A Review of the Literature on Academic English: Implications for K-12 English Language Learners

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Table of Contents

List of Tables

Appendix

A Review of the Literature on Academic English: Implications for K-12 English Language Learners

Executive Summary

The interaction between academic language and academic content continues to challenge teachers, researchers, and policy makers. As early as the 1980's Cummins (1986), Skutnabb-Kangas (1981), and others demonstrated that language minority students, many of whom were former English language learners (ELLs), were less likely than their native English-speaking peers to acquire the academic registers of different content areas. Academic English (AE) has been increasingly cited as a reason for gaps in achievement between ELLs and English-proficient students. It has also been the focus of professional development for teachers, the topic of numerous articles on and guides to instruction, and is beginning to appear in ELL teaching standards, and in teacher preparation, accreditation, and credentialing documents.

Although academic language is arguably the most important factor in students' academic success (Francis, Rivera, Lesaux, Kieffer, & Rivera, 2006), the distinguishing characteristics of academic language as it is used in academic discussions, classroom texts, and on state content assessments are still unclear. An important component in addressing the difficulties ELLs face is a deeper and more thorough conceptualization of AE that could inform the improvement of English language development (ELD) standards and assessments and provide better guidance to teachers on how to support ELL development of AE.

To date, the research that has been conducted to help describe AE is scattered across a number of different areas of inquiry and is of varying depth and quality, ranging from expert opinion and linguistic analyses of written and spoken texts, which are often not accessible to practitioners, to a very few descriptive studies of classroom practice. Up to this point, the research that is available on AE has not been collected, summarized, and interpreted within one document. Nor has it been critically reviewed from the perspective of its implications for ELL instruction. This report reviews current literature to determine what is known and not known about the nature of AE, instructional practices used to teach it, teacher preparation and training to improve instructional practice, and policies that support AE. It raises critical challenges for the field in defining AE and suggests areas for further inquiry.

The purpose of this report is to summarize and evaluate the literature on AE in order to provide an informed perspective to policymakers, researchers, and others interested in improving educational outcomes for ELLs. In addition, the report will be useful to practitioners who are interested in a comprehensive perspective on AE as it pertains to the education of ELLs. The student population that is the primary focus of this report is ELLs; students for whom English is not their native language and who have not yet developed proficiency in English. These students may or may not be enrolled in ELD programs. The report also has implications for all students who struggle with learning AE.

The report is organized around three of the four areas of interest used to guide the literature review: 1) defining AE, 2) AE teaching practices, and 3) the preparation and training of teachers to support AE development. The fourth area of interest, state policies on AE, is discussed within the context of the preparation and training of teachers.

Defining Academic English

Academic English is a complex concept that has been defined and operationalized from a variety of perspectives and for a variety of purposes. AE can be viewed as part of overall English language proficiency which also includes more social uses of language both inside and outside the school environment. It is referred to variously as a variety of English, as a register, or as a style, and is typically

used within specific sociocultural academic settings. In the broadest sense AE refers to the language used in school to help students acquire and use knowledge (Bailey & Heritage, 2008; Chamot & O'Malley, 1994; Schleppegrell, 2004). It is developmental with trajectories of increased sophistication in language use from grade to grade, with specific linguistic details that can be the same or vary across content areas. Learners of AE fall along a continuum that includes nonnative speakers, speakers of nonstandard varieties, and native speakers with little exposure to AE.

Three primary challenges in defining AE are presented. First, varying perspectives on the nature of language and AE have resulted in multiple systems for understanding the construct. Since researchers from different philosophies and educational backgrounds approach AE in very different ways, the range of conceptual frameworks and models vary from those with a primarily linguistic focus to those that emphasize the social context to those that emphasize use in specific content areas. Second, the picture is further complicated by the complex nature of the AE construct itself. In general, the linguistic elements that comprise the construct include discourse features such as language functions, grammar/structure, and vocabulary across the language modalities (listening, speaking, reading, and writing), and content areas (science, mathematics, language arts, and history/social studies). In addition, the increased complexity of linguistic features and sophistication of language use from year to year through the grades are a part of the picture. Finally, as previously mentioned, the nature of the information that is available varies in kind and completeness. A growing number of definitions and discussions about AE have appeared in the literature. However, few empirical investigations have attempted a systematic approach to describing the construct.

This section on defining academic English provides a review of the literature that establishes the emergence of the language of school as an additional register in children's developing linguistic repertoire. Although grounded in differing theoretical frameworks and often focused on disparate target learner populations, each approach illustrates how AE fits within a system of language use, sharing a recognition that the language of school exists, and that this language is foundational to academic access and success. The section next looks at research that is beginning to identify linguistic features of AE. The studies have systematically explored language use in various academic classroom contexts. Each focuses on different sources of AE, such as classroom talk or academic texts, describes different grade levels and content areas, and utilizes different approaches to the task of specifying the features of the AE construct. Despite the differences, these studies provide evidence for both the existence of AE and the forms AE may take in providing access to academic content. Finally**,** the role of AE in specific content areas is discussed. Much of the impetus for examining AE has come from educators in the disciplines who realize the critical role language plays in acquiring content knowledge. AE is gradually becoming a central theme in content-area classes such as mathematics and science, especially when those classes have large numbers of ELLs.

Academic English Instruction

The different perspectives in defining AE have significance for both research and instruction; they influence our understanding of how to teach AE as well as our understanding of the level of AE necessary for academic success. One of the implications for instruction addressed in the literature is the importance of teaching essential features of AE, including the academic vocabulary, grammar, and discourse structures common to specific content areas. Instruction in these features is of special importance to ELLs, particularly those with limited backgrounds in AE.

Across multiple content areas two primary AE needs are described: first, an explicit understanding of how AE differs from everyday, conversational language, and when to use each in academic settings; and second, an ability to recognize the features of AE texts of different disciplines, and use those features orally and in writing. A number of the studies reviewed *within* specific content areas support the idea that how one defines AE influences instructional practice; a narrow conceptualization of AE as mainly academic vocabulary limits the effectiveness of AE instruction.

The literature also focuses on how AE is developed through social interactions and in social settings, examining how effectively teachers have attempted to engage students in academic discourse and the language of particular disciplines. Providing opportunities for engaging students in AE requires a more balanced division of teacher and student talk, with teachers modeling academic discussions and questioning techniques that mirror the types of discussion within professional communities. Further, it requires opportunities for students to use AE and to develop a certain amount of metalinguistic awareness of AE features.

In addition to implicit and explicit assumptions about the relationship between how AE is defined and instruction is the assumption that AE is associated with conceptual understanding. Authors differ, however, in how they view that relationship. Two of the primary interpretations, described in a synthesis of research and findings from an international conference on science education, suggest: 1) that the ability to use the language of science—including science discourse, forms and functions—is a prerequisite for understanding academic content; and 2) that language "shapes and influences" understanding of academic content. Each of these interpretations, it is argued, has consequences for how AE is taught. The first interpretation supports direct instruction in the language of science. The second supports a less direct, writing-to-learn approach.

In general, the literature on AE instruction for K-12 classrooms suggests that it is necessary to consider both language and content in any discussion of AE proficiency. At a minimum, it is worthwhile considering features related to academic literacy, such as discipline-specific text organization and discourse patterns, AE functions emphasized in specific settings, and the multiple meanings of words. Across the literature on instruction in AE features, the primary focus was on academic vocabulary, with explicit teaching and pre-teaching tied to opportunities for practice. Across the literature on developing academic discourse, questions were raised regarding the relationship between how AE is defined and how it is taught, how classroom interactions are framed by the teacher, and whether AE can be considered or taught apart from everyday discourse. Although few answers were provided, a common thread was the importance of supporting teachers in laying the foundation for AE development.

Policies and Practices in Preparing and Training Teachers to Support Academic English Development
Despite differing views and approaches, most educators agree that improving the language and literacy skills of ELLs will depend on finding ways to deepen all teachers' knowledge of language and language development (Adger, Snow, & Christian, 2002). This portion of the report discusses policies and practices relevant to preparing and training elementary and secondary teachers to support ELLs' development of AE. While the focus is on ELL teachers, when information is available, discussion of the training of content teachers to teach AE is also included.

The second language teacher education field has drawn from several distinct traditions to describe what ELL teachers should know and be able to do (Merino, 2007). Currently and arguably the most dominant is the standards/competency tradition. This tradition typically involves experts within a particular knowledge domain conceptualizing and developing a comprehensive set of teaching standards that reflect a level of consensus on the core knowledge, skills, and effective pedagogy in this domain. Often this work occurs under the auspices of a professional organization that has influenced the content of ELL teacher education programs. This section on teacher preparation explores the ways in which several sets of national teaching standards address AE as well as the degree to which expectations for teaching academic language are included in state policy on teacher credentialing and program accreditation.

According to a survey of state and national teacher education policies (Merino, 1999), there has been an abundance of "competency" approaches to describing the knowledge that teachers of ELLs should possess, but few policies on what constitutes best teaching for ELLs. Moreover, virtually no attempts

have been made to evaluate teacher or student outcomes of the competency-based approach to ELL instruction (Merino, 1999). Despite the lack of outcomes-based research in this area, the competency/standards approach continues to dominate the field as an important determiner of the content and focus of teacher education programs.

Overall, the literature and documents on the competencies approach reviewed for this report provide little insight into defining what teachers should know and be able to do with regard to AE. Nor does this literature offer guidance on how to design and implement instruction that supports ELLs' development of AE. Teaching standards, teacher competencies, and state policies typically do not answer the question of what teachers should know and be able to do with regard to AE in order to support student learning of it. Furthermore, in their review of the research, policies, and practices that inform ELL teacher preservice and inservice programs, Tellez and Waxman (2006) caution that the knowledge base professional organizations use to develop teaching standards may not be sufficient to guide these programs to prepare and train ELL teachers.

Teacher preparation policy falls under the auspices of state governments and is typically addressed through the establishment of teacher certification requirements and accrediting teacher education programs. Currently only four states—Arizona, California, Florida, and New York—require specialized training for teachers working with ELLs (Ballantyne, Sanderman, & Levy, 2008). It is unclear from the state policies in Arizona, Florida, and New York the degree to which AE is addressed in implementing the requirements. California policy is more specific with regard to AE and is discussed with some detail in this section of the report.

While teacher preparation policies and practices regarding AE are in their infancy, the literature provides a number of recommendations for improving teacher preservice and inservice programs in AE. One of the strongest recommendations (Wong Fillmore and Snow, 2000) stresses the need for teachers to have the linguistic knowledge and skill to help students use the language associated with the academic discourse of school subjects and develop an awareness of how language modalities (speaking, listening, reading, and writing) function across different academic contexts. This section of the report provides specificity on the types of courses and approaches recommended for preparing teachers to assist students in acquiring AE.

This section also discusses several studies that investigate the impact of professional development interventions on teacher attitudes, knowledge, and skills involved in teaching academic English in content area classrooms. The professional development described in these studies focuses on the vocabulary and language patterns characteristic of science and English language arts classrooms. These studies demonstrate that high quality professional development can provide meaningful learning experiences for teachers on academic English within the content areas. Teacher beliefs and practices about language can be successfully challenged and changed when professional development provides teachers with a deeper understanding of the role of language in academic learning, when it is ongoing, and when it is directly relevant to the content teachers are teaching. The section concludes with recommendations for additional research on teacher preparation and training in AE.

Research Priorities

One of the purposes of this review of literature on AE was to assess the progress research has made toward a more thorough understanding of AE and how it is taught and learned. As the report makes clear, progress is uneven and research is still evolving.

Based on the findings and implications discussed in the previous section, overall priorities for research include the following.

- A systematic approach to documenting and describing the AE demands of teacher-student interactions, teacher talk, textbooks, and assessments. Such an approach could result in a commonly accepted framework of AE that could be used to guide states and districts in making instructional, professional development, and assessment decisions.
- Research that identifies the specific demands AE places on ELLs and the ways in which AE is used in different school settings.
- Studies of the impact of different approaches to AE instruction on student AE acquisition.
- Explorations of the effect of classroom interactions on the development of AE in ELLs.
- More rigorous documentation and evaluation of professional development programs designed to develop teacher knowledge and skill in AE.

For each of the potential investigations outlined here, the expectation is that research into AE will consider the influence of different levels of student educational experiences, ELP, culture and language. ELLs are not a homogenous group. Attention to their differing characteristics is an essential feature of meaningful research in this area.

Glossary

Academic English (AE): At its simplest level, language used in academic settings and for academic purposes. AE is interchangeable with academic language (AL) in this report.

Academic literacy: Sometimes refers to reading and writing, but more often to the knowledge and skills students need in order to be successful in an academic setting including speaking, listening, reading, and writing.

Basic Interpersonal Communication Skills (BICS): A label created by Cummins (1980) referring to fluency in conversational social language. See also CALP (Cognitive Academic Language Proficiency).

Cognitive Academic Language Learning Approach (CALLA): An instructional model which teaches students academic language and learning strategies using academic content.

Cognitive Academic Language Proficiency (CALP): A label created by Cummins (1980) referring to language ability required for academic achievement. See also BICS (Basic Interpersonal Communication Skills).

Context-embedded language: Language that is accompanied by information which provides individuals with context visually, verbally, or otherwise.

Discourse: Definitions vary: a conversation; a formal, lengthy discussion of a subject, either written or spoken; an extended communication (often interactive) dealing with some particular topic.

ELL (or EL): English language learner or English learner. Refers to those who are learning English as their non-native language.

ESL: English as a second language. Refers to English language instruction for non-native speakers.

Limited English Proficient (LEP): Refers to students who have insufficient English language proficiency to succeed in English-only classrooms. More often referred to as ELL or EL.

Lexicon: Vocabulary, or a set of vocabulary belonging to a specific language or field of study.

Modality (of language): Mode of communication, such as listening, speaking, reading, and writing.

Metacognition: An understanding about one's own learning and thinking processes.

Metalanguage: The language used to describe and analyze language.

Morphology: The study of word segments and word structure in language.

Operationalize AE: To specify AE in sufficient detail for specific applications within and across content areas and grade levels.

Phonology: The study of speech sounds and their use in language.

Pragmatics: The study of language meaning within the context of its use.

Register: Pattern of communication used for specific purposes and/or in specific settings; for example, baby talk or lawyer talk. *Register Theory* attempts to identify which aspects of context influence register choice.

Semantics: The study of language meaning without regard to context/situation.

Systemic Functional Linguistics (SFL): A language theory that focuses on the context and social purpose of language, as opposed to a more structural approach, which looks at language components and combinations. SFL was introduced by Australian linguist M.A.K. Halliday.

Sheltered English: An instructional approach focused on making content accessible for ELLs.

Sheltered Instruction Observation Protocol (SIOP): An instructional model for implementing Sheltered English. It guides teachers in making academic content understandable and in promoting AE learning.

Syntax: The structure, arrangement, and relationships of words in phrases and sentences.

A Review of the Literature on Academic English: Implications for K-12 English Language Learners

Introduction

The interaction between academic language and academic content continues to challenge teachers, researchers, and policy makers. Although academic language is arguably the most important factor in students' academic success (Francis, Rivera, Lesaux, Kieffer, & Rivera, 2006), the nature of academic language as it is used in academic discussions, classroom texts, and on state content assessments is still unclear.

As early as the 1980's Cummins (1986), Skutnabb-Kangas (1981), and others demonstrated that language minority students, many of whom were former English language learners (ELLs), were less likely than their native English-speaking peers to acquire the academic registers of different content areas. These academic registers have been the focus of study by linguists, sociolinguists, cognitive psychologists, and researchers from other related fields for some time.

Linguistic analyses of academic registers have helped clarify the distinctive language patterns and discourses associated with learning content within academic domains. The academic language associated with reading, writing, and talking about science, for example, is not the same as the language associated with reading, writing, and discussing mathematics (Schleppegrell, 2001). However, research on the nature of discourse within these different content areas has been conducted almost in isolation from research on second language development. Equally important, much of the research does not directly address the diversity of language groups, educational backgrounds, and language proficiency levels of the ELL population. Despite insights provided by some studies of academic language, not enough is known about what does or does not constitute the body of research on academic language as a whole, and the degree to which this research can address the challenges diverse ELLs face when learning language and content simultaneously.

Over the past decade, states and districts have made some progress in laying the foundation for improved opportunities for ELLs to develop academic English (AE). This progress includes the creation and implementation of English language development (ELD) standards and English language proficiency (ELP) assessments that address some aspects of academic English (Abedi, 2007), along with federal requirements that hold states and districts accountable for ELLs' progress and attainment of ELP.

The development of ELD standards and assessments has, to some extent, addressed the gap between the language instruction that has historically occurred in ELL classrooms and the AE required for success in academic content areas (Abedi, 2007). However, policies focused on academic language are in their infancy; implementation of these policies is difficult to assess given the lack of clarity on AE and how ELLs best learn. The development of improved curricula and program services has been hampered by the lack of a comprehensive body of knowledge on AE and on the pedagogy needed to develop it within and across content-area domains. An important component in addressing the difficulties ELLs face is a deeper and more thorough conceptualization of AE that could inform the improvement of ELD standards and assessments and provide better guidance to teachers on how to support ELLs' development of AE.

Rationale

To date, the research that has been conducted to help describe AE is scattered across a number of different areas of inquiry and is of varying depth and quality, ranging from expert opinion and linguistic analysis that is not accessible to practitioners, to a very few descriptive studies of classroom practice. A review of the literature is needed to determine what is known and not known about the nature of AE,

instructional practices used to teach it, teacher preparation and training to improve instructional practice, and policies that support AE. This report is timely in that AE has been increasingly cited as a reason for gaps in achievement between ELLs and English-proficient students. It has also been the focus of professional development for teachers, the topic of numerous articles on and guides to instruction, and is beginning to appear in ELL teaching standards, and in teacher preparation, accreditation, and credentialing documents. Up to this point, the research that is available on AE has not been collected, summarized, and interpreted within one document. Nor has it been critically reviewed from the perspective of its implications for ELL instruction. This report—a review of the literature—brings together much of the current research and thinking on AE. While by no means exhaustive, it raises critical challenges for the field in defining AE and suggests areas for further inquiry.

Methodology

This section briefly discusses the approach used to conduct the literature review. A more detailed description of the methodology is given in Appendix A.

The collection of documents for the literature review was guided by four areas of inquiry agreed upon by the U.S. Department of Education and the contractor. These areas were: 1) defining AE; 2) AE teaching practices; 3) teacher preparation and training in AE; and 4) policies on AE in states with large populations of ELLs (Arizona, California, Florida, Illinois, New York, and Texas). Within each area, the review focuses on the K-12 setting. *Key* questions, originally provided by the U.S. Department of Education, were refined to help guide the search for relevant documents within the four inquiry areas. Table 1 lists key questions by inquiry area.

Table 1. Inquiry Areas and Questions Guiding the Literature Review

Inquiry Areas	Key Questions
Defining and operationalizing AE	How is AE in K-12 classrooms defined and operationalized? What additional research is needed in order to provide guidance on operationalizing AE?
AE teaching practices	What information is available on teaching AE to ELL students in K-12 classrooms? What additional research is needed to provide guidance on teaching AE to ELL students in K-12 classrooms?
Teacher preparation and training in AE	How are English as a second language (ESL)/bilingual and content teachers being prepared and trained to teach AE? What are the expectations for ESL/bilingual and content-area classroom teachers in teaching AE to ELL students? What additional research is needed to provide guidance on the preparation and training of ESL/bilingual and content teachers to teach AE?
State policies on AE	Do states provide any guidance on AE in state polices? If so, what type of guidance is provided?

A broad collection of documents was compiled for the review; information on the topic drawn from research published in professional journals, practitioner handbooks, policy documents, and from other sources that exercise due professional diligence in describing and discussing educational issues was included. The assessment of documents for inclusion in the report centered on: 1) the presence or absence of a clearly defined purpose, 2) the degree to which the research and other information discussed in the document matched the author(s)' purpose, and 3) the quality of the discussion of findings. Quantitative and qualitative studies as well as information on the range of expert opinions that exist on the topic of AE have been included. It is important to note that although AE is defined from different theoretical and research perspectives, the report does not privilege a particular definition or viewpoint.

There were several issues in conducting the literature review that may affect the application or interpretation of findings. First, there is a scarcity of research on AE. Eligibility for inclusion in the review was thus necessarily broad. Although highly relevant to the topics of interest, few of the documents reviewed represent quantitative or large-scale studies; or describe methods, populations, or settings in enough detail to fully assess the strength of the findings discussed.

Second, literature pertaining to the teaching of AE for all students was included when curricular or instructional implications for ELLs could be made. The decision to include this literature was made because there is no research at this time indicating that instructional methods for teaching AE to ELLs should differ significantly from methods used to teach other students who face similar difficulties in acquiring AE. It is important to note that the target of proficiency in AE is the same for all students.

Overview of the Report

The purpose of this report is to summarize and evaluate the literature on AE in order to provide an informed perspective to policymakers, researchers, and others interested in improving educational outcomes for ELLs. In addition, the report will be useful to practitioners who are interested in a comprehensive perspective on AE as it pertains to the education of ELLs.

The student population that is the primary focus of this report is ELLs, students for whom English is not their native language and who have not yet developed proficiency in English. These students may or may not be enrolled in ELD programs. The report also has implications for all students who struggle with learning AE.

The report is organized around three of the four areas of interest used to guide the literature review: 1) defining AE, 2) AE teaching practices, and 3) the preparation and training of teachers to support AE development. The fourth area of interest, state policies on AE, is discussed within the context of the preparation and training of teachers. Within each of the three main sections, the literature has been organized into those subsections that best reflect their main findings or purpose. In some cases, there may be overlap across subsections, i.e., a study may address both AE discourse and the language demands of the mathematics classroom.

Finally, the terms academic English and academic language are used interchangeably in this report and refer, in their broadest sense, to the language of schooling. The term academic literacy is also used in the literature, but in some authors' views may refer to a slightly different construct and thus is not used interchangeably with AE and academic language in this report. A glossary of terms used in the report is located on page ix.

Defining and Operationalizing[1] Academic English

Academic English is a complex concept that has been defined and operationalized from a variety of perspectives and for a variety of purposes. AE can be viewed as part of overall English language proficiency which also includes more social uses of language both inside and outside the school

[1] *Operationalize* in this context means to specify what AE is in sufficient detail to be able to teach and assess the construct for specific applications in and across content areas and grade levels. While AE is generally accepted as the language of school, as a register with identifiable lexical, grammatical, and discourse features, the features must be described with a level of detail that allows for the development of standards, teaching materials, and test specifications.

environment. It is referred to variously as a variety of English, as a register[2], or as a style, and is typically used within specific sociocultural academic settings. In the broadest sense AE refers to the language used in school to help students acquire and use knowledge (Bailey & Heritage, 2008; Chamot & O'Malley, 1994; Schleppegrell, 2004). It is developmental with trajectories of increased sophistication in language use from grade to grade, with specific linguistic details that can be the same or vary across content domains. Learners of AE fall along a continuum that includes nonnative speakers, speakers of nonstandard varieties, and native speakers with little exposure to AE.

Given this complexity, it is not surprising that AE is an evolving construct not agreed upon in the literature. Bailey and Huang (submitted) point out that "a plethora of conceptualizations have been put forth to define the AE construct at different linguistic levels from lexical to discourse (e.g., Bailey & Butler, 2002/3; Schleppegrell, 2001), as well as at various dimensions, from cognitive to sociocultural (e.g., Scarcella, 2003)." Whatever one's perspective on AE, there is consensus that students must be able to understand and use language in a variety of situations to be successful in school, though Valdes (2004) indicates that "much more work needs to be done by the profession in understanding the kinds of language that will result in school success" (p. 102). This section of the literature review focuses on the description of language use in school settings. The discussions that follow capture the diversity of approaches to AE by describing ways in which the construct is currently being defined. First, however, the challenges in defining AE are presented.

Challenges in Defining Academic English

There are at least three primary challenges to defining and operationalizing the construct of AE. First, varying perspectives on the nature of language and, specifically, AE have resulted in multiple systems for understanding the construct. Since researchers from different philosophies and educational backgrounds approach AE in very different ways, the range of conceptual frameworks and models vary from those with a primarily linguistic focus to those that emphasize the social context to those that emphasize use in specific content areas. Some of the work is extremely technical and requires a basic understanding of linguistics for the information to be accessible. The approaches are not mutually exclusive, but rather require those who are attempting to operationalize the construct to make choices for their specific situations. Depending on the goal—articulation of standards, curriculum development, test development—the focus or emphasis on language features and context will vary.

The picture is further complicated by the complex nature of the AE construct itself. In general, the linguistic elements that comprise the construct include discourse features such as language functions, grammar/structure, and vocabulary across the language modalities (listening, speaking, reading, and writing), and content areas (science, mathematics, language arts, history/social studies). In addition, the increased complexity of linguistic features and sophistication of language use from year to year through the grades are a part of the picture. It is the interaction of these elements within specific sociolinguistic, sociocultural, and cognitive settings that educators must understand for their work to be effective in helping students develop AE skills.

Finally, the nature of the information that is available varies in kind and completeness. A growing number of definitions and discussions about AE have appeared in the literature. However, as Bailey and Huang

[2] *Register* in this case refers to the difference between formal and informal uses of language in different social situations manifested especially through choice of vocabulary and grammatical structures. Formal registers typically reflect more sophistication and complexity in both. For example, AE is considered a more formal register that social English. The degree of familiarity between those communicating also plays a role in register choice.

(submitted) point out, few empirical investigations have attempted a systematic approach to describing the construct. Most notably, the work of Bailey and colleagues (Bailey, Butler, Borrego, LaFramenta, & Ong, 2002; Bailey, Butler, & Sato, 2007); Bailey, Butler, Stevens, & Lord, 2007; Bailey, Huang, Shin, Farnsworth, & Butler, 2006; Butler, Bailey, Stevens, Huang, & Lord, 2004); Schleppegrell (2001, 2004, 2005); and Short (1994) has provided initial methodologies and data for characterizing the AE construct that have implications for the education of ELL students. Others (e.g., Moschkovich, 2002; Snow & Uccelli, 2009) have provided insight through synthesis of the literature and examination of specific features and are helping the field gradually understand the scope of AE across grade levels from K through post-secondary, content areas, and sociocultural settings.

The next section provides discussions of approaches to defining AE from a variety of viewpoints. The range of perspectives highlights the challenges involved in developing a working definition of AE. While the focus here is on AE, it is important to keep in mind the broader language use context in which school-age children communicate. Doing so helps provide perspective on the role of AE in the ELL's acquisition of overall ELP.

Overview of Approaches to and Models of Academic English

This section begins with a review of the literature that establishes the emergence of the language of school as an additional register in children's developing linguistic repertoire. Although grounded in differing theoretical frameworks and often focused on disparate target learner populations, each approach illustrates how AE fits within a system of language use, sharing a recognition that the language of school exists, and that this language is foundational to academic access and success. The section concludes with a look at research that is beginning to identify linguistic features of AE.

Defining academic English as a specialized language register

In acquiring AE, students build on a language foundation that has been developing since early childhood in the home and broader cultural community (Butler & Stevens, 1997; Gibbons, 1998; Schleppegrell, 2004; Zwiers, 2008). In this section, we explore a range of frameworks that describe AE within the school context.

In his seminal work, Cummins (1980, 1981) characterized most of the language students bring to school as Basic Interpersonal Communication Skills (BICS) or social language. From that foundation, students develop broader language skills which he referred to as Cognitive Academic Language Proficiency (CALP). This early work by Cummins provided one of the first paradigms for thinking about AE. Cummins' approach was interpreted as a dichotomous view of language acquisition and use, though his later position (Cummins, 2000) stressed the simultaneous acquisition and development of both in school-age children with the distinction being in the degree of cognitive and contextual demands of language-use situations. In the literature, BICS was considered social language (SL) and CALP the precursor to AE, with BICS relying on contextual cues for transmitting meaning while CALP was thought to be more cognitively complex and thus less reliant on contextual cues for meaning. Zwiers (2008) captures the general understanding of the distinctions between SL and AE:

> Social language (BICS) tends to be less complex and less abstract, and is accompanied by helpful extralinguistic clues, such as pictures, real objects, facial expressions, and gestures. Social language is used to build relationships and get things done in less formal settings, such as the home, parties, sporting events, shopping, and so on. Academic language (CALP) tends to be complex and abstract, lacking extralinguistic support. A conversation with a friend about a recent sports event would involve much social language, whereas listening to a lecture on globalization would be more academic (p. 20).

In reexamining this focus on differences between SL and AE, critics have pointed out these characterizations are not sufficient to explain the complexities of language in school settings. Bailey (2007), for example, cautions against "believing that there is something inherent in social language that makes it less sophisticated or less cognitively demanding than language used in an academic context" (p. 9). Rather, she suggests that the differences should be considered as "differences in the relative frequency of complex grammatical structures, specialized vocabulary, and uncommon language functions" (p. 9).

On the surface SL often appears less complex grammatically and lexically due to the setting and nature of the exchange, but banter and seemingly casual conversation can hide communication goals that could, in fact, be quite complex. There are instances in which SL and AE are not so disparate. Taking a somewhat different view, Schleppegrell (2004) locates additional sources of the complexity of school language in the social experiences and knowledge about language that students bring to school. She cautions that a deeper awareness of the "cultural and experiential roots of knowledge about language use at school" (p. 16) can lead to a deeper understanding of challenges school language may pose for children from varying backgrounds.

Bailey and Heritage (2008) in their discussion of the language of school-age children broaden the conceptualization of school language use by breaking AE down further into *School Navigational Language* (SNL) and *Curriculum Content Language* (CCL), where SNL is the language students use "to communicate with teachers and peers in the school setting in a very broad sense" – the language of classroom management – and CCL is "the language used in the process of teaching and learning content material" (p. 15). The authors contrast SL, SNL, and CCL based on the following features: the purposes to which these language varieties are put, their degree of formality, the context of their uses, the context of their acquisition, the predominant modalities they utilize (e.g., listening, speaking, reading, writing), teacher expectations for language abilities across the three varieties, and grade level expectations (e.g., those set by standards, instructional materials, administrators) (pp. 15-17). This conceptualization captures the range and variety of language acquisition situations and use for all students, native English speakers and ELLs, and provides a potential framework to help educators address the role of language in school settings.

In exploring the use of AE in the classroom, Gee (2005) defines AE as a large family of "related social languages" (p. 21). It is important to note that Gee's use of *social language* differs markedly from that of Cummins or Bailey and Heritage. For Gee, social language refers to how language is used to establish "a socially situated identity and carry out a particular socially situated activity" (p. 20). Rather than characterize social language in terms of an entire discipline (e.g., the language of biology or chemistry), Gee relates it to the specific practices and activities carried out by users within particular subdisciplines (e.g., the language activities of a microbiologist doing microbiology).

Thus, it is at the level of subdisciplines (e.g., geometry within mathematics) that Gee identifies patterns of language use. In Gee's words, "different patterns or co-relations of grammatical elements…are associated with or map to particular social languages…associated with specific socially situated identities and activities" (p. 20). Gee indicates that within a subdiscipline there will be variations in language use by

modality (oral versus written language) and also distinctive uses of discourse markers[3] such as language functions.[4]

Moschkovich (2002) further explores the situated nature of AE in her examination of varying approaches to teaching mathematics, in particular focusing on shifting notions of the mathematical communication that is integral to mathematical learning. The approaches she discusses are, in fact, applicable across content areas. The first approach, tied to a conception of mathematics instruction as carrying out computations or solving word problems, simplifies the view of language learning as a focus on the vocabulary students need to learn to carry out these operations. The second perspective, based on a situational framework of language use, focuses on meaning making or, as Moschkovich puts it, a "shift in focus from acquiring words to developing meanings for those words" (p. 195). The third perspective, and the one she suggests more closely fits current theories of teaching and learning, is a situated-sociocultural view centered on student participation in instructional discourses (e.g., negotiating meaning, explaining solutions).

Scarcella (2008) discusses both the types of language and the types of cognitive knowledge, skills and strategies students must have to do well in content classes. She includes the notions of the *Foundational Knowledge of English* and *Essential Academic Language* (EAL), as well as SNL, in her discussion of AE and ELLs. The foundational knowledge of English refers to the basics of the English language, in essence, the basic skills important for communication both outside and within the school setting (e.g., knowing how to read and write, how to produce key types of sentences, how to use verb tenses, et cetera). In addition, basic vocabulary is critical; a large number of commonly known words must be acquired. EAL consists of "the basic features of academic language that are used *across all content areas*" (p. 6) including academic words, complex sentence structures, and discourse features that provide cohesion. Scarcella argues that prerequisite to the teaching and learning of subject-specific language, ELLs should have a foundational knowledge of English, should know SNL, and would benefit from already controlling EAL.

In her discussion of the importance of cognitive knowledge and skills Scarcella (2008) stresses the importance of prior knowledge around basic concepts (e.g., animals and their characteristics) and the associated language in acquiring new content-specific language and concepts in content classes. In her view, the language skills, cognitive knowledge and strategies are interrelated, and all are essential for school success. Scarcella's conceptualization, like that of Bailey and Heritage (2008), is broad with an emphasis on the language and cognitive skills that should ideally be developed prior to the study of subject-specific content language. Yet, as Zwiers (2008) argues, students also learn and need to learn a great deal of language and thinking as they study content, particularly in upper grades.

Gibbons (1998) in her work with 9- and 10-year-old ELL students stresses the *intertextual* nature of classroom language, i.e., the interrelationship of the language modalities—listening, speaking, reading, writing—in learning content material. Classroom activities frequently involve multiple language modalities or intertextual relationships. As Gibbons points out:

[3] *Discourse markers* in this context represent a range of linguistic devices used to signal intentions of language users in connected text, either spoken or written. They mark direction of topic development and provide connectivity within and across texts, e.g., however.

[4] *Language function*, one type of discourse marker, refers to the effect or purpose of an utterance or text as it is used in the communication of a message, for example, "describe" or "make a comparison." Functions can be realized by a number of grammatical forms.

> A wide range of intertextual relationships exist in all classrooms, between, for example, what a teacher says and what students are expected to read; what students listen to and what they are expected to write; the print displayed in the classroom and the writing that students are to do; the discourse of the lesson and the texts students are expected to work with for homework… (p. 116).

To develop curricula for students who have difficulty linking language across modalities, Gibbons argues that a model of language is needed that is *discourse and text-based* and not focused on grammatical structures per se, though form is an integral component of any language model. As do others (e.g., Christie, 2002; Schleppegrell, 2004), Gibbons draws on Halliday's (1994) systematic functional linguistics[5] and Halliday and Hassan's (1985) register theory to establish the importance of context in the teaching/learning of AE. Gibbons looks at four texts that vary by modality (both written and spoken), time (present and past), and level of formality (encyclopedia text and student writing) to illustrate how linguistic features change from situation to situation as context dependency changes. The texts show a progression of specific language features that make the texts more or less context dependent as the communicative situation shifts. Gibbons work helps establish the critical nature of the differences in classroom contexts and provides linguistic examples that reflect those differences.

Snow and Uccelli (2009) provide a recent inventory of social and academic uses of language that draws on linguistic features already identified in the literature as a starting point. They suggest organizing linguistic features into the following categories: interpersonal stance, information load, organization of information, lexical choices, and representational congruence (i.e., how grammar is used to depict reality) with specific vocabulary and grammar structures necessary to actualize the features. Central to their approach is the notion that "communication goals are seen as driving decisions about specifics of expression" (p. 122). They offer a pragmatic heuristic based on context and social interaction as the core for characterizing AE that captures the specifics of lexicon, grammar, and discourse features. Like Scarcella (2008), Snow and Uccelli include cognitive domains in their discussion of AE performance.

The discussion above focused on theoretical frameworks as an approach for conceptualizing AE. Next the emphasis shifts to the few empirical studies available that help identify the kind of language that should be captured in characterizations of AE.

Research on the linguistic features of academic English

The studies summarized in this section have systematically explored language use in various academic classroom contexts. Each focuses on different sources of AE, such as classroom talk or academic texts, describes different grade levels and content areas, and utilizes different approaches to the task of specifying the features of the AE construct. Despite the differences, these studies provide evidence for both the existence of AE and the forms AE may take in providing access to academic content.

Scarcella (2003) proposes a framework for analyzing the features of AE that K-12 students must develop for success at the post-secondary level. The framework consists of five linguistic components: phonological, lexical, grammatical, sociolinguistic, and discourse. Within each component, Scarcella provides an inventory of the linguistic features that enable students to use language for complex academic tasks. Her examples highlight the language gap for students who have not yet developed AE and

[5] *Systemic functional linguistics* refers to a theory of language that explains how the meaning of linguistic forms is constructed from the use of language within specific social contexts. It describes how and why language varies depending on the language user(s) and the social setting.

emphasize the need for helping students master a fuller range of language proficiency. Table 2, based on Scarcella (2003), provides a synthesis of the linguistic features of AE Scarcella describes.

Scarcella's framework of components and features represents an analysis of linguistic competence in each of these areas rather than empirical research on AE in the classroom or as used in academic tasks. This theoretical work foreshadows much of the empirical work that follows.

Table 2. Synthesis of AE Linguistic Features Identified in Scarcella, 2003

Component	Linguistic Features
Phonological	Knowledge of the phonological features of AE, including stress, intonation, and sound patterns Examples*: demógraphy, demográphic, cádence, generic* Knowledge of graphemes (symbols) and arbitrary sound-symbol correspondences
Lexical	Knowledge of the forms and meanings of words in three categories: • General words used across academic disciplines as well as in everyday situations outside of academic settings Examples*: already, busy* • Technical words used in specific academic fields Examples*: fulcrum, pivot* • Nontechnical academic words used across academic fields Examples*: assert, research* Knowledge of the ways academic words are formed with prefixes, roots, and suffixes, the parts of speech of academic words, and the grammatical constraints governing academic words Example*: investigate*
Grammatical	Knowledge that enables ELLs to make sense out of and use the grammatical features (morphological and syntactic) associated with argumentative composition, procedural description, analysis Knowledge of the grammatical co-occurrence restrictions governing words; use of the reference system of pronouns and comparatives Knowledge of expanded features of the verb system, including word families, common grammatical collocations, and the modality system Knowledge of grammatical metaphor Knowledge of more complex rules of punctuation
Sociolinguistic	Knowledge of an increased number of language functions. The functions include the general ones of ordinary English such as apologizing, complaining, and making requests as well as ones that are common to all academic fields such as signaling cause and effect, hypothesizing, generalizing, comparing, contrasting, explaining, describing, defining, justifying, giving examples, sequencing, and evaluating Knowledge of an increased number of genres, including expository and argumentative text Knowledge of linguistic features that promote cohesion, including reference, substitution, ellipsis, conjunction, lexical cohesion, parallel structure, and sequencing of verb tenses
Discourse	Knowledge of the discourse features used in specific academic genres including such devices as transitions and other organizational signals that, in reading, aid in gaining perspectives on what is read, in seeing relationships, and in following logical lines of thought; in writing, these discourse features help ELLs develop their theses and provide smooth transitions between ideas, thus creating coherence

Bailey and colleagues operationalized the AE construct through an empirical approach that looked at multiple sources of AE use in mainstream, upper-elementary classes (Bailey et al., 2007; Bailey et al., 2002; Butler et al., 2004). The goal was to begin to articulate the AE target that students (native speakers and ELLs) must achieve to function well in content-area classes. Impetus for the work came from the needs of states to comply with the No Child Left Behind Act (2001), especially in the area of language testing for ELLs. Most existing language proficiency tests focused primarily on social language and in doing so did not provide a complete picture of a student's English language ability (Butler, Stevens, & Castellon, 2007). There was a need to document the type of English students encountered in the classroom and on content assessments so that this information could serve as a basis for a new generation of ELP tests.

Bailey and Butler (2007) describe the framework that provided the evidentiary basis for the undertaking. The overall effort included classroom observations, along with analyses of ESL and content standards, teacher expectations, and textbooks. Bailey et al. (2007) report on two studies which were part of the larger project that looked at the use of AE in mainstream content classes. The intent was for the documentation of AE from the studies to serve as a baseline for the development of language proficiency tests and for curricula materials. The first study looked at the oral language of teachers and students in fourth- and fifth-grade science classrooms. The second study examined the textbook language at the fifth grade for the content areas of mathematics, science, and social studies. Both studies focused on the functional use of AE. The results taken together suggest the beginnings of a functional paradigm, based on empirical evidence, for talking about AE.

Also focusing on the language needed for accessing content in schools, Schleppegrell (2004) examines how students construct meaning in school via the grammatical choices they make in responding to and creating oral and written texts. From this perspective, students are active language users who require explicit knowledge about language use in different contexts and for varying purposes in order to be effective in completing academic tasks in the school environment. Such language use is developmental in nature, increasing in linguistic challenges as students progress through school, learning how "to use language in new ways" (p. 1). Drawing on a systemic functional linguistics perspective (Halliday, 1994), Schleppegrell examines how grammatical and lexical choices are situated within the context of language use. Variation in language emerges from the choices users make of "field (what is talked about), tenor (the relationship between speaker/hearer or writer/reader), and mode (expectations for how particular text types should be organized" (p. 46). Schleppegrell illustrates how grammar and context are related within each of the three variables. The range of possible linguistic resources within the variables underscores the need to go beyond a focus on content alone to understand the meaning of a particular text or communication.

Much of the literature about AE focuses on the importance of vocabulary as a component of AE. Utilizing principles from corpus linguistics (samples of authentic texts), Coxhead (2000) developed and evaluated an academic world list (AWL), providing evidence that academic texts can be characterized to some degree by specialized vocabulary. To define what counted as a word in order to establish selection criteria, Coxhead drew on research that suggests comprehension of inflected or derived items within a word family requires little additional processing effort if the base word is known and learners understand and control basic word-building processes (Bauer & Nation, 1993). Thus, Coxhead used word families as the unit for selection. From a corpus of 3.5 million words drawn from written academic texts, Coxhead compiled a list of 570 word families common to a wide range of academic texts encountered by university students. Word families were selected based on 1) Specialized occurrence: not being included in the first 2,000 most frequent occurring words in English; 2) Range: occurring at least 10 times in each of the four main sections of the corpus (arts, commerce, law, science) and in 15 or more of 28 additional subject areas; and 3) Frequency: occurring at least 100 times in the corpus. AWL can be divided into ten rank-ordered sublists of word families. Samples of headwords from word families in the first subgroup include: analyse, approach, concept, constitute, data, economy, indicate, interpret, principle, significant, theory, and vary. While not addressing spoken language, the AWL provides a specialized academic vocabulary that broadly covers written academic texts across a number of subject areas. Originally developed for ESL university students, the AWL contains many of the words that appear in academic texts well before the post-secondary level, especially at the middle and high school levels. Thus the AWL can be a useful resource in working with the lexical component of AE.

Academic English in the Content Areas

No summary of the research on defining AE would be complete without mention of studies that have focused on AE in specific content areas. Much of the impetus for examining AE has come from educators in the disciplines who realize the critical role language plays in acquiring content knowledge. AE is

gradually becoming a central theme in content-area classes such as mathematics and science, especially when those classes have large numbers of ELLs. As Snow and Uccelli (2009) point out:

> Formulating instructional approaches to academic language is necessary not just for achievement in the domains traditionally associated with language (e.g., literature study, English language arts) but also for achievement in math, science, and other areas where all-purpose academic language forms the core of content-area-specific language. Designing instruction for academic and discipline-specific language, however, requires having a convergent view of what academic language involves, how it should be conceptualized, where its boundaries are, and how it might be assessed (pp. 114-115).

One such study of content area AE illustrates the insights about content-specific language to be gained from such research. In looking at AE across several content areas, Bailey et al. (2007) conducted descriptive analyses of mathematics word problems and extended texts from science and social studies. The types of analyses included sentence length; number of words, sentences, and paragraphs in the selection; and lexical, grammatical, and discourse analyses. The language functions in this study were categorized as dominant organizational features, providing structure to the larger selection, or as a supporting organizational feature, embedded within a dominant feature (e.g., a comparison, serving as a supporting feature, could be embedded in an explanation). A cross-content area profile (Table 5.4) was compiled of the linguistic features examined in the textbook analyses (Bailey et al., 2007, pp.135-136). The results provide a comparison of the appearances of specific features in the texts from the three content areas. These data were combined with the information from the classroom observation study to yield a content framework that provides a working model of AE in terms of vocabulary, grammar, and language functions across mathematics, science, and social studies at the upper elementary level.

While the amount of empirical data available on the role of AE in specific content areas is still limited, studies in three content areas—science, mathematics, history/social studies—provide initial insight into how AE functions in content classrooms. A review of these studies can be found in the next section of this report. In order to provide a convergent view of AE as suggested by Snow and Uccelli (2009), analyses of linguistic features characteristic of content-specific AE have been paired with reviews focused on instructional features of classrooms within each content area.

Summary of literature on defining and operationalizing academic English

AE is a dynamic concept that will continually evolve as educators and researchers better understand the use of language in school settings. As described in the first part of this literature review, a number of theoretical frameworks have emerged to capture the complexity of the construct. While varying in specific details, the common themes of *context, multiple varieties of language,* and *integration of language features and modalities* are central to most of the frameworks. The few empirical studies available help identify the kind of language that should be captured in characterizations of AE.

As this review has also illustrated, varying notions of teaching and learning impact how researchers and practitioners envision the nature and role of AE. In her review of three approaches to describing the language needs of ELLs in school settings, Moschkovich (2002) highlights this connection, suggesting that views of language and language learning are intrinsically tied to notions of what it means to learn and teach the subject content. Capturing a range of variation in theoretical perspectives, she links the complexity of learning language to specific frameworks for teaching content, in this case mathematics.

The work reported in this section leaves no doubt about the importance of AE in a student's school success. What is needed now is a systematic approach to describing the construct so that educators have access to details of language use necessary to support students in their acquisition of AE.

Recommendations for Research on Defining and Operationalizing AE

Mostly likely there will never be a single definition of AE, but a broad national framework that captures the many dimensions of AE could serve as a foundation for states to use in operationalizing AE for their own purposes. As a point of departure, the framework could be envisioned as a series of matrices for each content area based on empirical evidence that provides specific linguistic detail (vocabulary, discourse, syntax/grammar) across the dimensions of (a) grade level or grade cluster and (b) modalities/domains (listening, speaking, reading, writing). Companion documents would demonstrate the interrelated nature of the linguistic features across the dimensions and provide guidance for states in how to use the framework to review and refine their state's system of ELD standards, curricula, and assessments. The development of such a framework would draw on the collaborative work of educators representing a range of expertise, including linguistics and the content areas as well as curriculum and test development, all sharing a common vision about the need for practical guidance based on empirical evidence. The framework would be a living document that evolves as new evidence becomes available and would be an invaluable resource in shaping a national research agenda on AE.

Additional research is needed in several areas to help provide the structure and detail for such a framework. Specifically, studies are needed in mainstream content classrooms that exemplify best practices across content areas and grade levels. Research that captures the language teachers use in teaching science concepts or mathematics operations and that students are learning to use in conducting experiments, solving problems, and discussing historical events will provide content for an AE framework of oral discourse. To examine the language in texts students must read and produce, studies are needed that employ methodologies from discourse analysis and corpus linguistics, again across content areas and grade levels. Also, careful descriptions of classroom contexts, including assumptions about teaching and learning will provide a basis for interpreting and comparing data sets. The results of future research on AE will be more accessible to ELL and content teachers if incorporated in a framework such as the one proposed here.

Academic English Instruction

Overview of the Academic English Instruction Section

As discussed above, the literature on AE illustrates key differences in how AE is understood, defined and described. AE has been contrasted with everyday language, equated with academic vocabulary, viewed as one of a continuum of social languages, and depicted as a foundation for developing one or more of the "specialized registers that serve the participants in business, scientific, political, and research fields" (Zwiers, 2007, p. 94). These different perspectives defining AE have significance for both research and instruction; they influence our understanding of how to teach AE as well as our understanding of the level of AE necessary for academic success.

This section explores these different perspectives, beginning with a discussion of instruction that focuses on three separate aspects of AE (academic vocabulary, grammar and discourse structures). Subsequent sections address AE instruction within and across content areas (science, mathematics, social studies), and patterns of AE discourse and classroom interactions. The section concludes with a summary of findings and recommendations for research.

Instruction Addressing Individual Features of Academic English

One of the implications for instruction addressed in the literature is the importance of teaching essential features of AE, including the academic vocabulary, grammar and discourse structures common to specific content areas. Instruction in these features is of special importance to ELLs, particularly those with limited background in AE (e.g., Meltzer & Hamman, 2005). The literature reviewed differs in the emphasis given

to each. In keeping with much of the literature reviewed, grammar and discourse features are discussed together in this subsection.

Academic vocabulary

The AE feature most addressed in the literature reviewed is academic vocabulary. Academic vocabulary consists of words students must comprehend in order to access the concepts associated with a particular discipline, and also use in order to display their acquisition of these concepts. One way to conceptualize academic vocabulary is in terms of tiers or categories. A commonly accepted classification system is the one first developed by Beck, McKeown, and Kucan (2002), and later adapted (e.g., Calderón, August, Slavin, Duran, Madden, & Cheung, 2005). It frames academic vocabulary according to three tiers. The first tier is non-academic, conversational vocabulary such as flower or sleep; the second consists of general academic words such as however or illustrate; and the top tier is composed of content-specific, technical vocabulary such as organism or rectangle. Stevens, Butler, and Castellon-Wellington (2000) offer a similar example of a vocabulary-classification scheme that uses different labels: high frequency words (Tier 1), non-specialized academic words (tier two), and specialized academic words (Tier 3). Researchers have adopted other labels, such as brick and mortar words (Dutro & Moran, 2003) and content-obligatory and content-compatible words (Snow, Met, & Genesee, 1989) to describe the complexities of academic vocabulary development.

Importance of vocabulary instruction

Recent research on academic vocabulary emphasizes the importance of instruction in general and content - specific vocabulary, including the multiple meanings of words within and across content areas, and explicit teaching of word morphology and word origin. According to multiple authors (e.g., Bailey, Butler, Stevens, & Lord, 2007; Calderón et al., 2005) frequently neglected in both language and content instruction are Tier 2 words, also referred to as general academic vocabulary. These words are used across academic disciplines (e.g., conclusion, evidence, represent) and often have everyday counterparts, such as ending instead of conclusion (Calderón, 2007). The literature suggests that this general academic vocabulary is critical in order for students to understand the concepts associated with academic content, and demonstrate their understanding to others.

Snow (2008) provides the following justification for focusing on Tier 2 words with students. First, because Tier 2 words cross over into various fields, they take on multiple meanings with minute and nuanced differences. The literature has highlighted the importance of making explicit the multiple meanings of words (e.g., Adams, 2003). This, and the fact that Tier 2 words also only rarely occur in casual conversation, make acquisition more complex and instruction more necessary. Secondly, Tier 2 words are used to describe and explain Tier 3 words, so they are key to understanding more specialized vocabulary and overall "success in understanding oral and written scientific discourse" (p. 73).

In addition to Tier 2 words, the literature emphasizes the importance of word study, explicit instruction in the structure and origin of words. Aspects of academic vocabulary that the literature suggests are important for teachers to understand include homonyms and word derivations, which involves knowledge of roots and affixes, and how these units work to change the meaning and usage of words (Calderón et al., 2005). According to Wong Fillmore and Snow (2000), students can learn words faster and more efficiently if they are instructed in the relationships between word forms, thus teachers should know how the lexicon is structured and acquired.

An intervention study that illustrates the effectiveness of word study in developing AE is reported by Calderón, 2007 (also discussed in August, Carlo, Dressler, & Snow, 2005). The report describes results of a six-month academic vocabulary treatment based on the Success for All model, a whole-school reform model that includes a reading, writing, and oral language development program. Study participants included 300 bilingual (English-Spanish) third-graders across eight elementary schools in El Paso, Texas. In each

school, students received 90 minutes of reading instruction per day, including 30 minutes focused specifically on academic vocabulary: pronunciation, meanings, and English-Spanish cognates. The vocabulary used in the lessons was selected from school texts, and classified according to a process adapted from the three-tier model developed by Beck et al. (2002). Calderón and colleagues further classified target words with respect to the following criteria: 1) concrete or abstract; 2) presence of a Spanish cognate; 3) polysemous within a certain content area; and 4) utility across content areas. Instructional activities were then assigned to word groups, depending on their perceived complexity for an ELL.

According to Calderón (2007), findings indicated that the intervention had a positive effect on academic vocabulary: post-test scores on the English versions of the Woodcock Language Proficiency Battery-Revised (WLPB-R)[6] were significantly higher for the experimental group than those of the control group in three of four sections. Findings also indicated that even though the treatment included no instruction on Spanish language, only references to Spanish cognates, the ELL's scores slightly improved on the Spanish test as well.

Calderón (2007) also reports on similar findings from a quasi-experimental study of monolingual and bilingual (English-Spanish) elementary-level students. The researchers (Carlo, August, & Snow, 2005) implemented a word study intervention for 254 fifth-grade students in nine classrooms located in three states (California, Virginia, and Massachusetts). Instruction consisted of 30-45 minute vocabulary lessons, four days a week for four months. Spanish-speaking students were given Spanish previews of classroom texts and instruction in English-Spanish cognates. The pre- and post-tests measured breadth and depth of vocabulary knowledge, including multiple meanings, morphology, and text comprehension. At the end of the school year, the ELLs showed gains on vocabulary and reading comprehension, and, as a whole, all students showed significant improvement in knowledge and use of vocabulary meanings.

Principles of effective vocabulary instruction. Other principles of effective academic vocabulary instruction are emphasized by several authors, including Adams (2003), Carnine and Carnine (2004), Horowitz (2008), Irujo (2007a), and Scott, Jamieson-Noel, & Asselin (2003). As one example, Irujo (2007a) argues for the importance of pre-teaching academic vocabulary. Irujo's viewpoint is that teachers should begin lessons by introducing not only the main ideas of the lesson, but also the few words which are necessary to understanding the basic concepts presented. In this way, key vocabulary is pre-taught within context while the bulk of the new words are taught as instruction becomes more detailed. The author lists three other instructional keys for teachers: use previously taught words throughout instruction and structure activities so that students must use them; teach authentic, non-simplified academic vocabulary; and teach how to use new words and structures in addition to meanings.

Principles of quality instruction in academic vocabulary were also emphasized in a study of 23 self-contained classrooms of fifth, sixth and seventh-graders in Canadian public schools (Scott et al., 2003). According to the authors, precise use of vocabulary is a defining feature of AE, along with knowledge of how words are used and grammatical accuracy. Observations were conducted over three days in each of the classrooms; classrooms included a cross-section of learners in terms of geographic area, socioeconomic status, and ELP. As part of the study, the authors examined: 1) the time spent on vocabulary instruction; 2) the format of instruction, including individual work, small group work, or whole class instruction; and 3) instructional methods. Vocabulary instruction was defined as "every instance in which word-level

[6] The *Woodcock Language Proficiency Battery-Revised (WLPB-R)* is a set of individually-administered tests of English for measuring abilities and achievement in oral language, reading, and written language. It is suitable for people of all ages who are non-native speakers of English.

knowledge was a focus of instruction" (p. 273). Instructional quality was assessed using principles identified by Blachowicz and Fisher (2000): support students in personalizing word learning, immerse students in words, provide repeated exposure to words, encourage students to make connections between the words they know and the words they are learning. Few instances were observed of instruction demonstrating these principles of quality instruction, with the exception of providing multiple exposures to words. The authors conclude that "[e]ven in classrooms with rich contexts, teachers do considerable mentioning and assigning and little actual teaching" (p. 282). As a result, the amount and type of vocabulary instruction occurring in schools is not necessarily adequate for ELLs or other students with limited proficiency in AE. Scott et al. recommend a focus on both curriculum and professional development that illustrates research-based vocabulary instruction.

Another implication from the literature is that a focus on academic vocabulary alone is not sufficient as features of AE include not just specialized vocabulary, but also complex grammatical structures and discourse patterns (Carr, Sexton, & Lagunoff, 2006; Zwiers, 2008); certain habits, behaviors and cognitive features such as the ability to think critically (Merino & Scarcella, 2005; Snow, 2005); and how to use language within particular AE functions (Carrier, 2005; Echevarria, Short, & Powers, 2006; Schleppegrell, 2005). In addition, the literature suggests that instructional practices have been shaped by simplistic views of AE, and a narrow focus on individual language features; in particular, content-area vocabulary (e.g., Bruna, Vann, & Escudero, 2007; Moje, 1995).

AE instruction in academic vocabulary was part of a larger research project focused on how secondary teachers define and teach AE (Bruna, Vann, & Escudero, 2007). The authors describe findings from a sheltered science class of ninth grade ELLs. One of the findings reported by the authors is that, although AE was a primary instructional focus, it was defined only as academic vocabulary. Classroom observations indicated that the grammatical and discourse features of language were neither modeled nor taught, and students were not engaged in the language of science beyond the lexical level. The authors conclude from their analysis that a narrow focus on academic vocabulary ultimately limits ELLs from "the very linguistic input and output they need in order to acquire the language of science" (p. 51). Moreover, by equating academic language with academic vocabulary, students were not given sufficient opportunities to produce extended discourse around academic content, potentially limiting their ability to fully understand and interact in the discipline of science.

In a like vein, Moschkovich's 2002 analysis of mathematics discourse and bilingual learners suggests that when teachers emphasize the acquisition of mathematics vocabulary, their instruction focuses on translating traditional word problems from English to mathematical symbols. On the other hand, when teachers emphasize the differences between everyday and mathematical linguistic registers, their instruction supports students in using more precise, mathematics-specific language.

Although not focused on ELLs, conclusions from Moje's ethnographic case study of the potential impact of teacher talk on student behavior (Moje, 1995) were similar: A rigid emphasis on AE as academic vocabulary has the potential to inhibit AE learning. In the high school chemistry class observed, the teacher provided opportunities for students to use scientific language and identified herself and her students as scientists. These practices "created a feeling among students that science learning required a commitment over and above much of their other schoolwork" (p. 362), and allowed the teacher "to concentrate more on teaching content material and less on classroom management" (p. 367). However, the effect of the practices may not have been as the teacher intended; students were observed to read verbatim from text and notes, and to equate the ability to understand and use science vocabulary with the task of being a scientist.

As described thus far, the literature on academic vocabulary instruction has several common emphases, including ways of identifying and classifying essential words, the importance of previewing and pre-teaching as a way to connect new understandings to familiar words, and explicit word study and practice

across contexts. The literature also "provides a cautionary example of what can happen" when AE instruction is "driven by a simplistic approach" (Bruna, Vann, & Escudero, 2007, p. 52) such as an overemphasis on vocabulary. Missing from the literature reviewed are findings that demonstrate how effective academic vocabulary instruction is implemented and sustained in school settings.

Grammar and academic discourse/language functions

Two other features of AE emphasized in the literature, although to a lesser extent than academic vocabulary, are the grammar and discourse structures of language. Wong Fillmore and Snow (2000) and Schleppegrell (2001, 2004), discuss the importance of teachers, both ELL and content area, knowing the linguistic features and discourse structures of their academic disciplines as they relate to the AE tasks required by students. Equally important is for teachers to be able to analyze the discourse structures and rhetorical devises that are prevalent in texts from their discipline, and provide explicit instruction in these structures and devices within the context of subject area instruction (Wong Fillmore & Snow, 2000). The literature described in this subsection provides information that addresses both grammar and AE functions.

From a traditional linguistic perspective, grammar refers to the structure and arrangement of words in phrases and sentences within written discourse. A sociocultural or functional linguistics (SFL) perspective, in contrast, views grammar as "a dynamic system of linguistic choices that students learn to use to accomplish a wide variety of social, academic, and political goals in and out of school" (Gebhard, Harman, & Seger, 2007, p.421). Each of these perspectives is represented in the reviewed literature.

Discourse, too, is represented in different ways in the literature, referring broadly to any extended piece of language beyond the sentence level as well as to the typical verbal and written interactions within particular disciplines. The literature reviewed primarily addresses one aspect of discourse, academic language functions (AE functions). According to Bailey, Butler, Stevens, and Lord (2007), an AE function refers to the language associated with academic tasks and purposes. "Academic purposes include navigating written texts, asking and answering informational questions, asking and answering clarifying questions, relating information, comparing, contrasting, explaining cause and effect, justifying, drawing conclusions, summarizing, evaluating, persuading, and conducting research" (Dutro & Moran, 2003, p. 233).
A case study conducted by Schleppegrell (2004) provides an example of the kind of teacher knowledge needed for the explicit teaching of grammar and AE functions within a content area.

In order to teach two different types of science writing (written procedures for conducting an experiment and a written explanation of the results of an experiment), the teacher compared and contrasted the features of each, including the grammatical structures that would be necessarily included within an explanation text. Part of this explicit teaching is pointing out to students that discourse markers, such as because and for example are indicators that an explanation is occurring. Schleppegrell proposes that all teachers who work with ELLs should have the kind of linguistic and practical knowledge that allows them to help students see how grammatical choices lead to differences in the ways that ideas are portrayed in texts.

Grammar and discourse structures critical to student development of AE are identified in a review of three text types commonly taught in English classes in Australian schools (narrative, literary critical, and opinionated texts). The goal of the review was "to develop some measures by which the nature of students' control of written language must change if they are to achieve the kinds of advanced literacy that participation in a complex early 21st century will require" (Christie, 2002, p. 64). As Schleppegrell (2004) does in her work on AE, Christie draws on systemic functional linguistic (SFL) theory (Halliday, 1994) in building her argument for the criticality of abstraction, generalization, and argument in the development of advanced literacy.

While she does not use the term AE, the types of language use captured in the texts she examines corresponds to descriptions of AE in the writing modality. She looks at seven texts, six of which came from

primary and secondary-level Australian students who were native and non-native speakers of English; one text came from a newspaper in Melbourne. All texts (with the exception of the newspaper text which was not judged) were judged as good by teachers. Although the sample size is small, the detailed descriptive analyses yield initial measures of "developing success in writing" (p. 64). These measures are: control of reference, control of theme, growing facility with abstractions, greater uses of processes of being…realized in the verb to be, growing facility in creating elaborate nominal groups, the use of circumstance (e.g., prepositional phrase to create the circumstance of place or of time such as in the store window or once upon a time).

Another study reviewed (Snow & Uccelli, 2009) illustrates the potential challenges for students when explicit instruction in grammar and AE functions is not provided. The study involved a classroom intervention to help a diverse group of 7th grade urban students acquire general academic vocabulary. To determine the effectiveness of the intervention, students were asked to write short argumentative essays at the end of each week that included the academic vocabulary studied. No explicit instruction in constructing an argumentative essay was given. Analysis of the student essays involved comparing the linguistic features of the students' writing with those of an adult version on the topic. This analysis uncovered a number of AE features not present in the student writing. Features missing from the student writing included, among others, lexical density (i.e., packing a lot of information into a few words); the use of low-frequency words such as enhance and transmit; modal verbs such as would or might; connectives such as whereas or if; words that signal a detached stance (e.g., some would argue…, others contend…); and elaborate noun phrases (e.g., a primary goal of education) (Snow & Uccelli, 2009).

Although limited, the literature reviewed in this subsection emphasizes the interrelationship of grammar and AE functions, and the importance of teaching those structures that are required in specific disciplines. Expert opinion in this area argues for teachers who are knowledgeable about how these features of AE are used to support particular AE functions common to specific disciplines. Classroom observations provide some support for this opinion and illustrate the ways in which grammar and discourse structures may be taught. However, this small set of documents does not offer enough evidence to conclude that the recommended teaching practices will lead to gains in AE. The next subsection further explores the AE students are called upon to understand and produce in different school settings.

Conceptualizations and Instruction of Academic English across and within Content Areas

Two contrasting focal points emerge from the literature reviewed for this subsection. The first considers AE across the modalities (listening, speaking, reading, and writing) in relation to all content areas, and describes the AE demands common to all academic coursework. The second considers AE in light of unique features within content areas, and the linguistic demands upon students that are dependent upon content area.

Academic English demands across modalities and content areas

Among the first group are two studies of AE writing, one focused on elementary level students and one on secondary level students. Gebhard et al. (2007) provides an example of a teacher who led her class of fifth-graders, including several ELLs, through the process of transforming their own conversational wording into academic writing, based on the principles of systemic functional linguistics. The class composed formal letters to the school principal to persuade him to reinstate recess time, which had recently been cut. The project began with the students writing or drawing about their feelings regarding the change. The instructor then presented models and mini-lessons on appropriate sentence patterns and vocabulary for a formal letter, and guided students in implementing the new structures (e.g., connector words, modal verbs). After producing an initial draft, students met individually with the teacher to discuss their choices in syntax, lexicon, and formatting, and later rewrote their letters. When the principal responded by formal letter that recess would be reinstated, the students were not only able to recognize AE patterns in his letter, but were also able to experience authentic results from appropriate academic discourse.

Echevarria, Short & Powers (2006) report on a very different kind of study of academic writing, one of a series of investigations conducted for the Center for Research on Education, Diversity & Excellence (CREDE) between 1996 and 2003. In the study described, the authors examined the effect of a sheltered approach to language instruction, the Sheltered Instruction Observational Protocol (SIOP), on one aspect of AE, an expository writing task for ELLs in grades 6-8. Research methodology reported by the authors followed a quasi-experimental design: Academic writing achievement was measured prior to and following intervention and comparison classes. The pre- and post-test writing samples were collected by the researchers, using the writing assessment from the Illinois Measurement of Annual Growth in English (IMAGE). The assessment was chosen to approximate "the type of academic task that ELLs are regularly asked to perform in standards-based classrooms" (p. 204). Overall results indicated that the group taught using the SIOP model "made significantly better gains in writing than did the comparison group" (p. 205). The authors conclude that the consistent and systematic implementation of the features of instruction found in the SIOP model was effective in improving ELL's expository writing achievement.

AE reading and writing across content areas is addressed in one chapter of strategies ELLs in upper elementary and secondary classrooms can learn in order to access academic content (Kinsella, 1997). The author argues that along with a more general ability to study and learn students need to know how to read a textbook chapter or take notes on their own, answer an essay question or complete other reading and writing tasks. She emphasizes that this "proficiency is primarily developed through extensive reading in a variety of academic contexts and through years of repeated exposure to academic terminology during class discussions, lectures, cooperative tasks, and homework assignments" (p. 49). For ELLs who do not have this prior knowledge and experience, and who have "inefficient or nonexistent academic strategies" (p. 54), she provides examples of ways to teach academic skills, including several focused specifically on AE:

- using a dictionary, taking notes
- genre-specific reading skills such as text organization and features
- model/practice pre-reading of textbook chapters
- vocabulary study cards

Included in the literature reviewed are approaches that consider AE instruction across all four domains (AE listening, speaking, reading, writing) and can be implemented across content areas**.** One of the more comprehensive descriptions is presented by Horowitz (2008) as part of a guide to second language teaching and learning in grades K-adult. The author argues that content-area classrooms provide an ideal environment for the AE development of ELLs because there is a natural connection between language use and learning academic subject matter: In content-area classrooms, language input is contextualized, enhancing the negotiation of meaning between teacher and student. According to the author, fully supporting the development of AE in content-area classrooms is facilitated by 1) explicit emphasis on language and content through the establishment of language learning objectives; 2) providing appropriate listening and reading input through individualized reading materials, clear articulation, use of high-frequency vocabulary and simple sentence structures; and 3) focusing on academic literacy by pointing out the differences between academic and less formal language use, previewing classroom texts, activating and building background knowledge, teaching reading and dictionary strategies, and demonstrating and supporting academic writing. The author recommends that ELL teachers "identify the kinds of tasks students will have to accomplish in their content classes and include similar assignments in their language curriculum" (p. 171). She provides six guidelines that include assessing students' content knowledge and language development, and choosing and modeling problems-solving and other tasks in all four language domains. A final section illustrates instructional and assessment activities for science, mathematics, history, music, and social studies that integrate language skills with content and are designed to use both BICS and CALP.

Meltzer & Hamann's (2005) integration of findings from a review of two areas of research – the research on recommended practices to promote mainstream adolescents' academic literacy across the content areas; and the research on effective content-area instruction of ELLs – points to many of these same features, specifically the importance of modeling AE, making academic expectations explicit, providing ongoing and thoughtful feedback, explicit instruction in features of AE, and providing opportunities for verbal and written interactions with teachers and peers.

Although not focused on specific modalities, Zwiers (2007) describes differences in the AE demands of three seventh grade classrooms (science, social studies, and English language arts), centering his investigation on the AE development of four ELLs with intermediate levels of ELP. Observational data and field notes collected by the author over a four-month period were focused on the explicit teaching of AE as well as the academic tasks (AE functions) students were asked to complete and how students used language orally and in writing. AE functions observed in the three classrooms included identifying cause and effect, comparing, persuading, interpreting, and taking other perspectives. In social studies and science classes, however, there were more instances of comparing, while interpreting was observed most often in English language arts.

Overall, the literature on AE demands across multiple content areas suggests that common to all coursework are two primary AE needs: first, an explicit understanding of how AE differs from everyday, conversational language, and when to use each in academic settings; and second, an ability to recognize the features of AE texts of different disciplines, and use those features orally and in writing. The quality of evidence ranges from the quasi-experimental study of the SIOP model reported by Echevarria, Short, and Powers (2006) to models, frameworks, and strategies based on a combination of expert opinion and review of literature (e.g., Horowitz, 2008; Kinsella, 1997; Meltzer and Hamman, 2005). It includes Gebhard et al.'s illustration of one teacher in one classroom. Each provides a different perspective. The Echevarria et al. (2006) study, for example, is useful in that it demonstrates not only the features of a particular model of instruction but also the achievement gains associated with that model. However, the results are limited in that the writing assessment used is only one of the language tasks that students may be expected to accomplish in the middle school classroom. Although most of the remaining literature has a broader focus, further exploration is needed regarding the ways in which these approaches can be applied and supported, including the level of teacher preparation that would be necessary.

Academic English conceptualizations and instruction within content areas

In addition to literature that addresses multiple content areas, a number of documents address the way in which AE is conceptualized and taught within specific disciplines. This subsection presents this literature, starting with how AE is conceptualized and taught in science, then mathematics, and finally history/social studies.

How academic English is conceptualized and taught in science

The critical role of AE in science education is undisputed. As Gee (2005) points out:

> No domain represents academic sorts of language better than science. Science makes demands on students to use language, orally and in print, as well as other sorts of symbol systems, that epitomize the sorts of representational systems and practices that are at the heart of higher levels of school success (p. 19).

Indeed much of the work on AE in science is oriented towards identifying the linguistic features that will have implications for ways teachers can assist students in acquiring the language skills necessary for success in science classes. The three articles that begin this subsection examine first oral and then written features of AE in science classrooms. A fourth outlines the vocabulary used in science.

Bailey, Butler, Stevens, & Lord (2007) report on an analysis of the teacher talk observed during fourth- and fifth-grade science lessons that yielded a categorization of the type of language students were hearing as teachers were providing science instruction. The analysis helped specify subcategories under two broad categories: context of instruction and teacher communicative intent. Under context of instruction, subcategories include: 1) science instruction, 2) academic vocabulary instruction, and 3) process/application instruction.

Categories of communicative intent include: 1) oral language functions, 2) repair strategies, and 3) classroom management. Bailey et al. provide a matrix that illustrates the intersection of context and communicative intent, and captures the relative frequency of instances of specific communication intent across classroom visits. From this analysis, four oral language functions were identified: explanation, description, comparison, and assessment. Explanation and description were the two most frequently occurring functions in the teachers' speech, both when imparting content information and giving directions, and when providing support for tasks students were to carry out. Comparison was used occasionally when introducing new terms and giving instructions. These data help demonstrate the range of use of AE functions in very specific types of classroom science activities.

AE functions common to science are also described in a guidebook on making science accessible to ELLs in upper elementary through high school (Carr, Sexton, & Lagunoff, 2006). The guidebook refers to the lexicon and discourse of science. Whereas the lexicon is defined as "the set of terms scientists and science learners use to communicate about their subject matter" (p. 41), academic discourse "involves use of language to convey extended expression of thought on a topic in connected speech or writing" (p. 42). Discourse patterns that are associated with the AE functions of science include providing an explanation supported by evidence, writing a report of an experiment, along with other AE functions.

Gee's (2008) examination of different types of science texts illustrates styles of AE use that vary according to audience. Gee used excerpts from a science journal, a popular science magazine, and a high school science textbook. The first type of text is "concerned with furthering conceptual understanding within a subdiscipline of biology. Its language is carefully developed to do this—to build evidence and marshal support for certain biological claims within particular parts of the biological community" (p. 59). In contrast, the excerpt from a popular science magazine is not about methodology, theory, claims or arguments. "Scientists write for popular magazines to inform the public and to build public support for their work in the field at large" (pp. 59-60). In both instances, the language used is with a specific communicative purpose in mind.

The third excerpt, from a high school science textbook, is an example of an explanatory definition, a genre which is characterized by language that classifies items in relation to each other. Gee also identifies grammatical features that appear in both the journal text and the textbook; he suggests that these features make the textbook excerpt in particular difficult to read. The features include complex subjects, nominalizations, passive main verbs, and complex embeddings.

Snow (2008) characterizes AE as low context language which uses sophisticated and specialized vocabulary. She addresses the importance of helping students develop the vocabulary which is used in science discourse to discuss facts, hypotheses, arguments and claims. The author lists a variety of ways in which caregivers and elementary teachers can help prepare younger children to learn scientific AE, including opportunities to read, write, and talk about thoughts, feelings, opinions, make-believe, reality, and evidence. As part of her discussion, Snow references one study on teacher awareness and vocabulary instruction for preschool children. Teachers who participated in the study used transcripts from their own classes to identify and teach words they believed to be new or unfamiliar to their students. The researchers then analyzed differences in how teachers provided instruction in familiar versus unfamiliar

words. Findings indicated that teachers defined and used more non-verbal cues with unfamiliar words; however, teachers also repeated unfamiliar words less frequently than familiar words, and did not explicitly provide explanations of new words other than definitions. Snow uses this study to illustrate her point on the importance of engaging students in AE discourse in addition to teaching new words. Although the article is largely geared toward mainstream students, Snow does make brief mention of the specific needs of ELLs in learning AE. The author suggests that teachers can support ELLs' learning by providing context-rich environments and repetition of key vocabulary.

How academic English is conceptualized and taught in mathematics

There is a common perception that the content of mathematics is less language-dependent than that of other content areas such as science, history/social studies or language arts. The literature reviewed here tries to dispel this notion, focusing instead on the integral role language plays as students engage in problem solving, participate in discourse practices around mathematical topics, and construct meaning during their lessons (e.g, Adams, 2003; Irujo, 2007b; Moschkovich, 2002; Schleppegrell, 2007; Spanos, Rhodes, Dale, & Crandall, 1988). This subsection includes a discussion of literature regarding the AE demands of mathematics, followed by instructional practices supporting the development of AE in mathematics.

Linguistic challenges in mathematics and common patterns of mathematics language are highlighted in a synthesis of research by applied linguists and mathematics educators (Schleppegrell, 2007). The author points out that "each subject area has its own ways of using language to construct knowledge, and students need to be able to use language effectively to participate in those ways of knowing" (p. 140). She draws on Halliday's notion of a mathematics register (1978) and explains that the understanding of a specific mathematics register helps us understand how language constructs knowledge differently for different content areas (p.140).

Adams (2003) discusses the unique AE demands of mathematics for elementary and secondary-level classrooms, using examples from the literature on mathematics education and language learning. She describes the language of mathematics as a language of order, composed of abstractions, numerals, and symbols that can be used "to communicate, to solve problems, to engage in recreation, and to create works of art and mechanical tools" (p. 786). According to Adams, accurate reading in mathematics is essential. It involves:

- recognizing and using formal mathematical definitions,
- attending to multiple meanings or the difference between mathematical and everyday meanings,
- attaching the correct meaning to homophones and similar-sounding words,
- comprehending complex mathematics text,
- decoding mathematics word problems, and
- navigating the relationship between words, numerals, and symbols.

The author recommends instruction that draws students' attention to its unique features. The language demands described by Adams are in keeping with the results of other literature such as the earlier work of Spanos et al. (1988). The authors argue that there is a strong interdependence between language and achievement in mathematics. Like Schleppegrell (2007), they support Halliday's notion of a mathematics register comprised of special linguistic features that must be mastered by students who are studying mathematics. They argue further that the procedure of mainstreaming students into mathematics classes before they are placed in other content classes is based "on the invalid assumption that mathematics is language independent" (p.223).

Spanos et al. (1988) report on a research project designed in part to "investigate linguistic features that pose difficulties in understanding and solving algebra problems" (p.223). Data were collected through analyzing texts, tests, and student discussions "as they worked together to solve math problems" (p. 223). The research was conducted at the post secondary level, but it is useful for the K-12 setting because it provides a linguistic model that characterizes features of the mathematics register, specifically those features that caused difficulty for beginning algebra students in three colleges. The students participating in the study had a range of cultural and language backgrounds, including ELL and English-proficient students of Latino/Hispanic heritage. The authors drew on the work of Morris (1955) to categorize difficulties into three types: syntactic, semantic, or pragmatic. Syntactic difficulties consist of linguistic features such as comparatives and passive voice. Examples of semantic features include at the lexical level, new technical vocabulary and complex strings of words or phrases and at the referential level, articles and pre-modifiers. Pragmatic difficulties stem from both epistemological features (e.g., the degree of experience or knowledge about algebra) and textual features (e.g., lack of real life activities) that impede students' understanding.

Moschkovich (2002) describes AE in mathematics from another angle: She proposes a situated-sociocultural view to describe the language ELLs need to successfully negotiate the instructional demands of mathematics classrooms. According to this view, language is but one of the resources students use to participate in mathematical practices. They also draw on social and material resources, such as gestures, objects, or use of the native language, to access and construct meaning as they engage in learning. In addition to the notion that language is only one component of mathematical discourses, this perspective assumes that meanings are "multiple, changing, situated, and sociocultural" (p. 207).

In addition to describing AE in mathematics, the literature on mathematics suggests areas for instructional focus. Spanos et al. (1988) stress the need for a language approach to teaching mathematics that is based on the linguistics features that emerged from their study (syntactic, semantic, pragmatic). It is their contention that students will do better in mathematics if they talk through problems and "gradually become comfortable listening to and using mathematics language" (p.236). They further contend that "a language approach to the teaching of mathematics provides multiple opportunities for students to develop listening, speaking, reading, and writing skills as they are acquiring mathematical skills" (p.237).

Syntactic and semantic features that pose difficulties for students are also described by Schleppegrell (2007). The author observes that "mathematics is highly technical with characteristic patterns of vocabulary and grammar" (p. 142). As discussed in the subsection on academic vocabulary, she draws a distinction between the technical vocabulary of mathematics (Tier 3 following Beck et al., 2002) and the more common (Tier 1) words that have a different meaning when used in mathematics. She suggests that it may be easier for students to acquire the technical vocabulary than to learn new usage for a word with an already established general meaning. Schleppegrell argues that, in addition to vocabulary, attention should be paid to grammatical constructions that help establish mathematical discourse. She discusses the complexities of "long, dense noun phrases such as the volume of a rectangular prism with sides 8, 10, and 12 cm" and the challenges of "the precise and technical meanings of conjunctions that may be used in different ways in ordinary everyday language" (p. 144). She argues persuasively that while vocabulary is critical, it is not sufficient to understanding the mathematics register and that educators must expand their understanding of the language of mathematics to include the grammatical constructions as well.

Rather than provide an inventory of language features to characterize the AE of mathematics, Moschkovich (2002) offers an approach to examining classroom discussions that looks at the meanings of mathematics words, resources students draw on to communicate mathematics concepts, and common discourse patterns and practices. She examines mathematical discussions among bilingual learners in middle and high-school classrooms, using a set of questions adapted from Gee (Gee, 1999, cited in Moschkovich, 2002, p. 200). These questions include:

1. *Situated meanings:* What are the situated meanings of some of the words and phrases that seem important in the situation?
2. *Resources:* What are the multiple resources students use to communicate mathematically? What sign systems are relevant in the situation (speech, writing, images, and gestures)? In particular, how is "stuff" other than language relevant?
3. *Discourses*[7]*:* What Discourses are involved? What Discourses are being produced in this situation? What Discourses are relevant (or irrelevant)? In particular, what Discourse practices are students participating in that are relevant in mathematically educated communities or that reflect mathematical competence?

Moschkovich (2002) suggests that since participation in mathematical discussions involves more than learning new vocabulary related to the lesson topic or working through multiple meanings, a situated-sociocultural perspective provides a broader scope, one that does a better job of capturing what counts as competence in the mathematical classroom.

More concrete applications for AE instruction in mathematics come from Irujo's (2007c) review of three areas of research: mathematical language that causes difficulties for ELLs, discourse patterns in mathematics classrooms, and socio-cultural factors that influence mathematics learning. As with Adams (2003), Irujo describes AE demands in terms of vocabulary/semantics difficulties, vocabulary/syntax difficulties, discourse difficulties, and word problems. Based on the research reviewed, the author suggests the following implications for mathematics teachers working with ELLs: It is necessary to understand both mathematics content and the AE of math, effectively structure and scaffold small-group interactions, and draw on students' characteristics and background in planning lessons. Irujo does not refer to a specific grade-level, but the examples provided are elementary and secondary-level.

Irujo (2007a) also explains the basic steps for teaching vocabulary to ELLs as part of an integrated approach to AE instruction in mathematics. The first step is for the teacher to identify the potential difficulties in lesson materials, which requires learning to read tests and texts analytically, focusing on the language itself, apart from the content. She suggests team teaching and collaborating with ESL teachers for those with little language experience in teaching ELLs.

Irujo's second step is pre-teaching with experiential activities in the mathematics context. This includes activating prior knowledge of concepts and vocabulary pertinent to the lesson, and finding a way to relate new language to familiar experiences. Irujo emphasizes that only the key concepts and vocabulary needed to introduce the central ideas of the lesson should be taught at this point.

Irujo's third and final step is integration: the teacher should point out new vocabulary as it is encountered, model its use in context as frequently as possible, and repeat the cycle of modeling, guided practice, small group practice, and independent practice. She also recommends occasionally providing mini-lessons on complex language forms, such as prefixes and suffixes.

[7] Moschkovich uses Gee's (1996) definition of Discourses. In this sense, "Mathematical Discourses include not only ways of talking, acting, interacting, thinking, believing, reading, and writing but also mathematical values, beliefs, and points of view of a situation" (p. 198).

How academic English is conceptualized and taught in history/social studies

The studies examined in this section illustrate the high literacy demands of learning materials and practices in history/social studies classrooms. Analyses of reading and writing tasks identify a range of literacy-related linguistic features that typify AE in this content area.

Based on research conducted in middle school social studies classrooms, Short (1994) describes several challenges faced by English learners in grappling with the AE demands of their textbooks and in engaging in classroom tasks. Her analysis found that, to access content information in their textbooks, students must pore through long expository passages filled with abstract concepts (e.g., independence, liberty, propaganda). Graphics, such as maps, charts and timelines, provide visual support but are not always tied to the main teaching points of adjacent passages.

Short based her analysis of the AE linguistic features found in history/social studies textbooks on a taxonomy of six types commonly mentioned in reviews of expository texts. In her analysis, the most frequent text structures were sequential or chronological and cause/effect. Short then explored AE used in classroom routines, categorizing the language to include semantic and syntactic features as well as functions and tasks. Examples of AE demands in history include language functions used by both students and teachers such as explain and justify, language skills tasks such as taking notes and finding the main idea, text structures such as cause and effect and generalization and example, and syntactic features such as historical present and causative signals (Short, 1994, p. 597).

Additional insights into the AE demands of social studies are provided by a qualitative discourse analysis of student writing samples collected from a large-scale evaluation of literacy professional development (Schleppegrell, 2005). The author identifies writing tasks that reflect "different genres, recognizable types of texts that have particular purposes" (2005, p.5). She describes language features associated with each genre and in doing so helps specify AE in the content area of history. The analysis focused on identifying the linguistic features essential to writing expository essays in history classrooms, and the linguistic knowledge that would support teachers in scaffolding expository essay writing for ELLs and students with low literacy skills.

Three hundred and forty-five essays written over the course of an academic year by ELLs and native English speakers in grades eight and eleven were analyzed. Findings reported by the author indicate that in history, expository writing tasks include writing historical accounts, historical explanations, and historical arguments. Her analysis of these genres reveals that historical accounts draw on such language features as temporal ordering through the use of adverbs and prepositional phrases; historical explanations make use of description and rhetorical features to establish events in relation to each other or to compare and contrast different points of view; historical arguments utilize modality and other language resources to construct claims or authorial judgments. According to the author, writing an effective argument requires first understanding how to write an effective account and explanation. Yet, she continues, teachers typically assign students argument tasks before they have the necessary "language resources that enable them to account for historical events and explain the forces that brought them about or followed from them" (p. 21).

The AE demands of history are examined in an action research study conducted by Zwiers (2006) with two of his history-based ELD classrooms. The study consisted of participant observation, instructional intervention, and assessment of 60 middle school ELLs over a period of five weeks. Students were identified as at risk of academic failure and had intermediate levels of ELP. Two research questions were addressed: 1) what types of instructional activities appear to develop historical thinking skills and related AE among ELLs, and 2) how can teaching for a writing assessment help to shape historical thinking skills and AE development. Data collected included audio-recordings of lessons, student logbooks, and a final persuasive essay. The data were analyzed for "evidence of academic thinking skills and AE acquisition"

(p. 327). The author defines AE broadly, to include "highly-visible and discipline-specific terms such as photosynthesis" (p. 318), "more universal words and phrases that occur across disciplines" (p. 318), and "various types of thinking used in different content areas" (p. 319). Six dimensions of historical thinking were culled from the author's review of resources on historiography and California standards for history teaching in the middle grades: background knowledge, cause (why?), effect (what resulted?), level of bias in reporting of historical events, empathy and perspective, interpretation, and application.

In this article, the author emphasizes the need to teach AE in tandem with critical thinking and discipline-specific content. He concludes from his research that students are more likely to think critically and use AE when the teacher's own thinking is made visible and AE is "modeled, scaffolded, and practiced in the ways that historians think about history" (p. 330). According to the author, the research also had positive effects on his teaching, making him more thoughtful in his planning and implementation of AE and content. Finally, the author suggests that the findings have implications for all teachers, including teachers in international contexts.

Supporting the development of the AE of social studies is also part of an approach based on findings from a study of five social studies teachers participating in a school-university partnership (Szpara & Ahmad, 2007). The study context was a low-socioeconomic suburb of New York City; students were English proficient students and ELLs from a variety of language backgrounds. Study methods were not explicitly described in the article, but the partnership emphasized the following three areas of teaching practice.

1. Development of socially supportive classroom environments, in which "students feel comfortable learning both English and social studies and making mistakes while learning" (p. 190);
2. Teaching academic skills through the Cognitive Academic Language Learning Approach (CALLA), which "relies on the explicit instruction of learning strategies alongside content instruction" (p. 191) and AE; and
3. Reducing cognitive load in curriculum "combined with strategies for increasing the accessibility of complex content" (p. 190). Instructional practices include identifying key aspects to teach and using outlines, bulleted lists, graphic organizers, dramatizations or similar methods.

For each of the three areas, the authors present examples of effective strategies from classroom observations and interviews with the participating teachers. The authors conclude from their findings that "[E]ffective methods of instructing ELLs are available" (p.194) but need to be incorporated into teacher education programs and policies. Although the authors illustrate instructional practices that may support ELLs learning social studies content, it does not include information regarding the features that are *essential* for each of the three areas that make up their multi-tiered approach.

The literature reviewed on how AE is conceptualized and taught shows both subtle and distinct differences across content areas. AE demands in science and social studies include the ability to understand, read, and write explanations; and to describe and compare information. However, in the literature relevant to science, there is more discussion of how claims are substantiated, while the social studies literature speaks more of students' ability to analyze and present an argument. In the mathematics literature, comparison and definition are listed among the AE functions, but academic vocabulary is given more emphasis. The mathematics literature also offers more detailed descriptions of instructional strategies that reflect this emphasis: highlighted are teaching practices that include selecting essential AE, previewing, modeling, and practice. In all three of the content areas discussed, there is an expectation that the teacher address both syntactic and semantic features specific to the discipline.

In terms of quality of evidence, the subsection includes analyses based on small-scale, qualitative studies (e.g., Zwiers 2006). The usefulness of this literature is in the level of detail regarding the types of activities used to develop academic thinking and language. As one example, Zwiers provides a real glimpse into his classroom, illustrating his actions as a teacher as well as the actions and responses of the students. Analyses, although less detailed, were also illustrative and connected to the overarching purpose of the study. In both of these ways, the study demonstrates the advantage of teacher research with its emphasis on classroom discourse and teacher reflection. Implications from the study, however, must be considered in light of that same methodology, which is not intended to demonstrate effectiveness across multiple contexts. These types of studies are complemented by relatively large-scale observations of content-area classrooms and inventories of AE demands (e.g., Bailey et al., 2007) as well as text analyses and conclusions drawn from research (e.g., Gee, 2008; Short, 1994).

Patterns of Academic English Discourse and Interactions in the Classroom

In addition to describing AE in relation to specific content areas, the literature also focuses on how AE is developed through social interactions and in social settings. It includes studies drawn from discourse analysis, interactional linguistics and sociolinguistics. Although this literature is set within the context of content-area classrooms, the primary emphasis is on how effectively teachers have attempted to engage students in academic discourse and the language of particular disciplines. This subsection draws on this literature, beginning with one study specifically focused on student-to-student interactions, and moving to studies of student-teacher interactions or teacher talk and its effect on AE.

Student-to-student interactions within student groupings are the focus of a qualitative study conducted in two 7th grade social studies classrooms (Bunch, 2006). The author's findings are based on his analysis of transcripts collected as part of a larger study of "how linguistically heterogeneous groups in two classrooms used language to engage in group tasks" (p. 290). AE is defined broadly by the author; he focuses his analysis on the different ways students use language in a school setting. In working on these different classroom tasks, the students used what the author refers to as the language of ideas and the language of display. He equates the language of ideas with the context-embedded language associated with everyday or informal conversations. The language of display, in contrast, is more formal or de-contextualized. The author observed that group interactions in preparation for presentations were conducted in the language of ideas while presentations to the teacher and class were conducted in the language of display. He considers both types of language to be academic uses of language. Collectively, the students observed could "manage the linguistically and academically challenging tasks embedded in the curriculum" (p. 298). The author concludes that it is necessary to reconsider the notion of AE in light of the range of AE demands within the typical middle school classroom. In terms of instructional practice, he emphasizes the benefits of attending to the development of a community of academic discourse, with students engaged in extended interactions.

The importance of providing middle and high school ELLs with extended oral and written interaction is the emphasis of Verplaetse's (2008) review of two lines of second language acquisition literature: 1) interaction studies, and 2) the work of socio-cultural linguists. Findings from both types of literature indicate that classroom interaction "provides the learner the practice needed to develop AE communicative skills" (p. 168). AE is not explicitly defined, but is equated with language proficiency, and oral and written discourse. Based on the literature reviewed, the author describes instructional strategies that support student interactions with peers, teachers, and text. These include six strategies that support oral interactions:

1. Modifying teacher questions and responses to include follow-up questions, instructional conversations, and non-evaluative listening
2. Increasing student-to-student activities such as small group and pair group tasks
3. Varying assignments and questioning techniques based on student's language proficiency level

4. Modeling responses for beginning and early intermediate ELLs
5. Challenging intermediate ELL students to produce frequent, extended utterances
6. Encouraging students to use first language in planning responses

The author also emphasizes the importance of written interaction, citing literature on adolescent literacy development and the educational needs of adolescent ELLs. Her review indicates the need for "frequent opportunities for students to write extended text and to write on academic subjects other than personal narratives" (Verplaetse, 2008, p. 177). The author's conclusion from the different literature cited is that it is the responsibility of the teacher to provide opportunities for extended oral and written discourse in support of their AE development. Evidence cited from the author's own research (Verplaetse, 1995, 1998, 2000, 2001) also suggests that many teachers shelter ELL students from such interactions.

Similar findings are reported by Zwiers (2007), who presents results from a qualitative study of AE development in middle school content classrooms. As part of the study, the author explores the concept of AE, the social and cultural factors that underlie the acquisition of AE, and the teacher-student interactions that are likely to influence its development. In the classrooms observed, discourse patterns sometimes interfered with AE development. Among the teaching strategies observed, questioning was the most prevalent, followed by the use of gestures, examples, analogies, personifying, academic idioms, and linguistic enabling. According to the author, linguistic enabling is the least effective of these strategies, limiting students' opportunities to develop AE. Linguistic enabling refers to teachers accepting oral or written responses without challenging students to elaborate or produce AE. Open-ended questions, although requiring more academic thinking and use of AE, were typically directed at the English proficient students in the class rather than the ELLs. Implications from the study findings emphasize professional development in the cognitive skills required for the specific discipline, and the associated language strategies to make AE comprehensible, "classroom activities that reflect complex thinking and language patterns valued in academia" (p. 113), patterns of discourse that negatively affect language and thinking, and the nature of communication in the classroom.

The nature of communication in secondary mathematics classrooms is described in a report of a case study by Brenner (1998). Two algebra classes within a small urban school district were observed over the course of six weeks. In one class, which was composed entirely of Spanish speakers with low levels of ELP, students received direct, sheltered instruction primarily through large group interactions. In the second class, which was composed of English-proficient and less proficient learners, students interacted primarily in small groups. Both classes were taught by first-year teachers implementing CPM (College Preparatory Mathematics: A Change from Within), which focuses on the release of responsibility to students through small group instruction. Data were analyzed for type of interaction, type of mathematical communication, and language of interaction (English or Spanish). The communication framework the author used considers three aspects: communication about mathematics, which requires students to describe problem solving processes; communication in mathematics, which requires students to use the mathematics register; and communication with mathematics, which requires students to solve meaningful problems using mathematics. In general, the author found mathematical communication to be less extensive in the sheltered classroom where responsibility for carrying out mathematical discussions was not fully turned over to the students. The author concludes that although the small sample size and differences between the classes does not "warrant strong conclusions for policy" (p. 23), it does suggest the need for further study of the ways in which teachers and students negotiate and develop patterns of interaction that may inhibit or support mathematical communication.

In discussing the connection between language and learning science for elementary and secondary students, Gee (2005) points to another set of communication challenges as they relate to AE in science: The structures and patterns of everyday language can obscure crucial differences, causes, and relationships that are essential to scientific discourse. A typical face-to-face conversation, for example,

contains vague references, truncated language, and other features that can make it difficult or impossible for the teacher to effectively scaffold language or support students in developing a deep understanding of scientific concepts. Gee argues that it is only those students who already have an understanding of the underlying content and language who are "simultaneously learning and practicing science and scientific ways with words" (p. 36) in the typical science classroom. Gee's emphasis on language as social identity and practice reminds the reader that all languages play a role in society and its functions, such as education. Important in Gee's work is the notion that students, even very young ones, should be encouraged to use AE in talking about scientific subject matter. The author provides a few recommendations for how this can be done, including classroom discussions that allow students to "take longer turns, expand their language, and make clear their reasoning and its connections to what others have said" (p. 36), along with practice and discussion around the content and social language of academic texts.

Others as well urge the engagement of students in actively using AE to interact with content (e.g., Colombi & Schleppegrell, 2002; Gibbons, 1998; Scarcella, 2002; Spanos, Rhodes, Dale, and Crandall, 1988).

In a more recent article, Gee (2008) addresses the importance of students learning AE specific to science. Gee cites various works regarding child educational development which support his views on helping students progress toward AE fluency. In his description of AE, the author uses phrases such as "grammatical patterns," "styles of language," and "organize meaning" (p.58), and includes examples from scientific publications. The bulk of the article discusses five points that serve as implications for teachers in aiding the acquisition of AE:

1. The type of language exposure a child encounters prior to school plays a part in his or her readiness to learn AE in school. Advantageous home practices include interactive "book-talk" and extended single-topic rhetoric.
2. Students should be given the opportunity to develop their "academic identity", which should merge with previously held concepts of self.
3. Students need exposure to a variety of written and spoken models of language and speech acts in the content area.
4. Students need practice using language that speaks from a less personal, more public perspective.
5. Teachers should involve students in discussions concerning the identification and uses of AE in various genres.

The author points out that the process of learning AE is more difficult for ELLs because they are simultaneously learning conversational English instead of being able to use it as a foundation for developing AE skills.

Hart and Lee (2003) and Irujo (2007c) promote the use of both inquiry-based and hands-on activities to teach AE discourse, specifically in science and math. Hart and Lee reason that such tactile and experiential methods are not only more accessible because they are less dependent on language proficiency, but that they actually provide rich context to support learning AE. Their article, which is described more fully in the teaching preparation and training section of this report, also suggests that participating in small group discussions can provide students with opportunities to practice "authentic communication about science knowledge" (p.477) and to develop their own academic register. One obstacle to hands-on activities recognized by the authors is that such activities often require resources or funding that schools with high concentrations of ELLs tend to lack. Irujo adds the observation that teachers must make the link between the task and the use of AE explicit, as well as structure activities in a way that students use AE, not just conversational language.

How science language is learned through "engagement in discipline-specific activities" (Mohan & Slater, 2006, p. 303) was the question behind two studies of teacher-student interactions in secondary science classrooms (Mohan & Slater, 2006; Moje, 1995). Mohan and Slater concentrate their study on how one secondary "science teacher socializes his students into the science register—thereby teaching students science language and meaning—which links what they do and observe with the theory being taught" (p. 303). The study methods consisted of participant interviews and observation of teacher-student interactions in one class of 30 ninth-grade students representing a mix of native English speakers and ELLs of varying levels of ELP. Data were collected and analyzed from the perspective of systemic functional linguistics (SFL). AE is implicitly defined as the language of science or the science register. In their analyses, the authors examined the discourse patterns demonstrated by the teacher and students in terms of three levels of social practice: knowledge structures, question-answer relationships, and lexical cohesion. They paid particular attention to how the "science teacher used functional recasts to connect theory and practice" (p. 304). Analysis indicated that the teacher modeled AE by recasting student responses from practical experiences to theoretical understanding of science, from incorrect and informal discourse to the language of scientists, and from imprecise to more precise use of vocabulary. According to the authors, however, the teacher was not necessarily aware of the extent to which he was engaging in AE instruction. Mohan and Slater conclude from their study that conducting research from a systemic functional linguistics perspective has the potential to build our understanding of how to develop students' ability to use the language of science, and therefore students' ability to understand science content.

Snow (2008) discusses another area of academic discourse teachers should address. Her article on academic science language suggests involving elementary students in "inner-state" tasks to help them develop thinking and speaking patterns important in the sciences. Such tasks include asking students to discuss how someone else feels or thinks about an issue. This can be done in the context of a story the child is reading, where an adult engages the child in conversation about character perspectives in the story. Snow points out that they can discuss why there are differences in what characters know and think, as well as what is imaginary, true, or perceived to be true by each character. She explains that such skills are necessary to develop in order to effectively discuss facts, opinions, hypotheses, arguments, claims, truth, reality, and points of view in scientific discourse. According to the author, these activities are valuable to ELLs even if done in the child's first language because having these tools helps smooth the transition to English science language.

A second illustration of how discourse skills can be taught at the elementary level comes from Schleppegrell's (2004) description of the development of AE through student involvement in classroom sharing time. As a young child explains information and experiences unknown to the rest of the class, he or she is assuming the role of an authority on the topic. The student learns to form topic sentences, and detailed, chronological descriptions. Though the teacher may pose questions in prompting the child to implement certain discourse markers and patterns, the interaction is not conversational. In fact, Schleppegrell explains that the repeated question-answer interaction between a teacher and student gives the student practice in developing a "lexically explicit" expression, and together the student and teacher create a focused, expanded discourse (p.34). The author further notes that such class presentations also require the student to explain decontextualized information, a skill of academic discourse.

In general, findings in this subsection of primarily qualitative research pertain to the importance of carefully considering the ways in which classroom interactions challenge or support the development of AE. Among the strengths of the literature are the illustrations and analyses of classroom discourse. The literature presented here attempts to "envision classrooms in which students can be *included in*, rather than *excluded from*, opportunities to participate in as wide a range of English for academic purposes as possible" (Bunch, 2006, p. 299). According to this literature, providing opportunities for engaging students in AE means reframing the way teachers approach classroom management and instruction. It requires a more balanced division of teacher and student talk, with teachers modeling academic

discussions and questioning techniques that mirror the types of discussion within professional communities. Further, it requires opportunities for students to use AE rather than watered down versions of AE, and to develop a certain amount of metalinguistic awareness of AE features. In terms of professional development, it requires building teachers' engagement in reflective practice around AE.

Summary of Literature on Academic English Instruction

How instruction is shaped and influenced by a particular view of AE is evident in several of the documents reviewed. It is discussed most directly by Valdes (2004) in her comparison of the types of AE dialogue that take place within and across public and professional communities. These "various communities of practice may have very little to do with one another" (p. 112) and typically define AE in different ways. The professional discourse around English for special or academic purposes, for example, tends to emphasize the types of communication required for particular kinds of professions or to carry out particular kinds of tasks. Valdes maintains that conflicting descriptions of AE and the linguistic demands of school are problematic, limiting the academic possibilities for ELLs. She argues for more open and comprehensive dialogue among professional communities and an exploration of whether it is even possible to teach or learn AE effectively in the "self-contained, hermetic universes of ELL classrooms" (p. 123), where students do not have the opportunity to engage in AE.

The question of how AE is conceptualized and taught is also raised in the introduction to one of the more comprehensive conceptual frameworks of AE (Scarcella, 2003). As described in the discussion on how AE is defined and conceptualized, the framework includes a description of the AE construct along three dimensions: linguistic, cognitive, and sociocultural/psychological. Part of the justification for the framework Scarcella proposes is to extend our understanding of what may be considered the AE construct, and to apply that understanding to teaching practice. In contrast with Valdes (2004), Scarcella does not question the effectiveness of teaching AE in the ELL classroom. She makes the argument, however, that teachers do not necessarily "help their students lay the foundation for the development of AE" (p. 17), often because they do not have sufficient knowledge or expertise in AE and its teaching.

A number of the studies reviewed support the idea that how one defines AE influences instructional practice; including a study of explicit AE instruction in a transitional (sheltered) science classroom of 9th grade ELLs (Bruna, Vann, & Escudero, 2007), an examination of mathematics classrooms with bilingual learners (Moschkovich, 2002), and a two-year ethnographic case study of the potential impact of teacher talk on student behavior (Moje, 1995). Each of these studies came to similar conclusions: a limited conceptualization of AE as academic vocabulary limits the effectiveness of AE instruction.

In addition to implicit and explicit assumptions about the relationship between AE definition and instruction, the assumption of much of the literature reviewed is that AE is associated with conceptual understanding. Authors differ, however, in how they view that relationship. Two of the primary interpretations are described in a synthesis of research and findings from a 2002 international conference on language and pedagogy in science education (Yore, & Treagust, 2006). The first suggests that the ability to use the language of science—including science discourse, forms and functions—is a prerequisite for understanding academic content. The second suggests that language "shapes and influences" (p. 299) understanding of academic content. Each of these interpretations, the authors argue, has consequences for how AE is taught. The first interpretation supports direct instruction in the language of science. The second supports a less direct, writing-to-learn approach.

These very distinct viewpoints illuminate the challenges educators face in fully describing and planning for the instructional contexts predictive of the development of AE. In terms of implications for research, the literature reviewed includes studies focused on essential features of AE and how they are best taught, as well as studies focused on the context in which AE is best learned. Similarly, in terms of implications

for instruction, the literature on teaching individual features of AE stands in contrast to literature focused on learning AE through classroom interactions.

Much of the AE literature focused on a range of grade levels and thus provides few findings specific to elementary, middle, or high school. In general, the literature on AE instruction for K-12 classrooms suggests that it is necessary to consider both language and content in any discussion of AE proficiency. At a minimum, it is worthwhile considering features related to academic literacy, such as discipline-specific text organization and discourse patterns, AE functions emphasized in specific settings, and the multiple meanings of words. Across the literature on instruction in AE features, the primary focus was on academic vocabulary, with explicit teaching and pre-teaching tied to opportunities for practice. Across the literature on developing academic discourse, questions were raised regarding the relationship between how AE is defined and how it is taught, how classroom interactions are framed by the teacher, and whether AE can be considered or taught apart from everyday discourse. Although few answers were provided, a common thread in the literature reviewed was the importance of supporting teachers in laying the foundation for AE development.

Recommendations for Additional Research on AE Instruction

Despite the growing body of studies and expert opinion around AE instruction, there remain several areas in which further research is necessary. Missing from the literature is a clear conceptualization of AE as it relates to instructional demands, as well as the instructional practices that stem from these demands and that would address ELLs of different backgrounds and English proficiency levels. The findings described in this section are tempered by the different theoretical perspectives of the authors, and the fairly wide range of student populations and settings—including elementary grades through college, and ELL and English proficient students.

One potential area for further research is in identifying the specific demands AE places on ELLs and the ways in which AE is used in different school settings. The literature reviewed points out the need for experimental research on the lexical and syntactical demands AE presents, in what order they are generally encountered by ELLs, in which content areas they are most prevalent, and the resulting implications for planning curriculum and assessment.

In addition, more research is recommended regarding the impact of different approaches to AE instruction on student AE acquisition. For example, studies are needed to determine the effectiveness of widely accepted pedagogical frameworks, such as SIOP, in different settings and with different student populations. At an even more basic level, further study is needed regarding questions such as whether AE instruction that emphasizes the explicit teaching of linguistic features of AE is more or less effective than AE that is focused on developing students' sociolinguistic competence.

Further insight is also needed regarding how various aspects of academic communication support or challenge ELLs. Research is needed, for example, to further describe the extent to which AE and content learning are affected by "teachers' beliefs, practices, and discourse related to AE instruction" (Bruna, Vann, & Escudero, 2007, p. 36). Questions for research include what types of communication teachers are using to intentionally influence student use of AE, and how teacher communication is perceived differently by students of various backgrounds.

These are just a few of the lines of research that would complement and inform a common conceptualization of AE and the professional development needs of ELL and content-area teachers.

Policies and Practices in Preparing and Training Teachers to Support AE Development

Previous sections of this report discussed the complexity involved in defining and operationalizing AE, and the varying perspectives on and approaches to supporting student learning of this language. These differing viewpoints have important implications for how the teacher education field conceptualizes what teachers must know about AE and how they should apply that knowledge in the classroom. Teacher education is the purview of a broad array of institutions, including colleges of education, school districts, schools, state and federal assistance centers as well as other non- and for-profit entities. These institutions often have conflicting approaches to educating teachers about language and language instruction that are reflective of the larger debate on what constitutes AE and how ELLs best learn this language. Despite these differing views and approaches, most educators agree that improving the language and literacy skills of ELLs will depend on finding ways to deepen all teachers' knowledge of language and language development (Adger, Snow, & Christian, 2002).

This portion of the report discusses policies and practices relevant to preparing and training elementary and secondary teachers to support the development of AE in ELLs. Though the primary focus is on ELL teachers, when information is available, the preparation and professional development of content teachers to teach AE is discussed. An evaluation of the literature and polices is also provided as are recommendations for research.

Teacher Preparation in AE

Research suggests that significant differences in student learning are dependent upon having teachers with high quality teacher preparation experiences (Darling-Hammond, 2000; Gandara & Maxwell-Jolly, 2006). This claim can also be made for teachers of ELLs. In general teachers who do not have ESL or bilingual credentials are not well prepared to support ELLs (Hayes & Salazar, 2001; Hayes, Salazar, & Vukovic, 2002). A study of the relationship between ELL student achievement and the credential held by teachers who taught ELLs found that teachers with ELL authorization had a positive impact on their students' outcomes. Teachers with no state or district authorization had either small positive or negative impact on the ELL students they taught (Hayes, Salazar, & Vukovic, 2002).

Teacher preparation clearly plays a critical role in determining ELL teacher knowledge and pedagogy. Merino (2007) defines teacher preparation as a "complex process that encompasses a broad set of domains, including the development of both disciplinary and pedagogical knowledge and skills that can be addressed separately and as an integrated set of experiences" (p. 2). A thorough description of the teacher preparation process in AE is beyond the scope of this report; therefore, this section summarizes and evaluates information that can be gleaned from standards documents, state policies, and the teacher education literature to provide an understanding of the status of teacher preparation as it pertains to AE.

The role of competencies and standards in preparing teachers to support academic English

The second language teacher education field has drawn from several distinct traditions to describe what ELL teachers should know and be able to do (Merino, 2007). Currently and arguably the most dominant is the standards/competency tradition. This tradition typically involves experts within a particular knowledge domain conceptualizing and developing a comprehensive set of teaching standards that reflect a level of consensus on the core knowledge, skills, and effective pedagogy in this domain. Often this work occurs under the auspices of a professional organization, such as the National Council on Teaching Mathematics (NCTM) or, in the area of English language learning, Teachers of English to Speakers of other Languages (TESOL). Given that the work of these and other professional organizations has influenced the content of ELL teacher education programs, this section explores the ways in which several sets of national teaching standards—including those developed by TESOL in conjunction with the

National Council for the Accreditation of Teacher Education (NCATE), and those developed by the National Board for Professional Teaching Standards (NBPTS)—address AE.

The section also addresses requirements for content-area teachers' knowledge of AE and pedagogy through a discussion of NCATE's revised standards for accreditation of teacher education programs (NCATE, 2008) and the National Clearinghouse for English Language Acquisition's recent report on building content-area teachers' capacity to teach ELLs (Ballantyne, Sanderman, & Levy, 2008). Together these documents provide considerations for preparing all teachers to support student learning of AE. According to a survey of state and national teacher education policies (Merino, 1999), there has been an abundance of "competency" approaches to describing the knowledge that teachers of ELLs should possess, but few policies on what constitutes best teaching for ELLs. Moreover, virtually no attempts have been made to evaluate teacher or student outcomes of the competency-based approach to ELL instruction (Merino, 1999). Despite the lack of outcomes-based research in this area, the competency/standards approach continues to dominate the field as an important determiner of the content and focus of teacher education programs. In general, this approach is based on expert opinion, which in turn is based on experts' knowledge of second language education research. The teacher education standards documents reviewed here were developed by panels of experts who were selected based on their experience and expertise in the field of ELL education.

Teacher competencies. The first effort to establish a set of comprehensive competencies for what ELL teachers should know and be able to do occurred in the 1970's when the Center for Applied Linguistics (CAL) identified eight such competencies. The terms academic English and academic language were not in wide use at that time, nor do the CAL competences make reference to either of these terms. In the 1990s, Milk, Mercado, and Sapiens (1992) developed a list of teacher attributes necessary for effective ELL instruction. Only three of these teacher attributes could be construed as relating to knowledge of AE. However, rather than specifying the kinds of linguistic knowledge needed, the authors call for "the ability to teach in a way that engages students in ample speaking, listening, reading, and writing opportunities; scaffolds students' conceptual development…; and draws students into classroom dialog" (Milk, Mercado, & Sapiens, 1992).

Other examples of ELL teacher competencies described in the literature include; knowledge of how to use the student's native language and English for instruction in order to enhance clarity, clear explanations of tasks and expectations for student learning, ability to maintain appropriate pacing in instruction, use of active teaching behaviors, continual monitoring of student progress, provision of feedback, and a sense of efficacy about their ability to teach ELLs (Garcia, 1996). Up until the last decade, most of the literature that discussed ELL teacher competencies did not directly address teacher knowledge of the features of AE. As exemplified by the competencies just discussed, this literature described expectations for the types of behaviors and activities teachers should engage in when instructing ELLs.

A different approach to establishing ELL teacher competencies comes from the research on teacher verbal ability and its relationship to quality instruction, pedagogical strategies, and cultural knowledge. In the area of teacher verbal ability, correlational research has shown that teachers with higher scores on verbal ability tests have been associated with increases in their students' achievement (e.g., Verstegen & King, 1998). Tellez and Waxman (2006) suggest that this finding may be applicable to ELLs' development of AE. They speculate that teachers who are able to see patterns in language may be better able to help ELLs understand the ways in which they are using or misusing language.

More recently, educators, researchers and professional organizations concerned with teacher education and professional development have devoted greater attention to the issue of AE. For example, Merino (2007) drew from research to identify 10 competencies that ELL teachers should have. Merino's second competency directly addresses AE: Teachers of ELLs should be competent in "understanding academic

language in English with experience in helping students make connections to the home language" (Merino, 2007, p. 6).

In general, the competencies approach to defining what teachers should know and be able to do with regard to AE has provided little insight into the complexities of AE. Nor has it offered guidance on how to design and implement instruction that supports ELLs' development of AE.

Teaching standards. A venue for influencing teacher knowledge of language is the standards movement that is at the core of educational reform (Wong Fillmore & Snow, 2000). The two professional organizations that specifically focus on the education of ELLs are the Teachers of English to Speakers of Other Languages (TESOL) and the National Association for Bilingual Education (NABE). Both organizations have special interest groups dedicated to teacher education and both have produced standards on the theories, principles, and concepts that should constitute the core knowledge base for ELL educators.

NABE standards. In 1992, NABE published *Professional Standards for the Preparation of Bilingual/Multicultural Teachers* to provide guidance for institutions that prepare bilingual teachers (National Association for Bilingual Education, 1992). With the publication of these standards, NABE recognized the impact a teacher's knowledge and skill have on improving the quality of instruction for ELLs. Though these standards call for teacher knowledge in the areas of first and second language acquisition, they do not require specific knowledge of the features of AE. In fact the NABE standards put much more emphasis on teacher knowledge of institutional, legal, programmatic, and cultural aspects of language and schooling than on language itself (Tellez & Waxman, 2006).

Of the six standards, Standard 3—Bilingual/Multicultural Coursework and Curriculum—includes indicators that directly address language. However, only two indicators, *developing literacy across the curriculum* and *understanding the basics of language* relate directly to teacher knowledge of language. Furthermore, knowing the basics of language does not suggest a deep knowledge of the features of AE, and skill in developing literacy across the curriculum only implies knowledge of this language. Though explicit and specific knowledge of the characteristics of AE is not a core component of the NABE standards, Standard 4 does require that teachers themselves have full *academic language proficiency* in both languages (National Association of Bilingual Education, 1992).

TESOL/NCATE standards. In 2003 TESOL, the other professional organization principally concerned with ELL education, in conjunction with the National Council for the Accreditation of Teacher Education (NCATE) released its standards for the preparation of ELL teachers. NCATE is the agency responsible for accrediting institutions that prepare teachers and other school personnel, and as such is influential in determining the content and focus of teacher preparation programs across the country. Historically, NCATE has required that its accredited institutions prepare teachers to work effectively with students from diverse backgrounds, including ELLs (Gollnick, 2002). Though it is not certain how many ELL teacher preparation programs have been reviewed using the TESOL/NCATE standards, ELL programs that are a part of institutions that are accredited through NCATE will need to attend to these standards as part of their NCATE review. Thus, an analysis of this document to determine the extent to which it addresses academic language provides a useful lens through which to view the expectations for ELL teacher preparation programs in the area of AE.

The term *academic language* is used frequently in the TESOL/NCATE standards and is defined as: "the language used in the learning of academic subject matter in a formal schooling context; aspects of language strongly associated with literacy and academic achievement, including specific academic terms or technical language, and speech registers related to each field of study" (Teaching English to Speakers of Other Languages, 2003).

The standards are organized around five domains: language, culture, instruction, assessment, and professionalism. The language domain is divided into two standards. The first standard calls for teachers to understand language as a system and to know the components of language, such as phonology, morphology, syntax, semantics, pragmatics, discourse varieties[8], and writing conventions. This standard also calls for knowledge of *aspects of social and academic language and rhetorical registers*. The second standard requires that teachers understand first and second language acquisition.

Each standard is operationalized through a set of performance indicators and corresponding rubrics that describe three levels of teacher knowledge and skill: approaches standard, meets standard, and exceeds standard. For the purpose of this review, both standards within the language domain were examined to determine those performance indicators that most directly address AE. An explication of the performance indicators that most directly pertain to what teachers should know about AE follows.

The TESOL/NCATE performance indicators call for teacher knowledge of morphology, the structure of words; and an understanding of semantics, and word and sentence meaning. According to Wong Fillmore and Snow (2000), teacher knowledge of these aspects of language is a prerequisite for helping ELLs develop both oral and literacy skills. Though the TESOL/NCATE performance indicators do not describe in any detail what constitutes knowledge of the features of AE, the literature discussed in the previous two sections describes these linguistic features in more detail and the kinds of practices teachers engage in when teaching them (August et al., 2005; Calderón, 2007).

In the area of vocabulary, the performance indicators require that teachers understand and know how to teach multiple meanings of words, including the distinctions between everyday meanings of words and the meanings of words used in an academic context. Yet another performance indicator addresses the teacher's ability to identify key content vocabulary in academic subject areas. Again, research discussed in the previous section has provided a greater understanding of the kinds of word knowledge teachers should have in order to meet these performance indicators (August et al., 2005; Calderón, 2007).

The TESOL/NCATE teacher performance indicators call for teacher knowledge of syntax (phrase and sentence structure) to help ELLs develop written and spoken English. In order to demonstrate that they have met this performance indicator, teachers must know and be able to teach the syntactic structures that enable ELLs to communicate well in both spoken and written form in academic content areas, as well as in other contexts. Research conducted by Halliday (1994), Schleppegrell (2004), and Bailey, Butler, Stevens, & Lord (2007) sheds light on the specific areas of syntax that pose the most difficulties for ELL students in academic texts, particularly those texts students experience beginning in upper elementary grades and throughout middle and high school. These structures include: compound and complex sentences, nominalization and long noun phrases, passive voice, long or multiple prepositional phrases, and modals. If teachers are to help students understand and use these structures characteristic of academic texts, then their knowledge must go beyond how these structures are formed and include a deep understanding of how these structures are used in academic texts to create meaning (Schleppegrell, 2004).

In the area of AE discourse, another performance indicator requires teachers to have the knowledge and ability to distinguish "social versus academic discourse in written and spoken language" (TESOL, 2003). This indicator also states that teachers will be able to explain specific examples of AE through focusing on the important vocabulary, syntax, and discourse structures in oral and written academic contexts. The

[8] The glossary included in this document contains definitions of these linguistic features.

performance indicators also require ELL teachers to have the ability to identify ELLs' AE needs in order to provide instruction. In order for teachers to meet this performance indicator, they must not only be able to recognize AE versus social English, they must have enough knowledge of AE features to know why a particular utterance or text is, or is not, considered AE.

In summary, the TESOL/NCATE teaching standards directly address AE and have the authority to hold institutions that prepare teachers accountable for including these aspects of AE in their ELL teacher preparation curriculum. However, the degree to which programs have revised their curricula to attend to the TESOL/NCATE performance indicators is not clear at this time. According to researchers (e.g., Schleppegrell, 2004;Snow & Ucelli, 2009; Wong Fillmore & Snow, 2000), ensuring that teachers have the knowledge and skill set forth in the TESOL/NCATE standards requires rethinking what constitutes linguistic knowledge for teachers and ways in which this knowledge can be translated into classroom practice.

National Board for Professional Teaching Standards. In 1994, experts in the field of educating ELLs, which included ESL teachers, bilingual educators, and others with expertise in educating ELLs, began the development of advanced professional standards for teachers of students from age 3 to 18 and beyond. The National Board for Professional Teaching Standards (NBPTS) certifies teachers as being highly accomplished educators who have met high and rigorous standards for a particular subject area. The NBPTS certification process involves intensive study, expert evaluation, self-assessment, and peer review. The expectation is that teachers receiving National Board certification demonstrate high levels of knowledge and expertise in their respective content areas.

The English as a New Language Standards Committee translated the five core propositions of the National Board for Professional Teaching Standards (NBPTS) into a document that describes excellent teaching in the field of ELL education (National Board for Professional Teaching Standards, 1998). Despite the promise to set higher standards for expert ELL teaching, the NBPTS English as a New Language Professional Teaching Standards fail to address AE with the explicitness of the TESOL/NCATE standards. In fact, under the standard devoted to knowledge of language and language development, no mention of academic language or AE is made.

In a later section of the NBPTS document devoted to knowledge of subject matter and within the description of the ELD Specialist, very brief reference is made to understanding "the different demands that various language domains present", and having "knowledge of the specialized language of the disciplines in the school curriculum" (National Board for Professional Teaching Standards, 1998, p. IV-18). This oblique reference to AE substantiates Tellez and Waxman's (2006) proposition that the knowledge base referenced in ELL teaching standards is insufficient to describe what quality ELL teachers know and do.

It is important to note that NBPTS is currently revising their English as a New Language Professional Teaching Standards, which the authors of this report recently reviewed. A draft version released for review on the NBPTS website (retrieved July 22, 2009) refers directly to teacher knowledge of academic language and gives greater weight to this knowledge than do the 1998 standards.

Standards and recommendations for content-area teachers. Up to this point, this section has focused on the AE knowledge and skill expected of candidates in ELL teacher preparation programs. There has also been some movement toward specifying expectations for mainstream teacher knowledge of AE. In addition to the accreditation standards NCATE has developed for assessing programs that prepare teachers for instructing special populations, such as ELLs, NCATE also develops accreditation standards to assess the overall teacher preparation program. In the newest version of its standards for accreditation of teacher education programs (National Council for the Accreditation of Teacher Education, 2008),

NCATE has expanded its expectations for content-area teachers with regard to providing instruction to ELL students.

Another source of information on expectations for content-area teachers is the Roundtable Report on teacher quality developed by the National Clearinghouse for English Language Acquisition (Ballantyne, Sanderman, & Levy, 2008). The report stems from the recommendations of a panel of experts convened by the National Clearinghouse for English Language Acquisition (NCELA) under the auspices of the U.S. Department of Education's Office of English Language Acquisition, Language Enhancement, and Academic Achievement for Limited English Proficient Students (OELA). The report represents one response to OELA's strategic priority to "develop policy and program recommendations to improve the professional development of English language learner content teachers" (Ballantyne, Sanderman, & Levy, 2008, p. 2). Together the standards document and the report provide information on the knowledge and skill expected of content-area teachers with regard to AE.

The first of the NCATE standards covers the knowledge, dispositions, and skills teachers must have to educate all their students. This standard states that candidates must have the appropriate knowledge and skill to educate ELLs in the particular content or skill area for which the candidate is seeking licensure (NCATE, 2008). Though not explicitly stated, having the knowledge and pedagogical skill to support ELL mastery of academic content implies that teachers must know how to teach the content and language of their disciplines. The NCELA Roundtable Report references and extends NCATE's first standard by establishing a number of teacher performance criteria. Several of these criteria directly address AE (Ballantyne, Sanderman, & Levy, 2008).

The Roundtable Report's performance criterion on differentiation directly addresses AE. This criterion calls for mainstream teachers to "be able to increase student engagement by identifying language challenges in a text, differentiating material, and grouping students in purposeful and meaningful ways (Ballantyne, Sanderman, & Levy, 2008, p. 33). In order to address language challenges in texts, teachers must understand the linguistic features of academic texts and identify those features that cause the most difficulty for ELLs (Schleppegrell, 2004). Furthermore, in their discussion of the implications of this performance criterion for teachers, the authors state that teachers must be able to make explicit to students the stylistic characteristics relevant to writing in a particular content area. Again, in order for teachers to discuss these characteristics with ELLs, they must have a good command of the features of AE and how they are used to create academic texts such as lab reports in science and persuasive essays in language arts and social studies.

Another performance criterion in the Roundtable Report calls for teachers to "be able to explicitly teach academic vocabulary in context and provide ample opportunity for students to use these words, leading to mastery" (Ballantyne, Sanderman, & Levy, 2008, p. 33). Based on the discussion of AE in this report, it is important to note that providing ELLs support in AE requires much more than attention to vocabulary alone. Despite the limitations of the statement, the authors do point out that AE also includes academic language functions, which is a feature of language discourse. They also recommend that teachers be able to model more complex grammatical structures that students will need to use in writing academic texts (Ballantyne, Sanderman, & Levy, 2008).

Finally, in the Roundtable Report's performance criterion on writing, the authors again state that teachers must be able to point out the unique characteristics of their disciplines' texts. In discussing what this type of instruction entails, they provide examples from history, science, and language arts in which teachers are knowledgeable about the rhetorical structures of specific texts, and the ways in which language is used to signal, for example, that a conclusion is occurring or a fairy tale is in progress (Ballantyne, Sanderman, & Levy, 2008).

Though not a comprehensive resource on the aspects of AE that should be addressed within teacher education programs, the Roundtable Report does provide some guidance on AE for institutions that prepare mainstream teachers to work with ELLs. Given the generic nature of the NCATE standard on mainstream teaching and ELLs, it is difficult to know the degree to which a document such as the Roundtable Report will be used to guide requirements for mainstream teacher preparation programs. Moreover, the NCATE standard's lack of specificity with regard to AE leaves decisions about the importance of preparing mainstream teachers in AE up to individual teacher education programs.

To conclude this section on teacher preparation standards, it is important to note that a major problem with standards and competencies is the lack of guidance on which standards are most important for quality ELL instruction. "Educators have known for many years that the challenge in developing instructional goals is not what knowledge to include but what knowledge can be thoughtfully excluded" (Tellez & Waxman, 2006, p.10). Furthermore, as has been demonstrated here, teaching standards and competencies typically do not have enough specificity to answer the question of what teachers should know about AE in order to support student learning of it. In their review of the research, policies, and practices that inform ELL teacher preservice and inservice programs, Tellez and Waxman question the adequacy of the knowledge base used to guide ELL teaching, and call for "considerable scrutiny" (p.7) of the knowledge base promoted by various professional organizations.

State policies that support preparing all teachers in academic English

Though national standards have informed standard-setting at the state and local level, only state governments have the authority to make teacher education policy. They do so through such means as establishing teacher certification requirements and accrediting teacher education programs. A recent analysis of state requirements for the preparation of content teachers to work with ELLs, found that the majority of states (32) only referenced the special needs of ELLs or referred to language as an example of diversity in their state certification requirements. Fifteen states did not require any training or expertise in working with ELLs. Only four states—Arizona, California, Florida, and New York—have specific requirements for all teachers in the area of ELL education (Ballantyne, Sanderman, & Levy, 2008). Though it is unclear from the state policies in Arizona, Florida, and New York, the degree to which AE is addressed in implementing the requirements, some generalizations can be made based on the nature of the requirements. California policy is more specific with regard to AE and is discussed with some detail in this section.

Arizona. Beginning in 2006, Arizona required that all classroom teachers, supervisors, principals, and superintendents in the state have or obtain an endorsement in structured English immersion (SEI). In its ideal form, SEI refers to a thoughtfully-designed language-sensitive instructional approach meant to assist ELLs in simultaneously acquiring English and grade-appropriate content-area knowledge (Adams, 2005). The SEI endorsement requires that preservice teachers "take three semester hours of courses related to the teaching of English Learner Proficiency Standards adopted by the State Board of Education, including but not limited to instruction in SEI strategies, teaching with the ELL Proficiency Standards adopted by the Board, and monitoring ELL student academic progress using a variety of assessment tools" (Certification, 2005, 613-J).

Inservice teachers and administrators are required to complete a more extensive set of requirements. These requirements include "45 clock hours of professional development in the teaching of the English Language Learner Proficiency Standards adopted by the State Board of Education, including but not limited to instruction in SEI strategies, teaching with the ELL Proficiency Standards adopted by the Board and monitoring ELL student academic progress using a variety of assessment tools through a training program that meets the requirements" of state code for such programs (Certification, 2005, 613-J).

The Arizona requirement that all teachers take coursework in SEI does not necessarily mean that mainstream teachers receive the language training necessary to teach the academic language of their content areas, as is called for by the NCELA Roundtable Report on teacher quality (Ballantyne, Sanderman, & Levy, 2008) discussed above. The primary focus of a typical SEI course, such as that offered by Arizona State University—ELL 415 Structured English Immersion Methods (Arizona State University course catalog, retrieved 9/1809)—is on teaching with structured English immersion strategies. In general, a focus on SEI strategies implies that the course priority is for teachers to learn how to make content comprehensible for ELLs, as opposed to teaching them strategies for developing students' AE. Thus, depending on how the course is actually implemented, preparation for supporting ELLs to learn the academic language of a particular content area may or may not be addressed.

California. California is one state that has been in the forefront for developing K-12 ELL teaching standards and teacher performance assessments that address AE and literacy (Merino, 2007). In addition, a faculty task force representing California institutions of higher education examined the alignment between requirements for high school graduation and the academic literacy and critical thinking skills students need to perform the academic tasks required by entry-level college coursework. Included in the task force report are recommendations for AE instruction for ELLs (Intersegmental Committee of the Academic Senates, 2002). Using information from these varying sources, this section addresses a state-level perspective on what teachers must know and be able to do with regard to AE instruction for ELLs.

California policy makers have targeted ELL issues through the teacher credentialing process, through teacher program standards used in the development of program documents and through "teaching performance expectations" used in candidate assessment (Merino, 2007, p. 3). The teacher credentialing process in California allows for multiple pathways to licensure, most of which require training in ELL instruction. All pre-service K-12 teachers who attend a state approved teacher education program must take the course *Developing English Language Skills*, which is a comprehensive reading course that includes the "systematic study" of language and comprehension (Ballantyne, Sanderman, & Levy, 2008). Though the terms *academic English* or *academic language* are not used, systematic study of language implies, at a minimum, exposure to the concept of academic language.

At the level of teacher program standards, program standard #13 addresses AE by requiring that teacher education programs prepare teachers to "design lessons that promote language development and academic literacy to access and acquire academic content" (Merino, 2007, p. 3). Moreover, the newest version of the program standards gives greater attention to supporting student learning of AE as a means for accessing academic content than was previously the case (Merino, 2007).

California policy makers have also influenced ELL teacher knowledge of AE and pedagogy through teacher performance assessments. Two California standardized teaching performance assessments, the California Teacher Performance Assessment, and the Performance Assessment for California Teachers (PACT), address ELLs. One component of teacher performance on the PACT is the inclusion of AE development within an integrated cycle of lessons. On this performance assessment, AE development is viewed as one of five "independent constructs" (Merino, 2007, p. 4), along with planning, instruction, assessment, and reflection, that is evaluated within the teaching of a cycle of lessons.

The higher education community in California has also been at the forefront for bringing increased attention to AE. The three segments of this community, the University of California, the California State Universities, and the California Community Colleges, issued a position statement on the expectations faculty have for entry-level students' ability to read, write, and think critically (Intersegmental Committee of the Academic Senates, 2002). The report, *Academic Literacy: A Statement of Competencies Expected of Students Entering California's Public Colleges and Universities*, summarizes the results of a survey completed by university instructors of entry-level courses in disciplines as diverse as agriculture, art

history, engineering, sociology, and the humanities. Overall, the document is a response to faculty concern over students' K-12 preparation for the AE skills required by post-secondary level course work.

The report provides yet another perspective on the expectations for teacher knowledge of AE and pedagogy. The report acknowledges the differing perspectives on how AE is best learned by calling for instruction in both the features of academic language and the contexts in which students best learn AE. For example, the report recommends that teachers have the knowledge and ability to help students "learn and practice language features of AE" (Intersegmental Committee of the Academic Senates, 2002, p. 48). Specific features referenced include "grammatical conventions of standard written English, complex sentence structures, punctuation conventions, and vocabulary appropriate for different kinds of writing" (p. 48). The report also recommends that "language features of academic written English are, in general, best taught in the context of actual reading and writing assignments" (p. 48).

In addition to the report's recommendations on AE instruction for teachers of all students, it also specifically addresses the instructional needs of ELLs for developing AE. Instructional recommendations that have implications for the AE knowledge and skill teachers working with ELLs must possess include:

- Explicit instruction on the grammatical forms with which ELLs have particular difficulty,
- Activities that allow for opportunities for ELLs to receive feedback in spoken and written academic language, and
- Explicit, extensive instruction and practice with attending to language forms, such as how specific verb tenses convey different meanings and the structures used to introduce and show relationships among ideas in academic language.

Florida. As with Arizona, Florida requires that all certified teachers who are assigned to teach ELLs must have at least three semester hours, or an equivalent amount of inservice training, in teaching English to speakers of other languages (Ballantyne, Sanderman, & Levy, 2008). The content of the course or inservice training must address "at an awareness level, the five ESOL areas specified in the ESOL certification rule for the ESOL Endorsement" (Florida Department of Education, 2001, p. 5). The ESOL Endorsement areas are:

- Methods of teaching English to speakers of other languages (ESOL),
- ESOL curriculum and materials development,
- Cross-cultural communications and understanding,
- Applied linguistics, and
- Testing and evaluation of ESOL.

Though it is unclear how much weight should be given to each of the five endorsement areas, at the very least the requirement that applied linguistics be included in the course or training indicates that some aspects of AE are addressed. However, whether the course or training addresses AE features at anywhere near the level of detail discussed in previous sections of this report is highly unlikely given the other components the course must include.

Florida elementary teachers, middle- and secondary-level English language arts teachers, and special education teachers who are assigned to teach ELLs are required to have even more training in TESOL than other content-area teachers. Florida requires teachers certified in these areas to have 15 semester hours, or an equivalent amount of inservice training. In addition to the overview course that addresses the five ESOL Endorsement areas, elementary, English language arts, and special education teachers must have training that "thoroughly addresses the state's 25 ESOL Performance Standards" (Florida Department of Education, 2001, p. 5).

ESOL Performance Standard 10 calls for knowledge of the features of AE. This standard requires that teachers be able to "analyze student language and determine appropriate instructional strategies using knowledge of phonology, morphology, syntax, semantics, and discourse" (Florida Department of Education, 2001, p. 20). However the performance indicators that accompany the standard do not address the complexities of supporting ELLs to learn this language as it has been characterized throughout this report. For example, indicators 9 and 10 only require that teachers "categorize and analyze the structure of English sentences" and "recognize methods of grammatical analysis (e.g., traditional, structural, or contemporary)" (p. 20). Indicators of this sort imply that teachers only need to understand the forms and structures of the language, rather than how these forms are used to make meaning within a particular academic context and how to develop learning experiences that support ELL learning and usage of them in academic speaking, reading, and writing.

New York. In New York all teachers that graduate from approved teacher preparation programs must complete six semester hours in non-native and native speaker language acquisition and literacy development (Registration of curricula in teacher education, 2006, (b)(2)(ii)(c)). Though AE development may be addressed within the context of language acquisition or literacy development, there is no explicit reference to it. As with Arizona and Florida, state policy on the content and focus of coursework directed at preparing all teachers to work with ELLs provides little if any guidance on the knowledge and pedagogy needed to develop ELLs' AE.

In summary, with the possible exception of California, state certification and accreditation policies that explicitly require preparation in and development of expertise in AE are nonexistent. In her review of state certification requirements for secondary teachers relevant to supporting ELL language development, Patel Stevens found that only six states specifically "address educational linguistics as a source of competency for some of its teachers" (Patel Stevens, 2008, p. 320). The author also points out that even when a course of this type is required, it may not address the nuances and other features of academic texts relevant to developing ELLs' AE. In discussing the results of her research, Patel Stevens stresses that policy is important both for what it says, and for what it leaves out. She states that " the profound silence of language knowledge and research required for secondary teachers speaks to an irrelevant, outdated and unrealistic view of who is found in contemporary classrooms in the United States" (p. 325).

Improving teacher preparation in academic English

It is clear from the preceding discussion that teacher preparation policies and practices regarding AE are in their infancy. This section concludes with a discussion of approaches the literature recommends for improving teacher preparation in AE.

Perhaps the most rigorous proposal is Wong Fillmore and Snow's (2000) call for the "systematic and intensive preparation" of teachers in what they term "educational linguistics" (p.4). They recommend that teachers have the linguistic knowledge and skill to help students use the language associated with the academic discourse of school subjects and develop awareness of how language modalities (speaking, listening, et cetera) function across different academic contexts. For example, science teachers would plan instructional activities that help students speak, read, and write the discourse of science. ELL teachers would develop students' awareness of how speaking, reading, and writing in more social contexts differ from speaking, reading, and writing at school. All teachers would have the linguistic knowledge to select materials that help students develop increasingly sophisticated language skills and plan instructional activities that provide opportunities for students to use language in new and increasingly complex ways.

To prepare teachers to engage in this type of instruction, Wong Fillmore and Snow suggest that additional courses be included in the teacher preparation curriculum. These courses would address teachers' preparedness to work with ELLs as well as with other students who struggle to meet the language and literacy demands of school. Though all seven courses emphasize aspects of AE, the two courses that

address it most directly are "The Language of Academic Discourse" and "Text Analysis and Language Understanding in Educational Settings" (Wong Fillmore & Snow, 2000). A description of the content of these courses is provided in Table 3.

Table 3. Educational Linguistics Courses

Course Title	Description
The Language of Academic Discourse	This course would focus on the language used in teaching and learning school subjects, especially the structure of academic discourse and how this register contrasts with that of informal communication. The course would show how language production and language understanding interact with content learning—science, social studies, math, and so on—and how children's language development is promoted or not, depending on how language is used in instructional activities.
Text Analysis and Language Understanding in Educational Settings	A course like this would examine how language structures and style in written texts affect comprehensibility. It would guide teachers in deciding what aspects of text to target for instructional attention. Special attention in this course would be given to the needs of ELLs and vernacular dialect speakers in processing text (Wong Fillmore & Snow, 2000).

A common criticism of the authors' recommendations for improving teacher preparation in language is the addition of significantly more coursework to the teacher preparation curriculum (Baca & Escamilla, 2002; Richardson, 2002; Walker, Ranney, & Fortune, 2005). Teacher educators caution that there are continuous demands for additional teacher preparation topics (Walker, Ranney, & Fortune, 2005; Richardson, 2002) and that there is a limited amount of time and credit hours to address requests for new courses. Though most authors agree that the teacher knowledge base Wong Fillmore and Snow call for is needed, they contend that the addition of seven courses to the teacher preparation course load is not a practicable solution (Baca & Escamilla, 2002; Richardson, 2002; Walker, Ranney, & Fortune, 2005).

Baca and Escamilla (2002) offer several alternative approaches that address the language content Wong Fillmore and Snow recommend without over extending the teacher preparation course load. They suggest, for example, having trained language specialists coach teacher educators and teachers on how to integrate the language content into existing teacher education courses and classroom instruction. Another suggestion is that the seven courses be distributed throughout undergraduate, graduate, and professional development programs. Finally, they point out the important role that state content standards play in guiding instruction. Since schools and school districts attend to standards, the integration of language-oriented standards into content standards should be considered and would have important implications for AE instruction (Baca & Escamilla, 2002).

A case study of a course designed to prepare elementary and secondary teachers in language-sensitive instructional practices for ELLs, without adding new coursework, provides another perspective on preparing content teachers to address academic language (Walker, Ranney, & Fortune, 2005). The course, developed at the University of Minnesota, was designed as a one-credit seminar to facilitate teachers viewing themselves as language teachers as well as content teachers. The course addresses basic understandings needed by all teachers who provide instruction to ELLs. These understandings include knowledge of ELL student characteristics, teacher misconceptions of ELLs, second language development, and effective instructional approaches. However, what makes this course unique and enables it to specifically address AE is the way in which it is tailored to different grade levels and content areas.

The course, as described by Walker, Ranney, and Fortune (2005) is offered in different sections or "mini-courses." Each mini course is designed to help a cohort of preservice teachers understand the integration of language and content within their own teaching and learning context and to understand their roles in ELL language development. Because elementary teachers are responsible for developing children's literacy skills, the elementary section of the course focuses on the development of literacy in a second

language, challenges and strategies for teaching reading and writing to ELLs, and ways of developing oral language.

The authors (Walker, Ranney, & Fortune, 2005) make the point that since secondary teachers are responsible for a particular subject area domain, secondary sections of the course are divided by content area, and special focus is given to the language demands of the texts and curriculum of the content area. For example in the mathematics section of the course, mathematics teacher candidates analyze math textbooks and are guided to examine the linguistic demands of the texts by looking for particular features, such as vocabulary and grammatical patterns (e.g., passive voice), that are difficult for ELLs. In another section of the course, English language arts teacher candidates examine ELL student writing that demonstrates common error patterns and are introduced to grammatical explanations that can help ELLs improve their writing. The course developers contend that by varying course content and focus to different subject-area and grade-level contexts, preservice teachers are more likely to view themselves as language teachers, as well as content teachers, and thus are more prepared to support ELL language development.

Results from the case study of the course indicated that course takers gained the following knowledge: (1) ELLs require a much longer amount of time to demonstrate proficiency on academic content tests than participants previously thought, (2) there is a difference between social English and academic language, (3) practices that support ELLs benefit all students, (4) the first language supports development in the second language, and (5) language is a resource rather than a problem. Though it is unclear whether the teachers taking the course learned how to support ELL academic language development in their classrooms, the fact that teachers were exposed to the language demands of their grade level or content area and gained an understanding of the differences between social and academic language is encouraging (Walker, Ranney, & Fortune, 2005).

The inclusion of AE in standards and specially-designed courses are not the only means for improving teacher preparedness to support ELL academic language development. A recent study that involved teacher inquiry found that teacher research projects can impact teachers' perceptions of their preparedness to teach academic language (Merino, 2007). For the teacher research projects, graduate students conducted a case study and an intervention study. Graduates and faculty who were surveyed regarding these projects found that, among other things, an effective feature of this approach to teacher inquiry was the "focused attention on the academic language demands of the discipline standards, combined with guided reviews of the literature to identify pedagogically sound ways to address these demands" (p. 6). The research findings led to the implementation of a Credential/MA program at the University of California, Davis, that focused on preparing teachers to work with ELLs.

The teacher preparation documents, policies, and literature discussed in this section of the report shed light on the degree to which the programs that prepare ELL and mainstream teachers require the development of expertise in AE. With the exception of the TESOL/NCATE program standards for ELL preservice candidates, the standards and the competencies literature make only vague reference to AE or fail to mention it at all. At the state policy level, only California has begun to expect teachers to understand and apply AE in the classroom. As the NCELA Roundtable Report makes clear, most state policies on mainstream teacher certification and on teacher program accreditation, make only vague reference to the special needs of ELLs or to language diversity (Ballantyne, Sanderman, & Levy, 2008). This lack of specificity in guidelines for teacher preparation and certification means that the majority of new teachers will enter classrooms with only a limited understanding of the complexity of AE and of the difficulties ELLs and other students encounter in learning this language.

Professional Development in AE

The previous section of this literature review described the challenges facing pre-service education in providing teachers with the knowledge and skill needed to support ELLs' AE development. Tellez and Waxman (2004) point out that though teacher preparation programs can make improvements in how teachers are prepared to support student learning of AE, school districts must also provide comprehensive, long-term professional development programs that extend teachers' knowledge of and ability to support ELLs' AE development.

A recent research synthesis on teacher professional development on ELLs found very few studies that address the effectiveness of professional development programs for teachers of ELLs (Knight & Wiseman, 2006). Furthermore the research that does exist often does not address AE directly, or addresses it as one component among many.

The few studies selected for inclusion in this report focus on professional development on teaching AE within the content areas of science and English language arts. These particular studies were selected because there is a growing body of research indicating that teachers perceive that professional development is most useful when it addresses a teacher's academic discipline (e.g., Garet, Porter, Desimone, Birman, & Yoon, 2001).

This finding is also applicable to ELL professional development. According to Ballantyne, Sanderman, and Levy (2008), professional development focused on learning the academic language demands of a teacher's specific content area (e.g., mathematics, science, et cetera) is perceived as more useful than professional development on second language acquisition in general. Thus, general concepts, such as second language acquisition and the differences between informal and AE should be contextualized within each teacher's area of expertise (e.g., Ballantyne, Sanderman, & Levy, 2008). The studies reported on in this section of the report examine teacher perceptions of the usefulness of professional development within a content area, and to a more limited extent, the intersection between the professional development and change in teaching practice.

Science

In the first of a series of studies, Hart and Lee (2003) describe the results of a teacher professional development intervention aimed at helping elementary teachers to promote science and academic literacy achievement for culturally and linguistically diverse students. The researchers examined the results of the first-year professional development efforts and reported on two of the study's main objectives: (1) teachers' initial beliefs and practices about teaching academic language and literacy in science, and (2) the impact of the intervention on teachers' beliefs and practices. The study was conducted at six elementary schools and involved 53 third- and fourth-grade teachers in a large school district in which a significant percentage of the participating teachers' students were ELLs. Data sources for this study were: 20 focus group interviews with the participating teachers, self-report pre- and post-questionnaires, and two classroom observations of each teacher engaging in science instruction.

The professional development prepared teachers to implement a science and language intervention which involved teaching two instructional units at each of the two grade levels over the course of an academic year. Four full-day workshops were devoted to science inquiry and integrating academic language and literacy in science instruction. Descriptions of the instructional units indicate that instruction in academic language was an integral part of the intervention. The authors state that a "variety of language functions (e.g., describe, explain, report, draw a conclusion)" (Hart & Lee, 2003, p. 483) were part of the curriculum as were lessons on key academic vocabulary. Aspects of vocabulary that were given explicit attention included words that supported precision in describing objects and events (e.g., positional words), comparative terms, and affixes.

The authors concluded from analyses of the pre- and post-focus group interview data that teacher responses following the intervention indicated a "broader conceptualization of literacy in science instruction" (Hart & Lee, 2003, p. 489). This change in perception from a more "surface-level" (p. 489) understanding of science literacy was evidenced by teacher responses that were more diverse, greater in number, and more integrated with science content. These responses included having students explain scientific phenomena, eliciting higher-level questions to generate discussion, developing science vocabulary activities, and having students describe in writing their science fair projects. The authors concluded from their analyses of the observation data that though there was no statistically significant change in reading and writing teaching practices, there was a statistically significant change in teacher use of linguistic scaffolding.

Despite these results, the authors indicate that the participants did not report increased knowledge about or skill in fostering literacy on the post-questionnaire. The authors explain this finding in the following manner: "This may be because increased knowledge about literacy resulting from professional development created in teachers an awareness of the need for improvement in a domain in which they formerly felt relatively confident…. As opposed to leaving teachers feeling better equipped to integrate literacy and science, professional development may have served primarily to make them aware of the limits of their knowledge" (Hart & Lee, 2003, p. 493).

In a subsequent study, Lee, Deaktor, Enders, & Lambert (2008), examined the impact of the professional development intervention on the integration of science inquiry and academic language on student outcomes. Using project-developed science tests for students at the targeted grade levels—3rd, 4th, and 5th grades—the researchers studied students' "inquiry abilities" over the three year period of the intervention. Significance tests of mean scores between pre- and post-tests indicated statistically significant increases each year on all measures of the project-developed tests.

The researchers (Lee, et al., 2008) also conducted comparisons of the project-developed test items with items from the National Assessment of Education Progress (NAEP) and the Trends in International Mathematics and Science Samples (TIMSS). These comparisons suggested overall positive performance by the students of teachers who had participated in the professional development intervention at the end of each school year. Of particular interest were the substantial gains made by low achieving, low socio-economic status, and ESL-exited students. Gains made by these students exceeded the gains made by mainstream students, and thus provide some evidence for the effectiveness of the intervention for reducing the achievement gap between monolingual mainstream students and ELL students. Despite the positive effects of the intervention, the authors note that students did not experience success with all aspects of the inquiry task.

In current research, the team (Lee, LeRoy, Adamson, Maerten-Rivera, Thornton, & Lewis, 2008) is investigating the questions of a) whether ELLs can learn academic subjects, such as science, while also developing ELP; and b) whether ELLs who learn to think and reason scientifically also perform well on high stakes testing. The research involves third through fifth grade teachers at 15 elementary schools in a large urban district. The first part of this five year study examined teacher beliefs about the intervention. Data collection included a teacher questionnaire, classroom observations, and post-observation interviews. Initial findings at the end of the first year of this five year intervention indicated that teachers believed that the intervention, which included curriculum materials and teacher training, supported ELL students' science and mathematics learning and language development.

A separate but related study (Stoddart, Pinnal, Latzke, & Canaday, 2002) involved a five-week professional development intervention focused on integrating inquiry-based science with academic language development. The authors of this article describe academic language from a functional perspective:

> Academic subjects, such as science, have a linguistic register—norms and patterns of language use essential to the practice of the discipline (Halliday, 1978)…. [including] formulating hypotheses, proposing alternative solutions, describing, classifying, using time and spatial relations, inferring, interpreting data, predicting, generalizing, and communicating findings…. The use of these language functions is fundamental to the process of inquiry science (p. 665).

This quasi-experimental study involved 24 elementary school science teachers of predominantly Latino ELL students. Based on a conceptual framework for integrating ELD with inquiry-based science, the researchers developed a five-level rubric to assess teachers' understanding of science and language integration. Then, based on interviews with the 24 teachers, they provided exemplars of teacher thinking at each level in the rubric. The methodology used to study this intervention included pre- and post-intervention interviews, which were analyzed using the five-level rubric.

The researchers' preliminary analysis of teachers' work during the professional development (PD) program indicated changes in teachers' understanding of science and language integration (Stoddart, Pinnal, Latzke, & Canaday, 2002). Prior to their participation, the majority of teachers viewed themselves as well-prepared to teach science or language, but not both. After their participation in the PD program, the majority of teachers believed they had improved in the domain in which they had initially felt less prepared. This change typically involved a shift from a restricted view of the connections between inquiry science instruction and second language development to more elaborate reasoning about the different ways the two could be integrated.

The studies reviewed here suggest that professional development can impact teachers' conceptualizations of the role and importance of AE in learning science. There is also some evidence that professional development on teaching the academic language associated with a particular content area, such as science, can increase the attention teachers give to scaffolding AE within content instruction. Finally, the results of one study indicated that teacher professional development in AE positively impacted student outcome measures for ELLs who had exited ELL programs.

English language arts

The final study reviewed in this section focused on teacher professional development in AE writing within the content area of English language arts. In contrast to other studies reviewed in this section, this study did provide a conceptual framework from which to examine professional development on AE. Analysis of ELL student writing has indicated that a limited focus on sentence level grammatical errors or overall structure is not sufficient to address the kinds of errors that occur in ELL student writing. Teachers need deeper knowledge of the features of academic language within subject area domains in order to adequately address ELL writing difficulties (e.g., Schleppegrell, 2004). Based on these premises, a team of educators and researchers (Aguirre-Munoz, Parks, Benner, Amabisca, & Boscardin, 2006) created a professional development intervention that provided teachers with an alternate approach to addressing the issues occurring in ELLs' academic writing.

The functional linguistics approach (SFL) was used as the basis for the professional development intervention because it "provided direct guidance for analysis of language use in texts containing academic language and guidance as well in the analysis of student writing in a manner that more directly fosters the development of students' academic language development" (Aguirre-Munoz, et al., 2006, p.4). Using this approach to AE the team developed training modules that focused teachers' attention on specific linguistic features of a specific genre of text—in this case a character study--that promoted

cohesion across sentences within a particular genre of writing. Lack of cohesion in writing, particularly in the area of clause to clause linkages is a major difficulty for many ELL writers. Strategies for creating cohesion, including the use of nominalization[9], long noun phrases, and prepositional phrases, were emphasized in the teacher training and in subsequent classroom instruction.

The training modules were used over the course of four days and focused on the concepts of functional linguistics including strategies for applying them in instruction. The modules also incorporated two instructional strategies— instructional conversations[10] and readers' and writers' workshop. Participants were 12 teachers from five school districts in southern California with varying levels of teaching experiences.

The effectiveness of the professional development program was measured through teachers' perceptions of their ability to use assessment and instructional processes with ELLs, and in their ability to describe the strengths and weaknesses of students' essays from a functional linguistic perspective. Instruments used to determine the effectiveness of the training were 1) pre- and post-training surveys of teacher experience, preparation, assessment/instructional processes and attitudes; and 2) pre- and post-tests of teachers' ability to apply the functional linguistics concepts to student writing.

Findings from this study include teachers' reports of increased levels of understanding of ELLs' writing development, improved analyses of student writing to inform instruction, and more specific feedback on student writing. There were also differences in teachers' pre- and post-test responses to problem identification in student essays. Whereas pre-test feedback on student writing had focused on either mechanics (spelling, sentence fragments) or on global issues, such as organization, post-test feedback was much more specific and related to training content. This feedback included pointing out weaknesses in noun phrases, verb phrases, and connections between clauses. In general a trend emerged in which teachers moved from feedback that was vague (e.g., develop ideas more) to more specific (e.g., expand noun phrases). In general, the researchers concluded that the results indicated that the institute was effective in training teachers to examine student writing from a functional linguistics perspective and to generate instruction that could improve student understanding of a written character study.

An important contribution of this study (Aguirre-Munoz, et al., 2006) was the effort to ground the professional development in an approach to AE that could address both teacher development in understanding AE and provide teachers with instructional tools they could use to support ELLs' AE development. The use of functional linguistics allowed the researchers to achieve both goals. The study also showed improvements in teacher understanding of AE and in the level of specificity of the feedback teachers were able to provide on student writing. However, the researchers did not study teachers' implementation of the new feedback strategies in the classroom, nor did they measure effectiveness by examining whether student writing improved after instruction using functional linguistics.

Together, this group of science and language arts professional development studies demonstrates that high quality professional development can provide meaningful learning experiences for teachers on AE within the content areas. Teacher beliefs and practices about language can be successfully challenged and

[9] *Nominalization* is the use of a verb or adjective (germinate) as a noun or noun phrase (germination). The suffix "-ion" is commonly used to "nominalize" verbs or adjectives. In academic writing and speaking, nominalization allows the writer or speaker to condense a lot of information, such as a process, into one word.

[10] *Instructional conversations* is a methodology in which students engage in extended discussions or conversations among themselves or with the teacher in order to explore ideas.

changed when professional development provides teachers with a deeper understanding of the role of language in academic learning, when it is ongoing, and when it is directly relevant to the content teachers are teaching.

Despite these positive findings, research on professional development in AE is in its infancy. An important consideration for future research is to pay greater attention to how AE is defined and operationalized within professional development interventions. It is not enough to show improvements in teacher understanding and application to practice without attending to and carefully describing how AE is being conceptualized within a particular content area and within instruction. Without such attention, studies cannot be replicated, nor can they inform policy or practice. Finally, research is just beginning to examine the impact of professional development interventions on student outcomes. These studies will also need to provide sufficient information on the nature of AE as it is being operationalized within the professional development interventions so applications to policy and practice can be made.

Recommendations for Research on Teacher Preparation and Training in AE

It is clear from the literature and the standards and policy documents reviewed here that there are beginning to be requirements for teachers who work with ELLs to have a deeper knowledge of AE. According to the literature reviewed in previous sections of this report that knowledge would include, at a minimum, an explicit understanding of how AE differs from social language, and an ability to make explicit to students the features of AE and how these features are used within particular academic contexts. In order to understand how to develop this knowledge in teachers, a systematic approach to research is needed.

As a first step, research should document the varying ways in which AE is addressed within NCATE accredited teacher education programs for elementary and secondary teacher candidates. Case studies of the coursework designed to address AE, such as the Walker, Ranney, and Fortune study (2005) reviewed in this report, would provide information on differing approaches used to educate teachers in this area. Some of the questions that would inform this research include:

1. What theoretical approaches to AE are evident in teacher education programs across the country?
2. In secondary-level teacher education programs, is AE addressed through a stand-alone course or is it integrated with content-area methods courses?
3. How are either stand-alone or integrated courses designed?
4. For ELL teacher education programs, how are the features of AE, as outlined in the TESOL/NCATE standards, addressed?

A second step in a systematic approach to research would include follow-up studies comparing the AE instructional practices of teachers from different graduate programs. This research could examine the degree to which first-year teachers from programs with differing approaches to AE have implemented AE instructional practices with their ELL students. Studies of this type would provide information on the effectiveness of various teacher education programs. For example, is a stand-alone course on educational linguistics more or less effective in terms of implementation of AE practices than an approach in which knowledge of AE is integrated into content-area methods courses?

Likewise, professional development efforts that focus on AE should be documented so that the theoretical approach to AE and the practices and activities used to conduct the professional development are clear. Evaluation of the impact of professional development is useless without clear documentation of the content and approach taken. This report discussed several studies that used the functional linguistic approach to AE development. Additional research that operates from this or other theoretical approaches

and that fully describes the content and procedures used to conduct the professional development would do much to inform programming both for ELLs and for teachers of ELLs.

Conclusions and Research Priorities

One of the purposes of this review of literature on AE was to assess the progress research has made toward a more thorough understanding of AE and how it is taught and learned. As the discussion has made clear, progress is uneven and research is still evolving. Moreover, the diversity of the ELL population is given only minor emphasis in the literature reviewed. Nevertheless, common themes and considerations are evident within each of the main inquiry areas that have focused the review.

In characterizing AE, three general themes emerged: 1) contexts of AE use; 2) diverse registers or varieties of language that reflect the disciplines and sub-disciplines across school settings; and 3) features of language such as academic vocabulary, grammar and discourse as they are related to the modalities of listening, speaking, reading and writing. The theoretical frameworks described in the review tend to emphasize one or all of these elements.

According to much of the literature, AE cannot be described apart from the context in which it is used. The context exemplified in the review ranges from the school or classroom setting at different grade levels to teacher expectations for academic reading, writing or discussions to the types of texts or discourse that are brought into play during instruction.

Related to context are the different registers of language that include AE as it is used in science, mathematics, social studies, language arts, and other content areas, as well as the language used for classroom routines and to interact socially within school settings. A consistent message from the literature is the importance of describing patterns of language use as they relate to particular situations and purposes. Common to many of the approaches to conceptualizing and defining AE are descriptions and examples that document the linguistic competence necessary for accessing content through listening, speaking, reading, and writing tasks. Examples from the frameworks include knowledge of vocabulary common to academic texts read in the classroom, and grammatical and discourse structures common to specific academic genres of writing.

The literature calls for empirical evidence that confirms and integrates these and other essential elements of AE into a nationally accepted framework. One recommendation drawn from the review is to develop a framework of AE that could be used to guide states in making instructional, professional development, and assessment decisions. Ideally, this framework would be based on a collaboration of professional communities that includes experts in different areas of education and linguistics.

Several conclusions can also be drawn from the literature on AE instruction reviewed in this report. First, the literature demonstrates that instruction may be influenced by the particular view of AE held. This view, in turn, is determined by the dialogue that occurs within and, to a limited extent, across educational communities. For example, educational communities that view language as social identity tend to emphasize instruction focused on classroom discussion of academic concepts and the ways in which students make sense of these concepts. Through this discussion, teachers support students' AE development by helping them to use language to clarify their thinking and make connections to what texts, the teacher, and other students have said. On the other hand, educational communities that view language from a linguistic orientation emphasize instruction in the linguistic features of AE, such as vocabulary, grammar, and conventions of academic discourse. Though this report has shed light on the various conceptions of language and their implications for instruction, claims as to the effectiveness of one instructional approach over another cannot be made based on the research available at this time.

Second, the literature shows that improving students' AE is a concern not only for educators of ELLs, but also for educators from subject areas such as science, mathematics, social studies, and language arts. Experts tend to agree that AE is more difficult to learn than other language registers; not only ELLs, but also students from a broad spectrum of backgrounds have difficulty learning it. Thus, formulating and providing students with educational experiences that promote the learning of AE is critical for all content areas. What is not clear from the available research is how these educational experiences should vary depending on whether the student is an intermediate-level ELL, an advanced-level ELL, a speaker of a non-standard dialect, or a student who has never learned AE.

A third conclusion that can be drawn from the literature on AE instruction is that there are differences in AE across content areas which must be accounted for in instruction. For example, in science, students are expected to use language to substantiate scientific claims; whereas in social studies, students must demonstrate command of the language used to analyze an event or make an argument. In all of the content areas discussed, there is an expectation that the teacher address lexical, syntactic, and semantic features specific to the discipline.

Another finding from this review is that, in general, instructional practices have been shaped by one-dimensional views of AE rather than more comprehensive perspectives. The literature reviewed here makes the point that instruction focused only on individual language features such as academic vocabulary does not fully address the challenges of AE acquisition. According to multiple authors, AE includes not just vocabulary but also complex grammatical structures and discourse patterns that contribute to cohesion and coherence in communication. The different purposes or functions of language and the thought processes that connect to language are also addressed.

A final implication of the AE instructional literature is to examine more carefully the effect of classroom interactions on AE acquisition. The literature gives some support to the idea that opportunities for engaging students in AE means rethinking the ways teachers approach both language and content instruction. It calls for a better balance between teacher and student talk, and instruction in which modeling of academic discussions and questioning techniques occurs. The literature also demonstrates the importance of instruction that provides opportunities for students to use AE as it is used in professional and academic communities, and to develop students' metalinguistic awareness of AE features.

These implications from the literature on conceptualizing and providing instruction in AE lead to the third area of inquiry, the issue of educating teachers. The literature recognizes the importance of identifying the specific skills and knowledge necessary to develop a deep understanding of AE and implement AE instruction. However, current teacher education standards, the competencies literature and state policies on teacher certification and program accreditation do not provide sufficient guidance, particularly for content-area teacher education, on what teachers should know and be able to do with regard to AE. Additionally, research on teacher professional development on AE is just beginning to thoroughly document and evaluate results of varying approaches to developing knowledge and skill in AE.

Though there are somewhat clearer expectations for ELL teachers on the AE knowledge and skills they should possess, the literature indicates that AE language development is a responsibility not only of ELL teachers but of content-area teachers as well. An important implication of the teacher education literature is the need for greater collaboration between the ELL and content-area professional organizations that develop teaching and program standards. A collaborative approach to defining standards for ELL and content-area teachers could provide better guidance to the field on the knowledge, skills and practices required of all teachers. Likewise, a major implication of the professional development literature is that more rigorous and ongoing research on professional development in this area is needed in order to provide guidance to the field on effective practice.

Based on the conclusions and implications discussed above, overall priorities for research include the following.

- A systematic approach to documenting and describing the AE demands of teacher-student interactions, teacher talk, textbooks, and assessments. Such an approach could result in a commonly accepted framework of AE that could be used to guide states and districts in making instructional, professional development, and assessment decisions.
- Research that identifies the specific demands AE places on ELLs and the ways in which AE is used in different school settings.
- Studies of the impact of different approaches to AE instruction on student AE acquisition.
- Explorations of the effect of classroom interactions on the development of AE in ELLs.
- More rigorous documentation and evaluation of professional development programs designed to develop teacher knowledge and skill in AE.

For each of the potential investigations outlined here, the expectation is that research into AE will consider the influence of different levels of student educational experiences, ELP, culture and language. ELLs are not a homogenous group. Attention to their different characteristics is an essential feature of meaningful research in this area.

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APPENDIX

Literature Review Methodology

Appendix

Literature Review Methodology

The collection of documents for the literature review was guided by four areas of inquiry agreed upon by the U.S. Department of Education and the contractor. These areas were: 1) defining academic English (AE); 2) AE teaching practices; 3) teacher preparation and training in AE; and 4) policies on AE in states with large populations of ELLs (Arizona, California, Florida, Illinois, New York, and Texas). Within each area, the review focuses on the K-12 setting. *Key* questions, originally provided by the U.S. Department of Education, were refined to help guide the search for relevant documents within the four inquiry areas. Table A-1 lists these questions by inquiry area.

Table A-1. Inquiry Areas and Questions Guiding the Literature Review

Inquiry Areas	Key Questions
Defining and operationalizing AE	How is AE in K-12 classrooms defined and operationalized? What additional research is needed in order to provide guidance on operationalizing AE?
AE teaching practices	What information is available on teaching AE to ELL students in K-12 classrooms? What additional research is needed to provide guidance on teaching AE to ELL students in K-12 classrooms?
Teacher preparation and training in AE	How are English as a second language (ESL)/bilingual and content teachers being prepared and trained to teach AE? What are the expectations for ESL/bilingual and content-area classroom teachers in teaching AE to ELL students? What additional research is needed to provide guidance on the preparation and training of ESL/bilingual and content teachers to teach AE?
State policies on AE	Do states provide any guidance on AE in state polices? If so, what type of guidance is provided?

A broad collection of documents was compiled for the review, including information on the topic drawn from research published in professional journals, practitioner handbooks, policy documents, and from other sources that exercise due professional diligence in describing and discussing educational issues. The assessment of documents for inclusion in the report centered on: 1) the presence or absence of a clearly defined purpose, 2) the degree to which the research and other information discussed in the document matched the author(s)' purpose, and 3) the quality of the discussion of findings. Quantitative and qualitative studies as well as information on the range of expert opinions that exist on the topic of AE have been included. It is important to note that although AE is defined from different theoretical and research perspectives, the report does not privilege a particular definition or viewpoint.

There were several issues in conducting the literature review that may affect the application or interpretation of findings. First, there is a scarcity of research on AE. Eligibility for inclusion in the review was thus necessarily broad. Although highly relevant to the topics of interest, few of the documents reviewed represent quantitative or large-scale studies; or describe methods, populations, or settings in enough detail to fully assess the strength of the findings discussed.

Second, literature pertaining to the teaching of AE for all students was included when curricular or instructional implications for ELLs could be made. The decision to include this literature was made because there is no definitive research at this time indicating that instructional methods for teaching AE to ELLs should differ significantly from methods used to teach other students who face similar difficulties in acquiring AE. It is important to note that the target of proficiency in AE is the same for all students. The documents identified for inclusion in the review have been classified into methodological groupings: action research, descriptive study (which includes case study, classroom observation, exploratory analysis), correlational study, expert opinion based on research, linguistic analysis, literature review/synthesis (large-scale documentation of the available research), quasi-experimental study, state

policy, and teaching standards. Table A-2 describes the levels of evidence supporting findings and conclusions reported in the review. Only some of the more major sources of evidence are included; additional sources are listed in the references.

Table A-2. Document by Type of Evidence

Author	Type of Evidence	Includes ELL Focus (Y/N)	Age/Grade Level*
Adams, T.L. (2003)	Expert opinion based on research	N	K-12
Adger et al. (2002)	Expert opinion based on research	Y	K-12
Aguirre-Munoz, et al. (2006)	Quasi-experimental study	Y	6th
August et al. (2005)	Literature synthesis/review	Y	K-8
Baca & Escamilla (2002)	Expert opinion based on research	Y	K-12
Bailey (2007)	Multiple types of evidence	Y	K-12
Bailey & Butler (2002/03)	Descriptive study/linguistic analysis	Y	
Bailey & Butler (2007)	Descriptive study/linguistic analysis	Y	
Bailey, Butler, Stevens, & Lord (2007)	Descriptive study	Y	4th/5th
Bailey & Heritage (2008)	Expert opinion based on research	Y	K-6
Bailey & Huang (submitted)	Descriptive study/expert opinion based on research	Y	K-12
Ballantyne et al. (2008)	Expert opinion based on research	Y	K-12
Brenner (1998)	Descriptive study	Y	9th-12th
Bruna et al. (2007)	Descriptive study	Y	9th
Bunch (2006)	Descriptive study	Y	7th
Butler et al. (2004)	Descriptive study/linguistic analysis	Y	5th
Butler et al. (2007)	Descriptive study/quasi-experimental study	Y	3rd, 7th, 11th
Calderón (2007)	Expert opinion based on research	Y	3rd
Calderón, et al. (2005)	Quasi-experimental study	Y	3rd
Carlo et al. (2005)	Quasi-experimental study	Y	4th/5th
Carr et al. (2006)	Expert opinion based on research	Y	7th-12th
Christie (2002)	Descriptive study/linguistic analysis	Y	primary, secondary
Coxhead (2000)	Linguistic analysis	Y	postsecondary

Table A-2. Document by Type of Evidence

Author	Type of Evidence	Includes ELL Focus (Y/N)	Age/Grade Level*
Echevarria et al. (2006)	Quasi-experimental study	Y	6th-8th
Gandara & Maxwell-Jolly (2006)	Expert opinion based on research	Y	K-12
Gebhard et al. (2007)	Descriptive study	Y	5th
Gee (2005)	Expert opinion based on research	Y	K-12
Gee (2008)	Expert opinion based on research	Y	elementary
Gibbons (1998)	Descriptive study/linguistic analysis	Y	9-10 year olds
Gollnick (2002)	Expert opinion based on research	Y	K-12
Hart & Lee (2003)	Quasi-experimental study	Y	3rd-4th
Hayes & Salazar (2001)	Quasi-experimental study	Y	K-12
Horowitz (2008)	Expert opinion based on research	Y	K-adult
Intersegmental Committee of the Academic Senates (2002)	Expert opinion based on research	Y	K-12
Irujo (2007a)	Expert opinion based on research	Y	K-12
Irujo (2007b)	Expert opinion based on research	Y	K-12
Irujo (2007c)	Expert opinion based on research	Y	K-12
Kinsella (1997)	Expert opinion based on research	Y	upper elementary, secondary
Knight & Wiseman (2006)	Literature synthesis/review	Y	
Lee, Deaktor, Enders, & Lambert (2008)	Quasi-experimental study	Y	3rd/4th
Lee, LeRoy, Adamson, Maerten-Rivera, Thornton, & Lewis (2008)	Descriptive study	Y	3rd/5th
Meltzer & Hamann (2005)	Literature synthesis/review	Y	adolescents
Merino (1999)	Descriptive study	Y	K-12
Merino (2007, summer)	Expert opinion based on research	Y	K-12
Milk et al. (1992)	Expert opinion based on research	Y	
Mohan & Slater (2006)	Descriptive study	Y	9th
Moje (1995)	Descriptive study	N	high school
Moschkovich (2002)	Expert opinion based on research/linguistic analysis	Y	K-12

Table A-2. Document by Type of Evidence

Author	Type of Evidence	Includes ELL Focus (Y/N)	Age/Grade Level*
National Association for Bilingual Education (1992)	Teaching standards	Y	K-12
National Council for the Accreditation of Teacher Education.	Teaching standards	Y	K-12
National Board for Professional Teaching Standards (1998)	Teaching standards	Y	K-12
Patel Stevens (2008)	Descriptive study	Y	secondary
Registration of Curricula (2006)	State policy	Y	K-12
Scarcella (2003)	Expert opinion based on research/linguistic analysis	Y	K-postsecondary
Scarcella (2008)	Expert opinion based on research	Y	4^{th}-12^{th}
Schleppegrell (2001)	Linguistic analysis	Y	
Schleppegrell (2004)	Expert opinion based on research	Y	
Schleppegrell (2007)	Linguistic analysis	Y	
Scott et al. (2003)	Descriptive study	Y	5^{th}-7^{th}
Short (1994)	Descriptive study/linguistic analysis	Y	middle school
Snow (2008)	Expert opinion based on research	Y	pre-K-12
Snow & Uccelli (2009)	Multiple types of evidence	Y	K-12
Spanos et al. (1988)	Descriptive study/linguistic analysis	Y	post-secondary
Stoddart et al. (2002)	Quasi-experimental study	Y	elementary
Szpara & Ahmad (2007) September/October)	Descriptive study	Y	high school
Tellez & Waxman (2004)	Expert opinion based on research	Y	K-12
Tellez & Waxman (2006)	Expert opinion based on research	Y	K-12
Teachers of English to Speakers of Other Languages (2003)	Teaching standards	Y	K-12
Valdes (2004)	Expert opinion based on research	Y	K-adult
Verplaetse (2008)	Literature synthesis/review	Y	middle/high school
Verstegen & King (1998)	Correlational study	Y	elementary, secondary
Walker et al. (2005)	Descriptive study	Y	K-12
Wong Fillmore & Snow (2000)	Expert opinion based on research	Y	K-12

Table A-2. Document by Type of Evidence

Author	Type of Evidence	Includes ELL Focus (Y/N)	Age/Grade Level*
Yore & Treagust (2006, February)	Literature synthesis/review	N	K-12
Zwiers (2006)	Action research	Y	middle school
Zwiers (2007)	Descriptive study	Y	7th
Zwiers (2008)	Expert opinion based on research	Y	K-12

* Information is provided if applicable, specified by the authors or ascertained from the document.

Document Search and Selection Methods

The document collection and selection was approached systematically, and occurred in four phases.

Phase I. Initial document searches

The initial phase of the document collection focused on a search for information to address the four inquiry areas. A number of databases were referenced, including the academic search premiere available through The George Washington University's Gelman Library, the resource collection maintained by the National Clearinghouse for English Language Acquisition, and reports produced by the UCLA Center for the Study of Evaluation/National Center for Research on Evaluation, Standards, and Student Testing (CSE/CRESST). Questions to be addressed through the literature review were used to generate a search strategy. The following sets of key words and phrases were selected for the first document search.

- Adolescent/High School / Jr. High / Middle School/Secondary
- Academic English / Academic English Literacy/Academic Language / Vocabulary
- Assessment / Definition / Instructional Interventions/Instructional Strategies / Operationalization / Standards / Teacher Perspective/Teacher Quality
- K-6 / Elementary
- Secondary/high school
- English Language Arts/Mathematics/Science

Following a meeting with the U.S. Department of Education, the initial search was expanded to include elementary grade levels and core subject areas (English language arts, mathematics, science, and social studies). The assessment and standards section was deleted and a second database search was conducted, adding the terms elementary, English language arts, mathematics, science, and social studies to the previous list.

To capture the most recent perspectives on AE, searches were initially restricted to the years 2000-2009. Subsequently, it was decided to include documents published prior to the year 2000 if they were considered seminal to the field according to the opinion of the project's expert review panel.

Phase II. Document review and selection criteria

The project staff conducted an initial review of titles, abstracts, executive summaries, and reference lists to ascertain the type of information available, and identify additional documents to include in the review. During this phase, the project staff held regular meetings to discuss issues relating to criteria for inclusion, and the format for abstracting and presenting document summaries. One of the outcomes of these discussions was the decision that each inquiry area required special considerations in terms of selection criteria. Criteria for the four areas are as follows.

- Defining and operationalizing AE. There is a very limited number of studies that address the definition and operationalization of AE. It was therefore decided to include all available studies published in professional journals or books, whether or not they are based on experimental or other quantitative methodologies, and whether or not they address ELLs specifically. It was also decided to include a number of articles and monographs by key experts in the field.
- AE teaching practices. The research on AE teaching practices, although relatively plentiful, is primarily based on qualitative methods and focused on the teaching of academic vocabulary. For this reason, in addition to articles and monographs in professional journals, the review presents findings from professional development handbooks and Web-based journals published by experts in the field.
- Teacher preparation and professional development in AE. To access documents on teacher preparation and professional development programs that support effective teaching of AE, it was necessary to review literature published in professional journals, national- and state-level reports, national teacher education program standards, and state policies on teacher credentialing and teacher education program accreditation. Due to time and resource constraints, the review was limited to four states with large populations of limited English proficient students. These states were identified using data published by the National Clearinghouse for English Language Acquisition & Language Instruction Educational Programs (Ballantyne, Sanderman, & Levy, 2008).
- State policies on AE. In addition to database searches, state policies related to AE were located through a search of the state education Web sites for the states of Arizona, California, Florida, Illinois, New York, and Texas. State education staff members were contacted to confirm or expand information found on the sites. No guidelines on AE were found in state curriculum and instruction policies. For this reason, a separate section on state policies was not included in the report. It should be noted that state content standards were not reviewed for this report due to time constraints and limited resources. However, information on AE was located in state policies pertaining to teacher credentialing and teacher program accreditation. Therefore, information on these policies is included in the section on teacher preparation and professional development.

Phase III. Expert panel recommendations and reviewer decision making

Following the initial document searches, an annotated outline was developed that presented all selected documents categorized by the first three areas of interest. The outline was submitted to a panel of four experts in the field of AE, who were asked to suggest additional references for each area, and potential revisions to the outline. Two primary recommendations were made.

- Revise the outline to include a more explicit focus on sociocultural and sociolinguistic approaches.
- Broaden the review to include studies focused on preschool and postsecondary student populations.

In the interest of maintaining a clear focus on the questions of concern, the project staff made the decision to restrict the review to K-12 settings. However, the outline was revised to incorporate a socio-cultural and sociolinguistic perspective.

Along with changes to the scope and focus of the review, the panel submitted lists of specific documents to include. With the exception of those documents focused on preschool or postsecondary student populations, or documents unavailable through library or online sources, all recommended documents were obtained and reviewed for inclusion.