

Teaching Disciplinary Literacy to Adolescent English Language Learners: Vocabulary Development and Reading within the Disciplines

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Recent research on disciplinary literacy has called for a paradigm shift among secondary content teachers from perceiving themselves as disciplinary content transmitters to disciplinary literacy teachers who model and engage students in reading, writing, inquiring, and doing like experts within each discipline. How do content teachers incorporate disciplinary literacy and stay responsive to the unique and diverse learning needs of the adolescent English Language Learners (ELLs) who are integrated in the mainstream classes? Drawing on Moje's (2015) 4Es framework and a translanguaging pedagogy, this paper presents a set of instructional practices to support content teachers in integrating disciplinary literacy within the disciplines to enhance adolescent ELL students' learning in vocabulary development and reading.

La recherche récente en matière de littératie dans toutes les disciplines appelle à un changement de paradigme chez les enseignants des différentes matières du secondaire pour se percevoir non plus comme des transmetteurs de contenu de la discipline mais comme des enseignants de littératie de la discipline qui servent de modèles et motivent les élèves à lire, écrire, se renseigner et à se comporter comme des experts à l'intérieur de chaque discipline. Comment les enseignants de contenu incorporent-ils la littératie dans leur discipline et restent-ils à l'écoute des besoins d'apprentissage uniques et variés des adolescents qui apprennent l'anglais (AALS) et qui sont intégrés dans les classes ordinaires? En s'appuyant sur le cadre 4E de Moje (2015) et sur une pédagogie translangagière, cet article présente une série de pratiques d'enseignement visant à soutenir les enseignants de contenu dans l'intégration de la littératie dans toutes les disciplines de façon à enrichir l'apprentissage des adolescents ASL en matière de développement du vocabulaire et de lecture.

KEYWORDS: disciplinary literacy, adolescent ELLs, vocabulary development, reading

What is Disciplinary Literacy?

Traditionally, literacy is defined as a set of basic reading and writing skills that one typically acquires in primary schools. Once in high school, teachers view themselves as content instructors and expect their adolescent students to utilize the established literacy skills to tackle the increasingly complicated content in each discipline, or the so-called “read to learn.” However, entering the 21st century, the notion that early literacy skills would automatically lead to continued literacy advancement without explicit teaching no longer prevails (Shanahan & Shanahan, 2008). Shanahan and Shanahan (2008) defines “disciplinary literacy” as “literacy skills specialized to history, science, mathematics, literature, or other subject matter” (p. 44). Moje (2015) conceives adolescent literacy teaching and learning as “being about teaching young people the purposeful and meaningful literacy practices engaged by people within and across disciplinary domains” (p. 255).

Based on these understandings, it is clear that teachers who teach adolescents have to shift their mindsets from perceiving themselves as disciplinary content transmitters to disciplinary literacy teachers who model and engage students in reading, writing, inquiring, and doing like experts within the disciplines.

Special Challenges Facing Adolescent ELLs in Developing Disciplinary Literacy Skills

Research shows that it takes a minimum of five years for ELL students to catch up to native English speakers in academic English (Cummins, 1981). To make the situation direr, they are catching up to a moving target as the native-speaker peers are progressively increasing their literacy skills. The complexity of academic language reflects (a) the vocabulary load in content texts that include many low-frequency and technical words and (b) the increasingly sophisticated grammatical constructions, both of which are almost never used in everyday conversational contexts (Cummins, Mirza, & Stille, 2012).

In addition to the linguistic obstacles, adolescent ELL students have to adjust to a new culture and new education system which can differ drastically from their own within a very short period of time. Along with their L1 literacy skills, most adolescent ELL students also bring with them assumptions about what learning should be like in the class and after class (Jeannot, 2004). The differences between their assumptions and reality often add more complexity and anxiety to their cognitive and emotional adjustment.

Vocabulary Development and Reading within the Disciplines for Adolescent ELLs

Teaching students to read? Many high school teachers would flinch at the suggestion of it, perceiving reading as the language arts teachers' specialty. While it is unjust to ask every teacher to be "a teacher of reading" (Alvermann & Moje, 2019; Lent, 2016), all disciplinary teachers must share with students the secrets of how experts read and decipher new words in their discipline. Calderón, Slavin, & Sánchez (2011) suggest, "To help English learners catch up when they fall short in core knowledge, all disciplines must practice vocabulary knowledge, reading, and writing instruction" (p. 111). Other research studies have shown that adolescent ELLs particularly benefit from explicit teaching, modelling, and scaffolding of text comprehension and vocabulary learning across disciplines (Crandall, Jaramillo, Olsen, & Peyton, 2002; Cummins, Mirza, & Stille, 2012; Lee & Spratley, 2010; Meltzer & Hamann, 2005).

How can high school content teachers meet the two concurrent needs: to explicitly teach vocabulary learning and reading within the disciplines and to be responsive to the unique and diverse learning needs of the adolescent ELLs in order for them to strive to be at the academic forefront? This paper offers a set of practical instructional recommendations that draw upon conceptual frameworks from both fields of disciplinary literacy and applied linguistics.

1. 4Es Framework

To frame key teaching practices for disciplinary literacy instruction, Moje (2015) offers a 4Es framework—a heuristic that draws from practices of the disciplines and supports "disciplinary literacy teaching as the practice of teaching youth to navigate their school classes, their communities, and their lives" (p. 256). The four Es are: *engage*, *elicit/engineer*, *examine*, and *evaluate*. The first E prompts teachers to *engage* the six disciplinary practices that make up a cycle in daily lessons: (1) problem framing; (2) working with data; (3) using varied media to consult and produce multiple texts; (4) analyzing, summarizing, and synthesizing findings; (5) examining and evaluating claims; and (6) communicating claims. Teachers will need to incorporate the other E's within each part of the cycle. The second E, *eliciting/engineering*, focuses on eliciting the priori disciplinary knowledge and skills from the students, and then engineering the necessary knowledge, skills, and practices for students to make meaning. Moje (2015) sees content literacy strategies as powerful engineering tools to engage adolescent students in disciplinary reading practices. The third E, *examining*, is apprenticing students into closely examining the technical language and discourse practices of the discipline, in short, words and ways of words. The fourth E, *evaluating*, is training students to explicitly evaluate the usefulness of words, phrases, and discourses so

as to facilitate students' metacognitive, metalinguistic, and metadiscursive awareness.

2. *Translanguaging*

Translanguaging is a practical theory of language that reconceptualizes language as “a multilingual, multisemiotic, multisensory, and multimodal resource that human beings use for thinking and for communicating thought” (Li, 2017, p. 26). Li (2017) calls for a new transdisciplinary perspective shift “from treating languages as discrete and complete systems to how language users orchestrate their diverse and multiple meaning- and sense-making resources” (p. 27). A translanguaging pedagogy requires the educators to help students become cognizant of their entire linguistic repertoire and use the repertoire as resources for different situations, purposes, and tasks (Wiley & Garcia, 2016).

The tenets of both the 4Es framework and translanguaging pedagogy centre on learner agency and the understanding that learners are co-constructors of knowledge and skills. Translanguaging practices can be powerful tools for teachers to enact the 4Es in developing adolescent ELLs' vocabulary and reading skills within the disciplines.

Explicit Teaching of Disciplinary Vocabulary

To apprentice students into each part of the cycle of disciplinary practices in the first E, engage, teachers need to scaffold the technical language and disciplinary discourse within disciplinary inquiry practices (Moje, 2015). Vocabulary scaffolding is a particularly essential teaching step with ELLs as L2 vocabulary knowledge is the foundation of all the other aspects of language acquisition and the main factor underlying academic success (Horst, 2013). The following five practices serve to guide teachers in engaging and scaffolding the technical language with an additional focus on examining (Practice 2 & 3) and eliciting/engineering (Practice 4 & 5). Translanguaging practices will be incorporated in Practice 4 & 5.

1. Perceive Morphological Complexity from a Learner's Perspective

One of the core components of a translanguaging pedagogy identified in Garcia, Johnson, and Seltzer (2017) is that students' language practices and ways of knowing should inform instructional designs. In the same vein, Moje (2015) calls for teachers to develop knowledge of how students' cultural and social identities mediate their learning. Both require teachers to first take a language learner's stance, forsaking the one-size-fits-all L1 instructional approach and the presumption that adolescent ELLs have acquired the

linguistic and cultural knowledge (Koda, 2005) of the discipline that they themselves have taken for granted.

In his book *Crazy English*, Richard Lederer (1998) humorously and insightfully opens our mind to the craziness of English vocabulary that all ELLs struggle to master in the classrooms. For instance, *parkway* is not for parking but for driving whereas *driveway* is for parking. While students whose L1s are Germanic or Romance languages may be able to infer the meaning of a new academic word from the many cognates found in both their L1 and L2, those students whose L1s are more linguistically distant from English are not able to benefit from this type of metalinguistic knowledge.

Apart from the complexity of morphological rules, the many variations and illogical exceptions to the rules pose particular challenges to the beginning ELLs. For example, any beginner would logically assume the plural forms of *sheep* and *ox* as *sheeps* and *oxes*. After all, aren't they both domesticated animals like *cows*? And what's *hospital* to do with *hospitality*?

2. Explicitly Teach the Discipline-Specific Meaning of a New Word

Teachers need to be aware that ELLs cannot rely on the use of context clues for vocabulary growth. The former is a “reading-improvement strategy not a vocabulary-improvement strategy” (Folse, 2004, p. 83). Meanwhile, to construct text meaning, it is essential to retrieve context-appropriate word meanings (Koda, 2005). Thus, subject teachers need to explicitly teach the context and discipline-specific meaning of a content word, especially a polysemous one. By examining word use within a discipline, adolescent students learn to perceive disciplinary literacy as undertaking language practices of a specialized cultural group and to “make decisions about whether, how, and when to navigate into and out of those language uses” (Moje, 2015, p. 268).

Academic words in discipline texts especially in math and science books pose challenges to ELLs because of nonvernacular meanings in words such as *mean* and *domain* in math, or specialized terms such as *meiosis* and *mitosis* in biology (Fang, Schleppegrell, & Cox, 2006; Jetton & Lee, 2012).

In math, many directive words such as *illustrate*, *compare*, and *sketch* carry specific definitions and requirements hence knowing the general meaning would not suffice to answer the questions correctly. Teachers have to explicitly teach basic understanding and facilitate fluency with mathematical vocabulary before students can apply the language of mathematics purposefully and effectively (Riccomini, Smith, Hughes, & Fries, 2015).

3. Explicitly Teach Word Structures—Prefixes, Suffixes, Roots, and Compound Words

In spite of the notoriously “crazy” spelling and pronunciation illustrated in Richard Lederer's *Crazy English*, English words are often comprised of

prefixes, suffixes, and roots which offer clues to the meaning. Most native English speakers gain basic morphological insight and acquire a substantial amount of derived (prefixed and suffixed) words in elementary schools (Nagy & Scott, 2000). To help adolescent ELLs expedite the gap-bridging process, it is up to the secondary content teachers to teach common prefixes, suffixes, and roots in their discipline and to model how to decipher the meaning of a new word by breaking it down into component morphemes. Helman, Calhoun, and Kern's (2015) study shows that adolescent ELL students benefit from targeted instructions on morphemic analysis strategies. Making this teaching practice a daily routine would (a) facilitate an exponential expansion of ELL students' academic vocabulary, (b) develop students' linguistic repertoire, and (c) afford students the agency to closely examine how language is used to represent concepts (Moje, 2015) so as to develop the metacognitive and metalinguistic awareness.

This is particularly important in science. The technical vocabulary of science often contains a lot of Latin or Greek roots: *hydro* (as in *hydrolytic*), *iso* (as in *isotope*) or *macro* (as in *macrofossil*). Teachers can post the high frequency affixes on the wall and encourage students to use the list or online dictionaries of Greek/Latin roots as reference to unlock the multisyllabic science words, such as *endophyte* (a plant inside another plant; *endo* means *within* and *phyte* means *plant*) and *exothermic* (releasing energy through heat; *exo* means out of and *therm* means heat).

4. Elicit and Engineer the Use of Vocabulary Learning Strategies (VLS)

The amount of words that can be acquired via explicit vocabulary instruction is after all quite limited. Therefore, it is important to view vocabulary learning as a language skill and shift the responsibility to the ELLs by teaching them strategies (Carter & McCarthy, 1988). There has been consensus among most researchers in second language contexts on the importance of explicit strategy instruction (Chamot, 2004). The following are some translanguaging VLS that are multilingual, multisensory, and multimodal for teachers to elicit and engineer within the disciplines:

- Use mnemonics to help burn new words into memory. Mnemonic strategies help students learn new information by linking it to their prior knowledge (Mastropieri & Scruggs, 2007). Teachers can model how they utilize tricks to memorize new words: i.e., detrimental (look at mental and de, the word sounds like something that can destroy your mental health, so it must be harmful). Encourage students to use the online resource mnemonicdictionary.com where students can type in a new word and find the many different ways that would help them memorize vocabulary.
- Create visual links and tie them to meaning. For example, the word peep

can be illustrated by drawing two eyes in the middle surrounded by two fisted hands.

- Create links to students' L1. Use cognates and/or search for connections between the English word and the pronunciation and form of the word in their L1.
- Teach students how to keep a vocabulary notebook. There are multiple ways to organize the vocabulary notebook depending on students' learning styles and personal preferences. To allow learners to retrieve the word in multiple ways, four elements are essential in the layout: the target word, L1 or English translation, a synonym/antonym or key connecting word, and a brief example (Folse, 2004). Visual learners can also add concept maps and/or an image to strengthen the understanding.
- Provide opportunities in class for students to share strategies with each other in order to expand their repertoire of VLS.

5. Devote Time to Teaching New Vocabulary and/or Review/Recycle Words in Every Class

Vocabulary learning is incremental—learners' knowledge of a word accrues on small steps (Nagy & Scott, 2000). It is incumbent on discipline teachers to elicit and engineer as many opportunities in class as possible to help students build their discipline vocabulary rather than leaving it to incidental learning. Ways to review and recycle words which elicit and facilitate translanguaging practices could include the following:

- Vocabulary games that elicit the use of ELLs' rich linguistic/semiotic repertoire resources such as Charades, Taboo Words, Jeopardy, and Kahoot, the interactive game-based learning platform.
- Vocabulary activities such as bilingual or multilingual concept maps and Gallery Walk, Bell ringer questions, matching, and exit slips.
- Incorporating vocabulary into assignments and assessments and providing a list of key vocabulary prior to a new topic or unit tests so that adolescent ELLs are given the much-needed time to decipher the words and build their conceptual understanding upon their L1 knowledge.

Explicit Modelling and Scaffolding of Disciplinary Text Comprehension

Hong-Nam's (2014) study on high school ELL learners' reading strategy shows that these learners actively utilize strategies to assist their reading comprehension, and that highly proficient readers apply strategies more successfully than lower proficient ones. Hong-Nam (2014) proposes that teachers explicitly model and scaffold reading strategy practices to guide ELLs towards reading independence and comprehension. Moje (2015) advocates using these strategies to elicit/engineer adolescent students'

skills in disciplinary reading practices. However, teachers should not rely on generic comprehension strategies (Alvermann & Moje, 2019). Strategies vary across disciplines—reading a science article calls for a different set of strategies than reading a poem. The following are some instructional strategies for content teachers to engage adolescent ELL students in learning how to comprehend disciplinary discourse like an expert through one or more of the 4E dimensions. The central idea of translanguaging—that learning is multisensory, multilingual, and multimodal (Li, 2017)—is embodied in all of these strategies.

1. Elicit Students' Prior Background Knowledge

Learning is a process of self re-creation, not a reproduction (Cope & Kalantzis, 2009). Most of the adolescent ELLs in Canadian high schools come to school with some literacy skills in L1. It is essential for content teachers to understand that ELL students' disciplinary knowledge can be built upon their diverse cultural and linguistic experience (De Schonewise & Klingner, 2012). ELLs who have developed high L1 literacy backgrounds have a rich conceptual and linguistic knowledge base from which teachers should encourage students to draw upon to build their disciplinary literacy in English. All ELLs benefit from instructions that connect to their prior knowledge and life experiences (Coppola, 2003; De Schonewise & Klingner, 2012; Lee & Spratley, 2010).

To elicit students' prior background knowledge, teachers could pose questions or use Anticipation Guides to intentionally fire up students' intellect and engage them in tapping into previous learning and experience. Another highly effective means is to have students discuss in small groups about what they already know about the topic to multiply learning for each other. For example, prior to reading *Romeo and Juliet*, mix students into groups with diverse cultural backgrounds and have them share an immortal love story in their culture, then discuss and elicit common themes and core values that are universal across cultures and times.

Providing multimedia resources in L1 in advance of a new unit is another efficient translanguaging technique to retrieve prior knowledge especially for ELLs who come from countries where the science and math curriculum are ahead of Canada. One of the examples is Binogi.ca which offers content specific animated lessons in multiple languages to front load concepts for ELLs.

2. Explicitly Apprentice Students into Understanding and Examining Text Structures and Discourse Features

Meltzer and Hamann (2005) propose that if we want students to be able to think like mathematicians and read like historians, teachers should explicitly apprentice students into understanding the text structures as well as examining the discourse of their particular discipline; for example, the

discipline of social studies has its own grammatical patterns, typical genres, and rhetorical traditions (Fang, Schleppegrell, & Cox, 2006). In science texts and discourse, the frequent use of ordinary words with specialized meaning, complex sentence structures, and even passive voice often interfere with ELLs' comprehension (Fang, 2006).

Content teachers should make a habit of introducing the textbook features and structures at the beginning of learning and teach students to predict main and subordinate ideas based on the text structures and genres (Lee & Spratley, 2010). They should also constantly monitor ELL students' comprehension of the content by having them demonstrate their understanding through multimodal means—visual, oral, gestural, and spatial semiotic resources.

3. *Explicitly Model and Scaffold Comprehension and Process*

Whatever the discipline area is, it helps to stimulate a more focused mind and facilitate comprehension when students pose study questions for themselves before and during their reading of textual material (Costa & Kallick, 2008). However, teachers have to model how an expert would “think out loud” and pose questions while reading discipline-specific texts—the work of *examining* and *evaluating* in the 4Es framework. This is particularly important for the adolescent ELLs not only because they need the linguistic scaffolding and modelling but also because there are likely some gaps between what they perceive as reading based on their L1 literacy experiences and what is required in the disciplinary reading in English.

The table below lists some disciplinary practices on modelling text comprehension like an expert within the disciplines through examining and evaluating. Whenever possible, teachers should also model and encourage ELLs to employ their whole sense- and meaning-making linguistic repertoires to engage in these practices to construct meaning.

LA	<ul style="list-style-type: none">• Inferring and reading between the lines• Deciphering a new word based on context• Asking inferential questions• Discerning underlying themes and recurring motifs
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Social	<ul style="list-style-type: none"> • Detecting bias • Interpreting primary and secondary sources • Synthesizing information • Analysing an event/document from multiple perspectives
Math	<ul style="list-style-type: none"> • Breaking down a complex word problem into simple subject-predicate structure to aid comprehension • Converting a passive voice in the word problem into active voice
Science	<ul style="list-style-type: none"> • Searching and evaluating evidence • Interpreting graph data • Breaking down a challenging text into short segments

4. Reading Short Takes

To simultaneously build disciplinary knowledge and engage students with the disciplinary texts, it is important for adolescent subject area teachers to employ multiple text types and new media available to the disciplines to support knowledge construction that is required for students to decipher the abstract and dense texts of the disciplines (Moje, 2008, 2015). To develop strong reading comprehension skills and broaden vocabulary knowledge for ELL students, it is crucial to provide abundant access to printed texts and engage them actively with these texts (Cummins, Mirza, & Stille, 2012). With traditional monomodal literacy being supplemented by multiliteracies in which the linguistic, visual, audio, gestural, and spatial modes of meaning are integrated in reading and writing multimodal texts (Cope & Kalantzis, 2009), the printed texts should extend to multimodal texts.

I suggest that teachers spend several minutes in each class modelling reading aloud a short discipline-specific article. The purpose is twofold: to allow ELL students to gain content knowledge; and to engage them in examining how language is used and functions and evaluating the usefulness of the discourse. Some great online sources to obtain multimodal and multisensory short reading materials include the following:

- New York Times Learning Network and Readers Digest for all disciplines;
- tweentribune.com for quality non-fiction related to science, social studies, ELA, and math;
- newsinlevels.com for world news written at three proficient levels for ELLs;
- CBC Learning-English for audio and video news read by CBC anchors at a slower speed for ELLs accompanied by comprehension exercises;
- goodreads.com provides a rich array of short stories and quotes from popular books in all disciplines.

Conclusion

Just as the old adage goes: “it takes a whole village to raise a child,” it is now time for teachers who teach adolescents to adopt the mindset that it takes all discipline teachers to teach literacy to students. In response to this new paradigm shift in literacy teaching, this paper has introduced a set of instructional practices that are both research grounded and experience based for content teachers to integrate disciplinary literacy to enhance adolescent ELL students’ vocabulary development and reading comprehension within the disciplines.

Language development is incremental, so are students’ metacognitive and metalinguistic skills. If each content teacher makes an effort in every class to build one or more of the 4E dimensions into teaching disciplinary vocabulary and reading while staying responsive to the unique learning needs of the adolescent ELL students, it will enhance their English literacy skills exponentially. More importantly, these students will learn to be independent and become autonomous users of literacy, which is what Carrasquillo and Rodríguez (2002) advocate as a key long-term goal of schooling.

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