is a skill that is taken for granted and more precisely reading to learn is a skill that is taken for granted. If you slow down to analyze how you read and comprehend the material, you discover that there are many skills being applied at once to help with reading and comprehension.

The insight that Tony has about reading to learn as made visible through the metalinguistic protocol experience is one that I have commonly seen in preservice teachers over many courses. Michael also discusses this insight in his individual reflection of the metalinguistic protocol experience and includes a comparison of the two disciplines in which he and his partner Tony have expertise:

What we found foremost was that when we compared our two journals, he [Tony] and I had used essentially the same reading process. For both the natural scientist (Tony) and the social scientist (myself), the reading skills of prediction, inference, confirm/disconfirm and activation of prior knowledge, are utilized within the texts of our respective disciplines.

Another aspect we both agreed was present in our texts was specialized vocabulary. My text referred to chronology, geography, economics, politics, society and historical event. While my partner's text referenced terms that were specific to a scientific study of matter, weight, mass, volume, etc. Each of our texts was very specific in the terms that it used because of the content being presented was specific.

Here Michael comments about the specialized language in the disciplines of science and history and how he and Tony have become familiar with this vocabulary or discourse in their disciplines

Just as there was specialized language and vocabulary present in both of our texts, there was also a certain level of discipline specific knowledge that was inherently present with each, as well.

Partner Example 2: Mathematics and English

In the second partner example of the metalinguistic protocol experience Dorothy, a mathematics major and Kathy, an English major have worked together. Figure 7 below shows Dorothy's metalinguistic think-aloud journal. She has chosen

to read from a college mathematics text. Dorothy's think-aloud of the text in her "My thinking is" column on the right shows her immediate use of mathematical thinking. As Dorothy sets herself up to read she knows to expect abstract theories and prepares herself for this in a review of definitions. While stating the expectation as, "This book is going to talk about theories and applications..." shows reading strategy use of predicting on her part, it is also evidence of the expected way of thinking mathematicians use when reading in their field. Dorothy spends a great deal of time and space (as recorded in the right hand column of her metalinguistic journal) going over the theorems that will be used later in the text. She knows, as a mathematician, the logic that these theorems follow and that they will be important to comprehending the rest of the text. Dorothy has used the text features of the title, "the chapter starts" and paragraphing "the first paragraph explains" to help guide her comprehension. She also integrates and synthesizes information as she continues to read in the text. This is similar to Michael's think-aloud journal with the lexical density of the history text in the previous Partner 1 Example. In the mathematics text Dorothy must also read numbers and equations and in order to comprehend must know any relevant properties or theories behind this symbolic use of language in mathematics. In addition, Dorothy uses technical language such as "quotient" and "divisor" to think-aloud with the text and includes an abbreviation "gcd" (greatest common divisor) that no doubt is familiar to experts in her field.

Figure 7. Mathematics Major Think-Aloud Journal

The Text says:	My thinking is:
<p><i>Elementary Number Theory (revised printing)</i> By: David M. Burton 2.3 The Euclidean Algorithm (Title of Chapter)</p>	<p>When I think of Elementary Number Theory, I think of Theories that are found in the lower level mathematics. This book is going to talk about theories and applications in an abstract way with few concrete examples. This book will challenge the reader to think abstractly.</p> <p>The section I chose was The Euclidean Algorithm because it is a more concise section with a concrete example to support the definition and proof.</p> <p>The chapter starts with a brief definition and what The Euclidean Algorithm is used for. The first paragraph explains that, with the use of the Euclidean Algorithm, you can find the greatest common divisor of two integers.</p>
<p>The Euclidean Algorithm may be described as follows: Let a and b be two integers whose greatest common divisor is desired. Since $\gcd(a , b) = \gcd(a, b)$, there is no harm in assuming that $a \geq b > 0$.</p>	<p>The Euclidean Algorithm is a Theorem. The proof of the theorem is as follows, we want to find the gcd (greatest common divisor) of a and b. a and b are integers. The definition of an integer is any number ranging in the set $\{..., -3, -2, -1, 0, 1, 2, 3, ..., \}$. We assume that the integers are positive or greater than 0.</p>
<p>The first step is to apply the Division Algorithm to a and b to get $a = q_1b + r_1 \quad 0 \leq r_1 < b$.</p>	<p>In order for the Euclidean Algorithm to work, we must know what the Division Algorithm means. The Division Algorithm is defined as, Given integers a and b, with $b > 0$, there exist unique integers q and r satisfying</p> $a = qb + r \quad 0 \leq r < b.$ <p>The integers q and r are called, respectively, the quotient and remainder in the division of a by b.</p> <p>We are trying to find the gcd (greatest common divisor) of a and b. We write it as a</p>

Kathy, an English major, partnered with Dorothy. Kathy's metalinguistic think-aloud journal in Figure 8 also exemplified use of discipline specific ways of knowing, thinking and using language. She has chosen to read a story from a middle school language arts textbook. While Kathy's think-aloud of the text in her "My thinking is" column on the right-hand side of her journal shows her use of reading strategies such as predicting, her entry is also richly embedded with the disciplinary literacy of English. For example, in reading the title Kathy is referencing the literary element of theme in the notation "about a boy who finds something and it becomes a treasured item in his life" that might be revealed in the story. She then hones in on the authors' use of metaphoric language in images of the dark sky and the boy's mood and concludes "the boy is sitting on the steps of his family's apartment building and he is sad or angry about something". Kathy also uses knowledge of the literary genre of story in anticipating the conflict, "I am anticipating that this boy is also upset that his father doesn't understand his feelings and how hard math is for him" and notes the characters (the boy Greg and his father) in literary analysis, a way of thinking common to the field of English.

Figure 8. *English Major Think-Aloud Journal*

THE TEXT SAYS:	MY THINKING IS:
<p><i>The Treasure of Lemon Brown</i> By: Walter Dean Myers</p>	<p>I have not read a book by this author before. I am thinking this story will be about a young boy who finds something and it becomes a treasured item in his life.</p>
<p>The dark sky, filled with angry swirling clouds, reflected Greg Ridley's mood as he sat on the stoop of his building.</p>	<p>I am thinking that it is an overcast day and this young boy is sitting on the steps of his family's apartment building and he is sad or angry about something.</p>
<p>His father's voice came to him again, first reading the letter the principal had sent to the house, then lecturing endlessly about his poor efforts in math.</p>	<p>I am thinking this boy is having a hard time with his math lessons at school. He's feeling frustrated and angry. I am anticipating that this boy is also upset that his father is lecturing him and he feels that his father doesn't understand his feelings and how hard math is for him.</p>
<p>"I had to leave school when I was 13," his father had said, "that's a year younger than you are now. If I'd had half the chances that you have, I'd...."</p>	<p>I am thinking that Greg is listening to this lecture and is getting more frustrated that his father keeps lecturing him but doesn't try to help him or understand his problems.</p>
<p>Greg had sat in the small, pale green kitchen listening, knowing the lecture would end with his father saying he couldn't play ball with the Scorpions.</p>	<p>I am thinking the Scorpions is the baseball team that Greg plays on. His father will take away this privilege as a punishment for not doing well in school.</p>

Myers, W. D. (2001). The treasure of Lemon Brown. In *Glencoe Literature Course 3* (TX Edition), (pp. 5-13). New York: Glencoe McGraw-Hill.

After Dorothy and Kathy traded journals in the metalinguistic protocol experience they made entries on the partner discussion sheet. Dorothy's discussion sheet, as shown in Figure 9 lists the reading strategies decoding, predicting, using context clues and re-reading. She also mistakenly lists "foreshadowing" as a strategy which an English expert would know is not a strategy but a literacy device used in disciplinary thinking in the field.

Figure 9. *Metalinguistic Journal Partner Discussion – Mathematics Major*

Metalinguistic Journal Partner Discussion				
Reader: Dorothy Discipline: Math Title of Text Read: The Treasure of Lemon Brown		Partner: Kathy Discipline: English		
Reading Processes	Discipline Specific Knowing and Thinking	Text Structure and Text Features	Confusions	Other Thoughts I Have
I use these strategies too when I read... - decoding the text - foreshadowing - context clues - predicting - re-reading	This was helpful background knowledge and disciplinary thinking... - summarizing - confirming/disconfirming	The text structure and text features were a guide here... - context, reading the story and anticipating what will happen next. - foot notes - synthesizing	I got confused here... because.... I didn't have much confusion because of the help of footnotes and the reading level of the short story	

Kathy's partner discussion sheet as seen in Figure 10 records the reading strategies she used as: decoding, activating prior knowledge and re-reading. She references Dorothy's helpful background knowledge, "the theory and specific math terms," and notes the two text features of "footnotes and explanations," commonly used in English text, and used especially in secondary literature textbooks, that would have been helpful in clearing up her confusions. No doubt Kathy has learned as an expert in her field to think with and use these features in her own reading to learn. Dorothy, on the other hand, has had to develop expertise beyond surface level definitions in order to navigate the specialized language of mathematics and the complex conceptual knowledge associated with using that language in written text.

Figure 10. *Metalinguistic Journal Partner Discussion – English Major*

Metalinguistic Journal Partner Discussion

Reader: *Kathy*
 Discipline: *English*
 Title of Text Read: *The Euclidean Algorithm*

Partner: *Dorothy*
 Discipline: *Math*

Reading Processes	Discipline Specific Knowing and Thinking	Text Structure and Text Features	Confusions	Other Thoughts I Have
I use these strategies too when I read...	This was helpful background knowledge and disciplinary thinking...	The text structure and text features were a guide here...	I got confused here... ...because....	
<i>I also use decoding to make sense of the text.</i> <i>Prior knowledge - what info I understood from previous math classes.</i> <i>Re-reading - trying to comprehend the material</i>	<i>A person needs to use background knowledge to understand abbreviations, what they know about the theory, and specific math terms.</i>	<i>Context Clues - The 1st paragraph explained the theory and its history.</i> <i>The paper began using abstract information and concluded giving concrete example</i>	<i>Footnotes and explanations would have been helpful when I was reading.</i>	

Selected comments from Dorothy and Kathy's individual reflections are included and discussed below:

Dorothy writes about the difficulty she has in preparing the metalinguistic think-aloud, "I have to say it was quite difficult dissecting my mathematics text. I do it subconsciously and I never really noticed the way I read my mathematics text". Although Dorothy states that it was "quite difficult," she understands well the mathematical way of thinking and using language as elaborated below:

In order to read mathematics text, you must understand mathematical syntax. Understanding certain definitions and the language helps with the decoding of the text. I knew that whoever would switch journals with me would have difficulty reading the text because of their possible lack of mathematical knowledge and language.

Dorothy's think-aloud journal and discussion sheet as previously discussed also exemplify her knowledge of disciplinary literacy in her field of mathematics. She contrasts this with the difficulty she had while reading from the short story Kathy used for the metalinguistic protocol experience: "The first time I started to read the short story, I had to read the first page three times. Once I got the idea

of what was happening, I continued on.” As a good reader and someone who has experience with difficult academic text, Dorothy knew to re-read. This is not always something novice readers, such as adolescent students would do.

In Kathy’s individual reflection insights into discipline specific strategies for helping adolescent students learn are evident. She references the logic of mathematical thinking and the creative expression which is a way of knowing in the humanities and the field of English.

I feel that predicting is a reading strategy that language arts teachers use to help their students anticipate and predict what is going to happen in the story. I do not feel that prediction coincides with math in the same way that it does in reading. In math, students know they are going to be answering and solving equations; therefore, prediction of what is going to happen is a natural process. However, in reading a story, there are many times that the reader is unable to predict the end of the story because of the twists and turns the author has made when writing the story.

Both Dorothy and Kathy understand their disciplines well and are able to explain their unique way of thinking and using language in the written texts. Just as important, each partner in the metalinguistic protocol experience was also able to note strategies they use specific to reading to learn in their discipline and discuss that knowledge in implications for their future teaching of adolescent students. This is not always articulated well by preservice content area teachers after the metalinguistic protocol experience.

While both metalinguistic journal partner example 1, with a science and history major and partner example 2, with a mathematics and English major demonstrate that preservice teachers in the university content area literacy course gain insights into their discipline specific literacy and the implications for their teaching, some still report little beyond the importance of background knowledge for reading to learn. While this is valuable learning and will no doubt benefit their future teaching, I have realized more needs to be done earlier in the course experiences fore-fronting the disciplines. Next semester of the university course I plan to include an interview with a disciplinary expert who is doing work in their field as a course assignment before the preservice teachers engage in the metalinguistic protocol experience.

Conclusions

In this article I have explored some of the challenges of reading disciplinary texts, explained how I use the metalinguistic protocol in the university content area literacy course, presented an overview of the metalinguistic protocol framework and concluded with several examples of the protocol from preservice content area teachers. The metalinguistic protocol experience serves as a framework in university content area literacy courses to help preservice secondary teachers gain insights about the unique disciplinary literacies and challenges of reading to learn. While the initial experience preparing the think-aloud journal with the disciplinary text can be a tedious process, the secondary preservice teachers over the last five years I have taught the university course have consistently commented on how valuable the metalinguistic protocol experience is for the insights they gain into the reading process and reading strategies; the role of disciplinary background knowledge in reading to learn; and socially situated literacies, which includes disciplinary literacy and the unique way of thinking and of using language in the disciplines of knowledge .

In addition, the metalinguistic protocol experience has important implications for their future teaching of adolescent students. Until more recently university content area literacy courses have tended to focus on generic use of learning strategies rather than those unique to the disciplines. What is needed is more understanding about disciplinary literacy and how preservice content area teachers might use those literacy practices with their less experienced adolescent students. In addition, inservice teachers would benefit from professional development using experiences like the metalinguistic protocol. Schoenbach and Greenleaf (2009) state “as students encounter more sophisticated disciplinary texts and tasks, they need support to learn more discipline specific strategies” (p. 103). It has been more common in my experiences over the last five years for the preservice teachers to make reference to the knowledge they gained about the reading process and their general use of reading strategies to learn rather than specific literacy characteristics or strategies in their discipline. This is probably to be expected due to the preservice teachers’ expertise and efficient use of such knowledge as well as to the time we spend in the course developing those concepts. However, deeper insights into the unique disciplinary literacies needs to be fostered and made visible through additional course experiences. As Shanahan and Shanahan (2008) state “the nature of the disciplines is something that must be communicated to adolescents, along with the ways in which experts approach the reading of text” (p. 51).



References

- Afflerbach, P. (2002). Verbal reports and protocol analysis. In M.L.Kamil, P. B. Pearson, & R. Barr (Ed.), *Handbook of reading research* (vol. III, p. 87-103). Mahwah, NJ: Erlbaum.
- Bazerman, C. (1998). *Shaping written knowledge: The genre and activity of the experimental article in science*. Madison, WI: University of Wisconsin Press.
- Braunger, J., Donahue, D. M., Evans, K. & Galguera, T. (2005). *Rethinking preparation for content area teaching*. San Francisco: CA: Jossey-Bass.
- Coffin, C. (1997). Constructing and giving value to the past: An investigation into secondary school history. In F. Christie & J. R. Martin (Eds.), *Genre and institutions: Social processes in the workplace and school*. (pp. 196-230). London: Cassell.
- Draper, R. J., Broomhead, P., Petersen Jensen, A., Nokes, J. D., Siebert, D. (Eds.) (2010). *(Re)imagining Content-area Literacy Instruction*. New York: Teachers College Press.
- Eisner, E. (1985/1995). *Learning and teaching the ways of knowing*. Chicago, IL: The National Society for the Study of Education.
- Eisner, E. (1994). *Cognition and curriculum reconsidered*. New York: Teachers College Press.
- Fang, Z. (2004). Scientific literacy: A systemic functional linguistic perspective. *Science Education*, 89, 335-347.
- Fang, Z. & Schleppegrell, M. (2009). *Reading in secondary content areas: A language-based pedagogy*. Ann Arbor: University of Michigan Press.
- Farrell, R. T. & Cirrincione, J. M. (1984). State certification requirements in reading for content area teachers. *Journal of Reading*, 28, 152-158.
- Gee, J. (1999). *Social linguistics and literacies: Ideology in discourses*. New York: RoutledgeFalmer.
- Geisler, C. (1994). *Academic literacy and the nature of expertise: Reading, writing and knowing in academic philosophy*. Mahway, NJ: Lawrence Erlbaum Associates.
- Goodman, K. (1996). *On reading*. Portsmouth, NH: Heinemann.
- Grossman, P. L. & Stodolsky, S. S. (1995). Content as context: The role of school subjects in secondary school teaching. *Educational Researcher*, 24(8), 5-11 +23.
- Halliday, M. A. K. & Martin, J. R. (1993). *Writing science: Literacy and discursive power*. Pittsburgh, PA: University of Pittsburgh Press.
- Kintsch, W. (1986). Learning from text. *Cognition and Instruction*, 3, 87-108.
- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Lee, C. D. & Spratley, A. (2010). *Reading in the disciplines: The challenges of adolescent literacy*. New York: Carnegie Corporation of New York.
- Lemke, J. (1990). *Talking science: Language, learning, and values*. Norwood, NJ: Ablex.
- McArthur, K.G. (2007). *Exploring secondary preservice teachers' knowledge of the disciplines*. Paper presented at the 58th Annual Meeting of the National Reading Conference.

- McTighe, G. & Wiggins, J. (1998). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Mish, F. C. (Ed.) (2004). *Merriam-Webster's collegiate dictionary, Eleventh Edition*. Springfield, MA: Merriam-Webster, Incorporated.
- Moje, E. (2008). Foregrounding the disciplines in secondary literacy teaching and learning: A call for change. *Journal of Adult and Adolescent Literacy*, 52(2), 96-107.
- O'Brien, D., Stewart, R. & Moje, E. (1995). Why content literacy is difficult to infuse in the secondary curriculum: Strategies, goals and classroom realities. *Reading Research Quarterly*, 30, 442-463.
- Pontecorvo, C. (1993). Forms of discourse and shared thinking. *Cognition and Instruction*, 11(3&4), 189-196.
- Pressley, M. & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Schleppegrell, M. J. (2004). *The language of schooling: A functional linguistic perspective*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Schoenbach, R. & Greenleaf, C. (2009). Fostering adolescents' engaged academic literacy. In L. Christenbury, R. Bomer & P. Smagorinsky (Eds.), *Handbook of adolescent literacy research* (pp. 98-112), New York: Guilford Press.
- Shanahan, T. & Shanahan, C. (2008). Teaching disciplinary literacy to adolescents: Rethinking content area literacy. *Harvard Educational Review*, 78(1), 40-59.
- Smith, F. (1997). *Reading without nonsense*. New York: Teachers College Press.
- Twain, M. (2009). *The adventures of Tom Sawyer*. New York: Tribecca Books.
- Vygotsky, L. (1986). *Thought and language*. Cambridge, MA: The MIT Press.
- Wignell, P., Martin, J. R. & Eggins, S. (1993). The discourse of geography: Ordering and explaining the experiential world. In M. A. K. Halliday & J. R. Martin (Eds.), *Writing science: Literacy and discursive power* (pp. 136-165). Pittsburgh, PA: University of Pittsburgh Press.
- Wineburg, S. S. (1991). On the reading of historical texts: Notes on the breach between school and the academy, *American Educational Research Journal*, 28(3), 495-519.
- Wineburg, S. S. (2001). *Historical thinking and other unnatural acts: Charting the future of teaching the past*. Philadelphia: Temple University Press.
- Woolman, M. (2000). *Ways of knowing: An introduction to a theory of knowledge*. Australia: IBID Press.



About the Author

Kerry G. McArthur, Ph.D. is an Assistant Professor and Co-Director of the Sabal Palms Writing Project in the Department of Language, Literacy and Intercultural Studies in the College of Education at the University of Texas at Brownsville.