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TEACHER DECISIONS IN SELECTING VOCABULARY FOR INSTRUCTION TO ENGLISH LANGUAGE LEARNERS

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ABSTRACT

In response to the paucity of literature on vocabulary instruction among high school-aged English language learners (ELLs), this study used concurrent think-aloud methodology to examine the decisions of high school teachers with little to no experience working with ELLs. Participating teachers were asked to read a sample text, selecting vocabulary they might focus on when working with ELLs in their classes. The results indicated that teacher experience was a key factor in vocabulary selection. Junior teachers in the subject areas focused almost exclusively on local-level comprehension as a rationale for vocabulary selection, whereas senior teachers in the content areas focused on relative word frequency and word formation as criteria for vocabulary selection. Pedagogical implications of the study recommend a focus on productive vocabulary knowledge in addition to receptive vocabulary knowledge, as well as vocabulary instruction integrated across subject areas through collaboration among ESL teachers and their colleagues in the content areas.

KEYWORDS

English language learners, Vocabulary, Achievement gap, Instructional practices, Language comprehension/development

The achievement gap between English language learners (ELLs) and their non-ELL counterparts has become accepted as commonplace—so commonplace that the term achievement gap has become widely used. According to data from a recent report card from the National Assessment of Education Progress (NAEP, 2014), nationwide, eighth grade ELLs have scored quite significantly ($p < 0.0001$) lower than their non-ELL counterparts in tests of reading and mathematics for the past ten years, scoring 40 points lower on average than non-ELLs. Certainly, ELLs' English language proficiency is an explanatory variable, and specialized instruction in English as a second language (ESL) can help support development of English language proficiency. However, little is known about how mainstream teachers in subject areas can—and do—help support language development among ELLs in their classes. Further, even less appears to be known about how secondary school teachers can help support vocabulary development among their ELLs.

The contribution of vocabulary knowledge to reading comprehension is well established (Blachowicz, Fisher, Ogle, & Watts-Taffe, 2006; Laufer & Rav-

enhorst-Kalovski, 2010). Simply put, in order for students to understand what they read, they must know the words that are used. Vocabulary instruction is therefore vital to the ability to read fluently, to comprehend what is read, and to retain the information that is presented in a text. Vocabulary knowledge becomes critical to high school students, especially as they complete the transition from learning to read to reading to learn (Grabe, 2009). However, the vocabulary of ELLs in mainstream classes may lag behind the vocabularies of their non-ELL classmates, placing them at a disadvantage. Traditional approaches to vocabulary learning, particularly incidental learning of vocabulary (i.e., vocabulary learning through passive exposure to input), may not be appropriate for ELLs as they do not possess the base of vocabulary to facilitate incidental learning (Laufer, 2003; Nation, 2001). Further, a comparison of the number of words learned incidentally to the number of words needed to gain access to academic content in English suggests that direct vocabulary instruction throughout the curriculum can support ELLs as part of an effort to bridge the gap (Nation, 2006).

While few would argue that vocabulary knowledge is vital to reading comprehension (Nation, 1983, 2001, 2006), recent research suggests that the development of vocabulary knowledge is key to success in academic subjects ranging from science (Shaw, Lyon, Stoddart, Mosqueda, & Menon, 2014; Weinburgh, Silva, Horak, Groulx, & Nettles, 2014), to social studies (Hedrick, Harmon, & Linerode, 2004), to mathematics (Abedi & Lord, 2001; Bernardo, 2002; Firmender, Gavin, & McCoach, 2014). The importance of vocabulary to academic success is clear. However, a review of the research on vocabulary and its importance to each of the subjects reveals two areas which appear to be understudied. The first is how vocabulary is best selected for targeted instruction. The second is how vocabulary is taught in instructional contexts beyond eighth grade.

Choosing vocabulary for targeted instruction among ELLs can be a daunting task. Numerous frameworks can be consulted to guide the selection of vocabulary for instruction among ELLs, ranging from frequency-based selection (Davies, 2008; Nation, 2006; West, 1953), to specialized lists of academic vocabulary (Coxhead, 2000; Gardner & Davies, 2014), to the tier system of selection (Beck, McKeown, & Kucan, 2002, 2005), which was made known more widely by Calderón, August, Slavin, Duran, Madden, and Chung (2005). However, mainstream teachers in the subject areas must also balance the need to teach content-specific vocabulary with teaching general vocabulary to the ELLs in their classes. Yet much of the literature from educational research examines vocabulary instruction in K-5 instructional contexts, typically in English Language Arts, and typically using children's literature (Austermuehle, Kautz, & Sprenzel, 2007; Beck et al., 2005; Boulware-Gooden, Carreker, Thornhill, & Joshi, 2007; Calderón et al., 2005; Cunningham & Stanovich, 1991). Further, such research appears to focus on vocabulary instruction as a means to text comprehension, despite (a) conceptions of vocabulary knowledge as multifaceted (Nation, 2001), and (b) research evidence to suggest productive knowledge of low-frequency vocabulary is associated with written L2 performance (Johnson, Acevedo, & Mercado, 2013, 2016). How then, are mainstream high school teachers to choose vocabulary for instruction to ELLs in their classes? Further, what are the instructional practices of high school teachers, and how do they compare to the practices described in research among K-5 students? This study aims to address the first question by examining the vocabulary selection process of a small group of high school teachers of various subjects. Specifically, the study explores the following research questions:

1. What are high school teachers' views toward vocabulary learning in their classes?

2. How do high school teachers with little to no training in the instruction of ELLs choose vocabulary for instruction to ELLs in their classrooms?

3. How do teachers' choices of target vocabulary differ by subject area?

4. How do teachers' choices of target vocabulary compare to word frequency information and to Coxhead's (2000) academic word list?

METHOD

Setting

The study was conducted at a large high school located in a city of approximately 90,000 people in the southeastern United States. At the time the study was conducted—the 2015-2016 academic year—the school served 1,523 students. Demographic information based on a survey of students is presented in Table 1. The number of ELLs enrolled at the school fluctuates, as many are children of migrant seasonal workers.

Participants

Participants in the study were recruited from among mainstream teachers in the four main subject areas: math, science, social studies, and English language arts. Only teachers with no special training in ESL methods were recruited for participation. A total of six teachers in three of the subject areas (English language arts, math, and social studies) volunteered to participate in the study. As shown in Table 2, the participating teachers had varying years of experience as instructors.

Table 1. Students' self-identified racial/ethnic affiliation at the participating school

Ethnic/racial group	*N*
African American	837
White	507
Hispanic/Latino(a)	95
Asian	47
Native American/Alaskan	4
Hawaiian/Pacific Islander	1
Two or more	32

Materials and Procedures

A brief biographical questionnaire was created to determine participating teachers' area of instruction, experience, and training in working with ELLs. Texts were selected for use in interviews with the English language arts instructors (a text on John Steinbeck) and the social studies instructors (a text on the fall of the Berlin Wall) based on subject matter and Lexile measure (1140). Texts for use in the interview with the math instructors were algebra problems with explanations of how to solve the problem. All materials were printed on Livescribe ™ paper, which works with a Livescribe ™ digital pen to track handwritten notes and synchronize them with specific time points in a digital recording.

Table 2. Participating teachers, their subject areas, and experience

	Subject area	Experience
Teacher A	Social Studies	Approx. 3 months
Teacher B	English Language Arts	7.5 years
Teacher C	Math	11+ years
Teacher D	English Language Arts	Approx. 3 months
Teacher E	Social Studies	18 years
Teacher F	Math	14 years

Table 3. Orientations toward vocabulary learning (Konopak & Williams, 1994)

Orientation	Description
Knowledge orientation	Schematic and conceptual learning support the learning of vocabulary.
Instrumental orientation	Direct vocabulary instruction supports schematic and conceptual learning.
Access orientation	Vocabulary learning occurs through the development of automaticity of retrieval.

The participating teachers were interviewed individually by either the author or a research assistant. In the interview, the teacher first completed the biographical questionnaire. After completing the biographical questionnaire, the research team member presented the teachers with a text appropriate to their content area. The teachers were asked to read the text and to circle or underline any vocabulary they might choose to focus on with ELLs enrolled in their classes. As the teachers did this, they were asked to "think aloud"—to verbalize their every thought—articulating their thought processes and an explanation for the vocabulary choices they made. Digital recordings of the teachers' concurrent think-aloud processes were linked to their handwritten notes using a Livescribe ™ digital pen.

After reading the text under think-aloud conditions, the teachers were asked to complete a brief survey (Konopak & Williams, 1994) about their views toward vocabulary learning in general and vocabulary instruction to ELLs in particular. The survey asked participants to rate their agreement with the statements about vocabulary learning on a Likert scale (1 = totally disagree, 4 = totally agree). Answers to each of the survey items were used to determine a teacher's orientation toward vocabulary learning. Three broad orientations are identified by the survey's creators (Konopak & Williams, 1994) and are summarized in Table 3. At the end of the interview, teachers were compensated for their participation with a $20 gift card for a major retail chain.

Data Analysis

Views Toward Vocabulary Learning

The participating teachers' numerical answers to the Likert-scale vocabulary learning survey were averaged in each of the three orientations specified by the survey's creators: Knowledge, Instrumental, and Access (see Table 3). The internal reliability of the questionnaire was assessed using Cronbach's alpha.

Vocabulary Selection

Given the exploratory nature of the present study, no a priori analytic framework was available. Each of the participating teacher's think-aloud data were transcribed and read numerous times to determine trends in teachers' selection criteria and their views on vocabulary instruction among ELLs in their mainstream classrooms. Noted trends were then compared between subject areas for similarities and differences. Additionally, the transcription of each think-aloud protocol was analyzed using the corpus analytic program AntConc for word frequency information and collocations.

Teachers' Choices and Word Frequency Information

The selected vocabulary for each instructor was compiled into a text file and analyzed using the Range software program (Heatley, Nation, & Coxhead, 2002), together with word lists of the first 1,000 most frequent word families (1K) through the fifth 1,000 most frequent word families (5K), according to the British National Corpus (Nation, 2006).

Additionally, each teacher's word list was compared to the Academic Word List (henceforth AWL; Coxhead, 2000).

RESULTS

Teachers' Views

One of the participating teachers completed only the first half of the vocabulary learning survey. This teacher's answers to the second half of the survey were replaced with the mean of the remaining participants to compute Cronbach's alpha. The internal reliability of the survey—although not ideal—was considered acceptable for the purposes of this study ($\alpha = 0.64$). Scores for each of the vocabulary learning orientations (see Table 4) were averaged and compared among the subject areas with a Mann-Whitney U-test, the results of which indicated no significant differences in the teachers' orientations toward vocabulary learning. However, as can be seen in Table 4, all the teachers had higher scores in the Knowledge orientation survey items, suggesting a view that vocabulary learning is a natural outcome of content learning. Three of the teachers had slightly lower scores in the Instrumental orientation survey items and the Access orientation survey items, suggesting an orientation toward vocabulary learning that downplays the importance of direct instruction to build automaticity of retrieval.

Table 4. Teachers' orientations toward vocabulary learning

	Knowledge	Instrumental	Access
Teacher A	3.67	2.75	3.25
Teacher B	3.33	3.25	2.25
Teacher C	3.67	2.88	1.38
Teacher D	3.67	1.75	2.00
Teacher E	4.00	3.00	3.50
Teacher F	3.67	3.50	3.15

An analysis of the think-aloud data from the vocabulary learning survey indicated views of vocabulary learning that were consistent with a Knowledge orientation toward vocabulary learning. Most of the participating teachers believed context to be important to vocabulary learning, as can be seen in the following excerpt from Teacher E, the senior social studies teacher:

> Well, you're talking about textual reading, I use a lot of visuals when I'm teaching so I'll often recruit pictures and images and works of art and do a visual. I'll engage the students' visual literacy, and I'll talk about the content through visual literacy, and then I'll segue that into textual literacy so that, you know, when we're reading the text, they already have an image in their mind of what the Berlin wall was because we've looked at an image of it, or maybe a film clip, and so I think that context, you know, will support all of the other stuff that they need to do with textual literacy.

Such a view aligns clearly to a Knowledge orientation toward vocabulary learning. Context was seen as the relationship between vocabulary and the subject matter—in the case of the social studies teacher, the relationship between vocabulary and European history. In contrast, for the senior English language arts teacher, Teacher B, context appeared to refer to the linguistic context, the students' ability to deduce the meaning of new vocabulary from its use:

> Some words they'll be able to get through context clues, which is where if they're reading a word that is like particular jargon or a word that is related to that topic and they're able to pick up

> from the context clues the meaning of the word, that's possible.

However, Teacher B and Teacher C—one of the math teachers—also considered the importance of context to vocabulary use. For the math teacher, context of use was described in terms of student ownership of the vocabulary:

> I think once you know some facts or whatever about the word, I don't think becomes part of you until you actually start using it in context, and I think that if you know it, then you know some facts about it, about a word in particular, you probably would, I guess, recognize it and know what it means, but I don't think it becomes a part of you or you totally acquire it until you start using it in context.

In contrast, the senior English language arts teacher described context of use in terms of the ability to use new vocabulary in several syntactic contexts. According to this teacher, vocabulary use was an important aspect of vocabulary learning:

> You can learn a word, what a word means, and still not know how to use that word in a sentence and not know how to use it in conversation. You've not learned how to conjugate the word. You don't know how to apply prefixes and suffixes to it. Like for example, I give a vocabulary test every week, and I'll have kids come in, and they can tell me the definition of the word. They cannot use it in a sentence. They cannot fill in a blank with a word that completes the sentence. So just because you know what something means, doesn't mean that you actually know how to use the word.

It should be noted that considerations of vocabulary use—rather than a focus solely on vocabulary comprehension—set Teacher B and Teacher C apart from the remaining participants.

Vocabulary Selection

As transcripts of the teachers' think-aloud protocols were analyzed, it became clear that there were greater differences between teachers with longer teaching careers (senior teachers) when compared to relatively new teachers (junior teachers), rather than between teachers in each of the subject areas. While the original research question driving inquiry in this area arose from an interest in how—if at all—teachers of different subject areas differed in their decision-making processes when choosing vocabulary to focus on with ELLs in their classes, the decision was made to instead examine the decision processes of the senior teachers and how they differ from junior teachers.

When examining transcripts of the teachers' think-aloud data, the participating teachers seem to have used three main methods of selection. The first method was a perceived need for students to understand a given word in order to either complete a task or comprehend a given text. The second was some degree of attention to word formation. The last method was some consideration of the relative frequency of a target word. As will be seen in the following two sections, the math teachers, as well as the two junior teachers of social studies and English language arts, relied heavily on the first selection method—the perceived necessity of a word to the completion of a task. For two of the more experienced teachers, frequency and word formation were overtly discussed as rationales for vocabulary selection.

Math Teachers

It is, perhaps, not surprising that teachers of math chose fewer words than their colleagues in English and social studies. This is most likely an artefact of the task, since the available texts for use with math instructors were limited to materials which guided students through algebra problems. Further, math is not often considered a language-intensive area of study. However, the participating math teachers in the current study were conscious of vocabulary that

may be critical for ELLs in their mainstream classes. Teacher C selected nine words for focus with her ESL students, and Teacher F—a math teacher—selected eight words for focus with his ESL students.

What is most striking about the criteria that both math teachers verbalize is its instrumental quality—vocabulary as a means to an end. In both cases, vocabulary selection was done in the context of working through the problem as the teacher might do with students during a regular algebra class. Much of the vocabulary selection for both instructors was treated on a "need to know" basis, as if it might be addressed parenthetically in the context of a whole-class, teacher-fronted work through of an algebra problem:

> 'Constants'...and I would explain what a constant is at this point to an ESL person. A constant, you know, is a number, any number, any scale, any number like one, two, three is a constant.

This was particularly true of Teacher F, who made no reference to vocabulary concerns beyond the scope of the immediate task. Such a result might be expected, as math subjects are often thought to be "language proof" and not subject to the common issues seen in language-intensive areas of study such as English language arts, social studies, or science. However, Teacher C differed from Teacher F in that she[1] did voice some concern over the transfer of vocabulary knowledge to other math tasks:

> 'Equation' itself. That would be one because they would have to recognize that it is an equation, so they would have an idea what they were supposed to do to solve the problem. So problem recognition is important.

Teacher C's concern with students' ability to use key vocabulary in other tasks makes this concern particularly evident:

> Hopefully one of these days I will become the type of teacher that I can be able to help my students learn new things and try to put it in context. I think the way that it should be.

As can be seen, both math teachers were quite instrumentally oriented in their selection of vocabulary for focus with ESL learners in their mainstream classes. In other words, vocabulary was seen as a means to an end: the solutions of the model problem. This orientation appeared to be common among the less experienced junior teachers in each of the remaining content areas.

Junior Teachers

The junior teachers in each of the subject areas—English language arts and social studies—appeared to be more similar to the math instructors in their orientation to vocabulary selection. Both focused almost exclusively on local-level word comprehension as a means to understanding the text at hand. For example, Teacher A—a social studies teacher—focused heavily on the meaning or perceived importance of a given word to the task at hand as selection criteria. A concordance based on the most frequent words in the teacher's think-aloud transcript indicated the following strings were most frequent in her think-aloud recording (see Table 5).

Table 5. Most frequent word strings in Teacher A's think-aloud

String	Raw frequency
"...need to know..."	17
"...important..."	18
"What does ____ mean?" or "what does ____ do?"	46

[1] To protect the anonymity of the participating teachers, and to ease the reporting of the study results, genders have been randomly assigned to each of the teachers.

In Teacher A's think-aloud transcript, "what" was the most frequently used word. Collocation lists indicated that questioning—again a focus on text comprehension as a criterion for selection—was a common occurrence throughout the junior teacher's think-aloud. The most common collocates with "what" in the teacher's think-aloud recording were "what does" and "what is."

This is not to say that Teacher A did not consider matters of history and cultural orientation. However, these were addressed in the think-aloud recording as vocabulary that was "important," or vocabulary the learners "needed to know." The junior teacher in this case was aware of cultural and historical concerns in selecting vocabulary for ESL students. However, she may not have been able to fully articulate such concerns.

The junior English language arts teacher—Teacher D—shared many features with his social studies counterpart. Teacher D focused almost exclusively on local-level comprehension as an aid to text comprehension. An analysis of the most common content words in Teacher D's think-aloud transcript indicated that the junior English language arts teacher relied heavily on the words "what" and "mean." A concordance of the most common words in his think-aloud transcription indicated that the most frequently used words were often used in conjunction with one another as in the following question: "What would _____ mean?".

This suggests a purely meaning oriented approach to vocabulary selection—and likely vocabulary instruction—perhaps as a means to text comprehension rather than skill building. However, there is some indication that this instructor was aware of inferring word meaning from context as a potential strategy for learners.

> I would stop with the word 'exalted' and then ask why they were exalted circles and connect it to the fact that it says next he was a friend of the Kennedys, a frequent guest of the Johnson White House, and a key player in the postwar New York literary set and see if they can connect that list of friends to what it means to be in 'an exalted circle.'

Further, this teacher also noted a theme of opposites running throughout the text. He commented on this theme as a method to help students deduce word meaning from context:

> So let's look at the word 'gregarious.' If they were opposites, and he was painfully shy and stayed so all his life, then what would the word 'gregarious' mean?

However, little was evident in the teacher's think-aloud to indicate attempts at word building and attention to word frequency as a criterion for selection, a focus that appears to be missing from the think-aloud recordings of both the junior teachers, particularly when they are compared to their more experienced colleagues.

Senior Teachers

One of the most immediately striking differences between the junior teachers and the senior teachers in their selection of target vocabulary was a movement away from meaning and comprehension as the sole criteria for selection. Both the senior teachers in this study considered meaning and text comprehension as a selection criterion. However, both also considered frequency information and word formation as criteria.

Social Studies

When examining Teacher E's think-aloud transcription, two main criteria for selection emerge: (a) the perceived frequency of a word relative to the frequency of other words in the English language and (b) the status of a word as a compound.

While the junior social studies teacher (Teacher A) appeared to have focused primarily on history,

cultural orientation, and particularly text comprehension as criteria for vocabulary selection, the senior social studies teacher (Teacher E) focused on perceived word frequency and compound words as criteria for selection. For example, Teacher E cites a word's status as an "infrequent" word as a reason for choosing a target word in eight instances: "So these words are just infrequently used in discussion and probably not read by them very often." Further, a word's status as a compound was also a criterion for selection for Teacher E: "Compound word, kind of big, they'd have a problem with that."

While Teacher E mentioned compounding only three times as a criterion for selection, the presence of compounding as a criterion was in stark contrast to the junior social studies teacher, who made no mention of compounding and word formation as a selection criterion.

A selection criterion that appeared unique to Teacher E was a concern for learner confidence: "Infrequent word, probably pronunciation here they would need a little bit of confidence in pronouncing the tail end of that." As a strategy for helping learners, this teacher described the following:

> So 'dissent'...umm...that would just be something that they probably wouldn't pronounce it correctly so if an ESL kid, if they hear a correct pronunciation, I imagine they're going to feel more comfortable attempting to read it out loud, so a good modeling approach is what I would use to help out kids with dissent. I would say it, and often my kids, like I'll help them with a word, and then they'll skip right over it, and I'll make they, make them say it. I'll say, 'No. Tell me the word.' So I make them do that.

Teacher E appeared to have focused on potential problems that ELLs might encounter. In ten instances, she used the word "problem" overtly to provide a rationale for the selection of a target word. Further, the senior teacher often characterized vocabulary in the text as a meeting, using the word "encounter" in at least four instances, but also characterizing the students' own process in a number of instances: (a) "They would probably just stop there," (b) "...they'd be terrified to pronounce it," and (c) "...a compound word that would probably frighten them...".

When examining Teacher E's decision-making process, it was evident that her experience had contributed to the process. Compared to her less-experienced colleague, differences in selection criteria appeared to be an attention to word frequency and word formation as well as confidence building. These criteria suggest an approach to target vocabulary selection based on empowering the learner to use target vocabulary beyond the scope of the material at hand. This approach was particularly evident when examining the think-aloud transcript for the senior English language arts teacher, Teacher B.

English Language Arts

Like Teacher E, Teacher B explicitly mentioned word frequency and word formation as criteria for selection. However, unlike Teacher E, Teacher B focused not only on compounding, as in the following example—

> Hmmm...I'd probably go 'frequent,' 'postwar,' 'argumentative,' 'relationships,' 'remembered,' 'painfully,' and the reason why I'm picking some of these...uh...'postwar' is a compound word, and compound words can be difficult for anyone who is an emerging reader because we have two types of compound words.

—but also on affixation, as in the following example:

> It's an infrequent word itself, and then it's also got a suffix on the end, and that's also one of the reasons why I was looking at 'remembered' and 'painfully.' Mostly because of the suffixes, so it presents an ideal for where you can teach them suffixes and prefixes, and they can use those to

identify words, and it's something that doesn't just apply to that one word.

In addition to word formation and frequency information, Teacher B included allusion and figurative language as criteria for selection. For example, when the story of King Arthur was mentioned in the article on Steinbeck, the senior English teacher commented:

> Well, if we want to talk about *Le Morte d'Arthur*, and we're going to talk about allusions with *East of Eden*, every time we talk about King Arthur, we talk about Guinevere. That's definitely something where I would bring up the story for the kids and show them that this is a famous piece of literature in Western civilization, and we'll talk about how it's influenced a lot of things that we read and talk about and actually some concepts in our culture, so that's definitely some things that I'd go over.

Further, when language was used in a figurative sense in the article, the senior English teacher commented on this as an inclusion criterion. For example, when the article on Steinbeck mentions that, "As an almost elderly man, he was still pounding out manuscripts," the senior English teacher commented, "'Pounding' is figurative language so I would try to explain to them that it's not actually punching something. It's actually the metaphor."

Additionally, Teacher B shared with Teacher E a concern for empowering student pronunciation. However, rather than a focus on modeling as a strategy for teaching pronunciation, Teacher B focused on a facilitative approach:

> 'Coordinated' is a word that, if I was going, if they were in my reading class, I would teach them the 'divide it' rule in order to break down longer words, so they know how to pronounce them. Because there's rules to how you pronounce syllables, and this is just a really good one because with that double O, a lot of the kids aren't going to know how to pronounce that.

For both these senior teachers, concerns other than local-level word comprehension as a means to achieve general comprehension of the text seemed to have been at the forefront of vocabulary selection. Rather, word-building—by calling attention to compound words, prefixation, and suffixation—pronunciation and sound-spelling correlates, as well as confidence-building through modeling or explicit teaching of pronunciation rules, were the key goals of the senior teachers in this study. However, another key concern that distinguished senior teachers from their junior colleagues was senior teachers' explicit focus on word frequency information as a criterion for word selection. As will be seen in the following section, all teachers' decisions about target vocabulary selection appeared to be influenced by relative word frequency, whether frequency was explicitly mentioned as a criterion or not.

Frequency Information

To examine the teachers' choices of target vocabulary and the relative frequency with which the words occur in the English language, two lexical frequency profiles were generated: (a) the first comparing the chosen vocabulary to the 1K through the 5K word families (Nation, 2006) and (b) the second

Table 6. Frequency profiles of vocabulary selected by the math teachers

	Teacher C	Teacher F
1K word types	33.33%	62.50%
2K word types	55.56%	37.50%
3K word types	11.11%	-
4K word types	-	-
5K word types	-	-
Not listed	-	-

comparing the chosen vocabulary to the AWL (Coxhead, 2000). The following sections provide an overview of the teachers' choices by subject area.

Math Instructors

As illustrated in Table 6, both math teachers focused on relatively high-frequency vocabulary. Neither teacher chose vocabulary from beyond the 3K list. Further, Teacher F chose no vocabulary from beyond the 2K list. This could very well be an artefact of the subject area, which can be conceptually quite difficult for learners. Although not mentioned overtly in the participating teachers' think-aloud transcripts, it seems plausible that both teachers chose to focus on simple vocabulary in an effort to not further complicate an already complicated subject.

Interestingly, both math instructors, despite having the same text, chose different words from the AWL (see Table 7).

Table 7. Words from the AWL selected by the math teachers

Teacher C	Teacher F
constant	constant
distributive	negative
substitute	positive
variable	

Social Studies Instructors

Lexical frequency profiles generated from the teachers' vocabulary selections (see Table 8) indicate that the senior teacher's (Teacher E's) intuitions regarding the relative frequency of the targeted vocabulary were quite accurate in assessing the relative frequency of the vocabulary selected. When the teachers noted a word as being low frequency, it typically was indeed low frequency. Of all 20 instances in which the teacher cited the infrequency of a particular word as a criterion for its selection, none of the selected words was among the most frequent word families (the 1K word families). Six words were among the 2K word families; three were among the 3K families; one was among the 4K families; and five were among the 5K families. Another five were beyond the 5K word families, suggesting that they appear even less frequently in the English language. In contrast, the majority of Teacher A's selections (57.97%) were high-frequency word types from the 1K and 2K lists.

When comparing the social studies teachers' selection of target vocabulary from the AWL (see Table 9), the junior teacher (Teacher A) selected the same words as her senior colleague (Teacher E). However, the junior teacher also selected 12 more words from the AWL than the senior teacher, suggesting the senior teacher was more strategic in her selection of vocabulary. As the senior teacher focused heavily on frequency, rather than perceived importance, as a criterion for selection, such a conclusion seems warranted.

Table 8. Frequency profiles of vocabulary selected by the social studies teachers

	Teacher A	Teacher E
1K word types	26.81%	9.09%
2K word types	31.16%	29.55%
3K word types	10.14%	9.09%
4K word types	12.32%	6.82%
5K word types	7.97%	22.73%
Not listed	11.59%	22.73%

English Language Arts Instructors

Like the senior teacher of social studies, the senior teacher of English language arts (Teacher B) explicitly mentioned word frequency as a criterion for selection 11 times. In one case, the teacher suggested that a word may be a low frequency word, then changed his mind, leaving ten instances in which the teacher mentioned low frequency as a criterion for selection. Like his social studies counterpart, Teacher B's instincts were quite reliable: of the ten words selected for their relatively low frequency in the English language, two appear in the 3K list. The remaining eight were not listed in the 1K-5K lists, suggesting comparatively very low frequency.

Table 9. Words from the AWL selected by the social studies teachers

Teacher A	Teacher B
accessible	accessible
challenged	economy
collapsed	enormous
consumer	instituted
decades	isolation
domination	restrictions
economy	restrictive
enormous	
illegal	
instituted	
isolation	
layer	
professionals	
regime	
regulations	
restrictions	
restrictive	
structure	
successor	

When comparing the percentage of word types from each of the lists (see Table 10), it is interesting to note that Teacher B, the senior English teacher, chose a number of high-frequency words for focus with ELLs when compared to Teacher D, the junior English teacher.

Table 10. Frequency profiles of vocabulary selected by the English language arts teachers

	Teacher D	Teacher B
1K word types	3.03%	16.30%
2K word types	9.09%	9.78%
3K word types	12.12%	11.96%
4K word types	9.09%	13.04%
5K word types	3.03%	8.70%
Not listed	63.64%	40.22%

However, when the 14 high-frequency words selected by the senior teacher were examined and compared to the teacher's rationale in the think-aloud transcription, most them were either part of the teacher's larger discussion of how compound words are formed and/or interpreted (e.g., *first-rate*, *third-rate*, *relationships*, *remembered*, *lifetime*), a discussion of figurative language (e.g., *fired*), or a discussion of sound-spelling correlates (e.g., *received*).

When comparing the number of word types from the AWL (see Table 11), though the two teachers' selections overlap for the most part. However, the senior teacher chose an additional four words when compared to the junior teacher.

Table 11. Words from the AWL selected by the English language arts teachers

Teacher D	Teacher B
coordinated	apparently
inevitable	coordinated
Isolation	depress
passive	inevitable
	isolation
	participate
	passive
	publication

DISCUSSION

Views on Vocabulary Learning

The teachers' views regarding vocabulary learning appeared to be consistent when compared across subject areas. The main orientation regarding vocabulary learning was a Knowledge orientation, in which vocabulary learning is viewed as a natural outgrowth of content learning. This is not a surprise, given that each instructor's primary goal is to promote student mastery of the content. Further, given that much vocabulary learning in the L1 is done incidentally through exposure to text and content (Laufer 2003; Nation, 2001), and that the participating teachers had no training in working with ELLs, a Knowledge orientation toward vocabulary learning is understandable.

Vocabulary Selection

Interestingly, except for the math instructors, the primary differences among the teachers' rationales for vocabulary selection were not among subject areas, but rather between senior teachers and their junior colleagues. The math teachers and the junior teachers in this study selected vocabulary based primarily on their perceived importance of the word to comprehension of the material at hand. For these teachers, form-meaning mapping was their primary consideration. In contrast, the senior teachers focused on relative frequency of words selected and word formation as criteria for selection. Further, particularly for the senior teacher of social studies, student confidence appeared to be a selection criterion.

Frequency and the AWL

Teachers' intuitions regarding the relative frequency of selected vocabulary appeared to have been accurate. With the exception of the math teachers, the teachers in the study selected low frequency vocabulary for focus with their students. The senior teachers in the study commented overtly on their intuitions regarding word frequency and were largely accurate in their predictions. While the junior teachers did not mention frequency as a selection criterion, they did in fact select low frequency vocabulary to focus on with ELLs in their classes.

The teachers' selections from the AWL differed among subject areas. The teachers of math did not select any vocabulary from the AWL; again, this is likely an artefact of the task or an effort not to complicate an already complicated subject. In contrast, the teachers of social studies and English language arts selected several words from the AWL, although this was not mentioned as a selection criterion. It would therefore appear that teachers' intuitions with regard to academic vocabulary as well as relative word frequency are quite reliable.

Pedagogical Implications

The results of the study suggest that teachers have good intuitions about academic vocabulary as well as low frequency vocabulary. However, an orientation toward vocabulary as a means to an end—i.e., text comprehension—and an incidental orientation to vocabulary instruction predominated among the junior teachers in the study. In contrast, senior teachers in the study focused explicitly on word fre-

quency and word formation, suggesting an orientation toward vocabulary instruction that helped learners achieve some degree of productive mastery over the target vocabulary. This was particularly true of the senior English language arts teacher. Based on this result, the following pedagogical suggestions are put forward.

First, teachers may wish to generate lexical frequency profiles of texts used in class to either (a) select vocabulary for instruction or (b) confirm their intuitions about the relative frequency of vocabulary they have selected for target with ELLs. Such profiles can be generated using the Vocabprofile tool[2] or using the Range program (Heatley et al., 2002) freely available via Paul Nation's faculty website.[3] The Vocabprofile allows users to generate profiles based on frequency data from the Corpus of Contemporary American English (Davies, 2008), together with frequency lists generated from the British National Corpus (Nation, 2006). In contrast, the Range program (Heatley et al., 2002) allows teachers to generate specialty frequency lists either individually or in collaboration with teachers in other subject areas.

Such collaboration could potentially do more than simply generate specialty vocabulary lists: it could unify vocabulary instruction across subject areas so that learners receive multiple exposures to target vocabulary and have the opportunity to practice use of the target vocabulary in addition to receptive comprehension. Teachers of English language arts may help learners with word formation and methods in developing learners' productive knowledge of the target vocabulary, while teachers in subject areas such as social studies and the sciences can provide learners with contextualized use of the target vocabulary.

In all cases, teachers should conceive of vocabulary knowledge as multi-faceted (Nation, 2001)—in other words, not solely as a means of text comprehension, a simple form-meaning association. Rather, attention to students' (a) use of target vocabulary, (b) formation of target vocabulary, and (c) manipulation of target vocabulary (Johnson et al., 2016) is vital to vocabulary acquisition among high school-aged ELLs. In considering productive vocabulary knowledge, teachers should use frequency information to balance two objectives which seem to contradict one another: (a) mastery over accurate productive knowledge of high frequency word families (Johnson et al., 2016), and (b) use of low frequency word families (Johnson et al., 2016), particularly among ELLs from Romance language backgrounds (Johnson et al., 2013).

CONCLUSION

As a first step toward addressing the seeming shortage of vocabulary learning research among high school-aged ELLs, this study examined the decisions of high school teachers of math, social studies, and English language arts—none of whom had formal training in working with ELLs. Surprisingly, differences in selection criteria were not found among the teachers with regard to subject area, but rather with regard to their level of experience. The results of the study suggest that relatively new teachers relied almost exclusively on the perceived importance of a word to students' comprehension of a given text. In contrast, more experienced teachers examined the relative frequency of a word, its composition, and its productivity when selecting vocabulary for instruction. The results of the study suggest the implementation of integrated vocabulary instruction across subject areas with vocabulary lists chosen through collaboration of mainstream teachers in the subject areas and English language teaching specialists.

[2] At http://www.lextutor.ca/

[3] See http://www.victoria.ac.nz/lals/about/staff/paul-nation

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