A Professional Development Initiative for Developing Approaches to Vocabulary Instruction With Secondary Mathematics, Art, Science, and English Teachers

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Abstract

During a yearlong collaborative effort to enhance vocabulary instruction in secondary classrooms, high school teachers and university faculty developed and implemented a variety of approaches to support students in building rich representations of word meanings as well as an understanding of word features such as roots, affixes, and parts of speech. This article describes those approaches and provides specific examples.

According to the Report of the National Reading Panel (NRP) (2000):

> A great deal is known about the ways in which vocabulary increases under highly controlled conditions, but much less is known about the ways in which such growth can be fostered in instructional contexts. There is a great need for the conduct of research on these topics in authentic school contexts, with real teachers, under real conditions (p.4-4).

The NRP Report (2000) challenged educational researchers to develop and document approaches for supporting vocabulary development, and the current professional literature reveals that the

challenge is being addressed (e. g., Baumann & Kame'enui, 2004; Beck, McKeown, & Kucan, 2002; Hiebert & Kamil, 2005; Graves, 2006). However, much of the reported vocabulary work focuses on young children or children in elementary school. At the middle-school and high school levels, there are far fewer available resources, and those that do exist often focus on English class as the primary context for vocabulary instruction (e.g., Dixon-Krauss, 2001; Dole, Sloan, & Trathen, 1995; Harmon, 1998). Little research has been reported for scaffolding vocabulary development in secondary level content areas such as history, science, and mathematics, despite the fact that high school students spend most of their time in these content area classes.

This article provides an account of a professional development initiative involving university faculty and secondary teachers from Alleghany High School in northwestern North Carolina. The purpose of the initiative was to "assist teachers' implementation of effective . . . vocabulary instruction [and] to increase the amount and type of reading that students are assigned in content area instruction" (Trathen, 2003, p. 5).

Together, the educators developed and implemented a variety of approaches to support students in building rich representations of word meanings as well as an understanding of word features such as roots, affixes, and parts of speech. These approaches and specific examples of how they were implemented are described in this article and should provide useful information for secondary teachers and teacher educators who prepare such teachers.

Overview

Alleghany High School has a student population of 412, with 3 percent taking advanced placement courses. The high school was identified as a high-need district within the region based on an evaluation of SAT scores and state end-of-grade student achievement test scores (Trathen, 2003).

Of the 20 faculty who teach the major academic subjects at Alleghany High School, 10 volunteered to participate in the professional development. Four of these teachers agreed to share their developing understandings and experiences through interviews, observations, and written reflections. These teachers and their subject areas are: Donna Hash, geometry; Donna Link, art; Linda Miller, earth science; and Lucas Pasley, English. Their insights will be described later in the article.

One of the incentives for participating in the professional development effort was that each teacher received funding for text-based classroom resources such as books and magazines. The school media center also received funds to be spent on resources suggested by the teachers. Teachers were encouraged to purchase reference books like dictionaries and thesauri as well as tradebooks related to content area themes. The tradebooks would provide alternative contexts for students to encounter vocabulary words and find information about topics they were learning about in contexts in their textbooks. These resources would also provide struggling learners with readings at varying levels of difficulty. Through the professional development workshops, teachers would learn about a variety of instructional approaches to support students in making the most of those resources.

The professional development plan suggested to and approved by the Alleghany faculty was one that encouraged and supported teacher choice and decision making. The plan involved a series of workshops and content area team meetings. During the workshops, university faculty presented and demonstrated a variety of approaches for vocabulary development and the use of multiple texts. During the content area team meetings, teachers within a specific content area, in consultation with university faculty, designed instruction that they decided would be: (a) most appropriate for their students, (b) meet the demands of their curriculum, and (c) match their interests and teaching styles. Subsequently, university faculty observed in teachers' classrooms and discussed with teachers their use of specific instructional approaches. As the semester progressed, teachers were encouraged to implement several different methods, and to reflect on the effects of these methods on student learning and engagement.

In the sections that follow, the activities and content of the professional development initiative are described. These descriptions reveal the context within which the teachers made decisions about how they would address vocabulary development in their courses.

Professional Development Workshops

The professional development effort began with teachers attending workshops the summer before the implementation year. The workshop included a series of sessions that provided teachers with information about specific approaches for vocabulary instruction, and focused on the use of

multiple texts to complement and reinforce vocabulary and content presented in textbooks.

Vocabulary Instruction

The vocabulary workshop sessions emphasized two aspects of effective vocabulary instruction: developing rich representations of word meanings, and learning about how words work. Such approaches are particularly supportive of struggling learners because they provide multiple ways to construct the vocabulary knowledge needed to support conceptual understanding and access to text ideas.

Rich Representations of Word Meanings. Information presented to the teachers during the vocabulary workshop sessions emphasized that effective vocabulary instruction involves opportunities for students to have multiple encounters with words in a variety of contexts (Beck, McKeown, & Kucan, 2002; Laflamme, 1997). Another important principle was that groups of conceptually related words are more easily learned than lists of words that do not share some connection (Hennings, 2000).

Teachers were introduced to specific activities to support students in developing rich representations of word meanings that exceed merely associating a word with its definition. The activities are presented in Table 1. The examples in the table suggest that inviting students to develop multiple representations (e.g., verbal, visual, dramatic) as well multiple connections (e.g., synonyms and antonyms, analogies) are important ways to mediate students' developing representations of word meanings.

Table 1

Activities for Developing Rich Representations of Word Meanings

Crafting a definition for a word after investigating multiple sources of information

Locating appropriate synonyms and antonyms

Constructing visual representations

Role playing

Comparing/contrasting

Identifying examples/nonexamples

Developing analogies

Sorting words into categories

Associating a word with people, places, events, movies, songs, literary characters

Specifying situations in which a word might be used

Reading a word in multiple contexts

Using a word in written and oral discourse

Learning about How Words Work. The second aspect of effective vocabulary instruction—supporting students in learning about how words work--was also discussed during the vocabulary workshop sessions. Teachers learned about research demonstrating the efficacy of teaching students to engage in morphemic analysis; that is, to attend to the meanings of morphemes, or units of meaning, such as roots and prefixes (e.g., Carlisle, 2003; Edwards, Font, Baumann, & Boland, 2004; Graves, 2004). They were encouraged to focus their instruction on word features (such as prefixes and roots) and word histories (etymology), as well as related words, and forms of words (parts of speech). Table 2 lists specific activities for teachers to use with students to engage them in the analysis of words and word parts.

Table 2

Activities for Learning about How Words Work

Investigating the etymology, or history of a word

Identifying word roots and meanings

Identifying affixes and meanings

Identifying a word's part of speech

Generating forms of a word (noun, adjective, verb, adverb)

Generating related words (e.g., *thermal, thermometer, thermostat*)

Multiple Texts to Complement and Reinforce Vocabulary and Content Presented in Textbooks

In the workshop that focused on the use of multiple texts, two specific approaches were presented: (a) Literature Circles (Daniels, 1994) and (b) multigenre reading and writing (Kucan, in press; Moulton, 1999). These specific methods illustrated for teachers how a variety of texts could be used to complement and reinforce vocabulary and content presented in their textbooks.

Literature Circles. Teachers were introduced to the idea of Literature Circles (Daniels, 1994) through a description of students reading different texts related to a central theme or topic. The texts can be books but also entries from reference books, newspaper or magazine articles, and Internet documents. Small groups read the same text and each student in the group assumes responsibility for a specific role (for example, Discussion Director, Illustrator, Investigator, Vocabulary Enricher). After reading and discussing their specific text, each group shares information.

Multigenre Reading and Writing. One of the workshop activities designed to emphasize the idea that students can benefit from using information from a variety of sources to build understandings of content was reading an article by Moulton (1999). In the article, Moulton described the work of her students in using multiple resources to investigate a particular topic. Moulton's students transformed the information they had gathered to create a variety of artifacts in different genres. The article demonstrated how students could use information from diverse sources to investigate a topic or concept.

The teachers talked about a multigenre project described in the article that focused on Eva Peron, Evita. The student who created the project had used a wide array of resources to learn about her subject. Then, she transformed the information to create: a birth certificate, movie poster, stream-of-consciousness fragment, newspaper article, a journal entry by an Argentinian who attended a rally at which Evita spoke, a poem by Evita about the people of Argentina, a poem by Evita to Juan Peron, and a memoir by Evita's mother. They also viewed slides of multigenre projects created by preservice teachers (Kucan, in press).

As an example of how students can transform information from multiple sources, teachers were also introduced to "I" poems (Siebert, 1988) and poems for two voices (Pappas, 1991). In both types of poems, writers take the perspective of a person, object, place, or concept, and express their ideas from that point of view. Poetry is one of the genres most often selected by students for their multigenre projects (Kucan, in press).

An example of a poem for two voices is "Prime numbers" by Pappas (1991, pp. 46-47). Two people or groups are needed to read the poem aloud. One person or group reads the lines in the left-hand column. The other person or group reads the lines in the right-hand column. Lines that appear across from one another in both columns are read by both readers, or groups of readers.

We like to think	
	of ourselves
as the basic numbers.	
2	
	3
5	
	7
. . .	
No one can	No one can
take us apart.	factor us further.
We're not composite.	
We're prime!	We're prime!

Team Meetings

Subsequent to the workshop sessions, teachers met with their colleagues in content-area teams to talk about the various approaches presented in the workshops and to formulate plans for making use of the methods in their own classes. The sections that follow describe the efforts of four participating teachers. The descriptions are based on teacher and faculty brainstorming sessions, interviews, and entries on a project blog, as well as classroom observations, student artifacts, and teacher websites.

In the sections that follow, it is interesting to note how the teachers transformed the information provided during the workshop sessions and team meetings to accommodate the mandated curriculum as well as their personal interests and teaching styles.

Donna Hash: Geometric Relationships

Donna Hash is a veteran mathematics teacher with more than 15 years experience. In her geometry class with tenth graders, she worked with vocabulary from the chapters in the geometry textbook. To support students in learning that vocabulary, she developed activities to emphasize meaningful relationships between and among terms. She engaged students in comparing and contrasting, categorizing, and discovering shared word roots.

Comparing and Contrasting. Drawing on the information provided during the summer workshops about poems for two voices (one of the genres used by students in creating multigenre projects), Ms. Hash decided to engage her students in using the approach. She shared models of poems for two voices (Pappas, 1991), and asked students to work with a partner to create their own poems related to: regular and irregular polygons, complementary and supplementary angles, prime and composite numbers, and distance and midpoint formulas. Below is a poem that two students wrote about complementary and supplementary angles.

|	
We are angles.	We are angles.
My sum is 90 degrees.	
	My sum is 180 degrees.
I'm complementary.	
	I'm supplementary.
I make a right angle.	
	I make a line.
I'm half of supplementary.	
	I'm 2X complementary.
We come in pairs.	We come in pairs.

Comparing and contrasting *supplementary* and *complementary* and other pairs of related terms gave students an opportunity to develop deeper representations of those terms.

Categorizing. As a review of terms in several chapters, Ms. Hash asked small groups of students to create visual displays of related terms and to be prepared to explain to the class how the terms were related. Some of the categories were: angles, polygons, lines, reasoning, and properties. Figure 1 shows some of the displays students created for angles and polygons.

Creating the visual display as well as the explanation presented to peers allowed students to organize several terms into a single category and to articulate the features those terms shared.

Figure 1. Visual displays of related geometric terms.
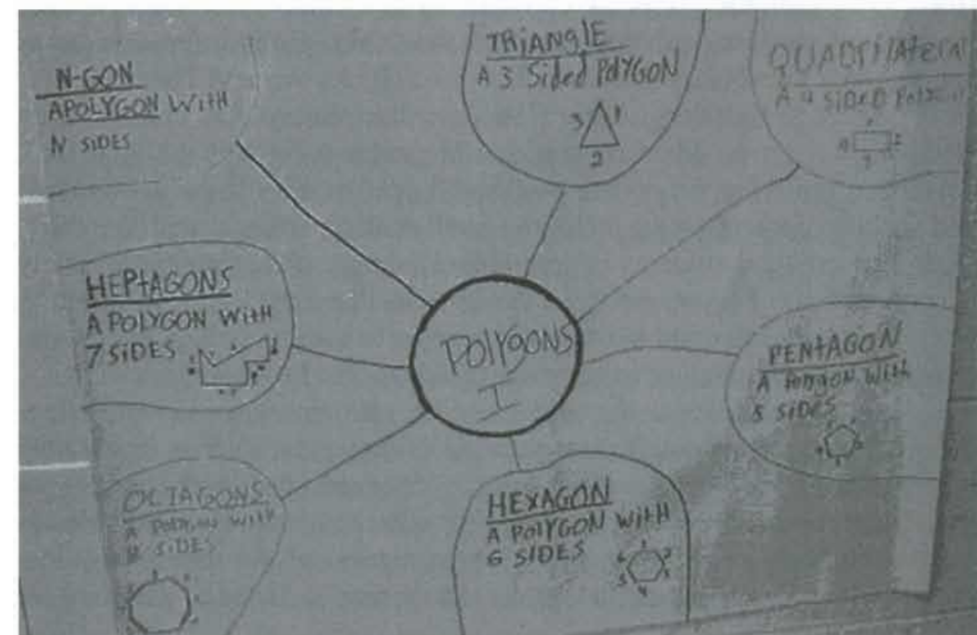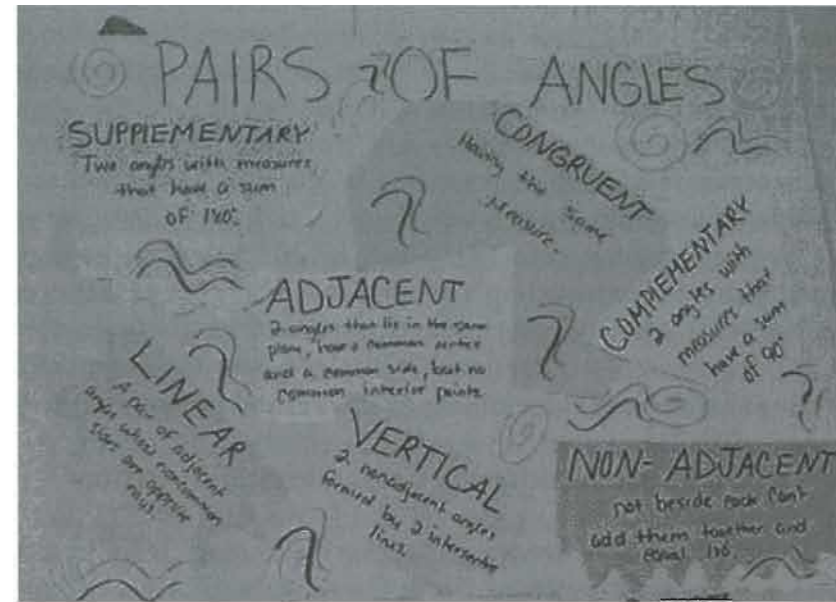
Discovering Shared Word Roots. When Ms. Hash introduced geometric terms to students, she also introduced non-geometric words that shared the same word root. For instance, when students learned about the geometric terms *circumference* and *circumscribe*, Ms. Hash asked them to use the glossary and examples in their textbooks to compose definitions for the terms. She also asked them to use dictionaries to find out the meaning of the word root *circum* (Latin, "around') and the words *circumstance* and *circumstantial*. Likewise, in introducing the geometric term *median*, she had students find out the meaning of the word root *medianus* (Latin, "in the middle") and the word *mediator*. The non-geometric terms reinforced the meaning of the word roots and provided more connections for reinforcing the meanings of the geometric terms.

All the activities that Ms. Hash invited students to engage in supported them in constructing networks of relationships between and among words: comparing and contrasting pairs of words (poems for two voices); categorizing words (visual displays and explanations); and discovering shared word roots among geometric and non-geometric terms.

Donna Link: Multimedia Cross-Curricular Artistry

Donna Link, also a veteran teacher with more than 15 years of experience, was recently named North Carolina Art Teacher of the Year. Her enthusiasm for art is as apparent as her enthusiasm for teaching. During the professional development year, Ms. Link infused two art courses with vocabulary activities: Interdisciplinary Art and Thematic Art.

Interdisciplinary Art. The Interdisciplinary Art course is an elective that can be taken by students in grades 9 through 12. Ms. Link developed units for the course that highlighted relationships between art and specific content areas, including mathematics, science, and literature. Each unit engaged students in responding to a question through a variety of explorations. For example, in the art and literature unit, the question was: How can you combine text and images to make a collage that sends a paradoxical, satirical, or ironic message about the world we live in?

As they explored the unit question, students learned vocabulary that included art-related terms such as *collage*, as well as traditional literary terms --*parody, satire, irony*. Students had opportunities to investigate uses of the words in multimedia contexts. For example, to support students in building a rich representation of the term *irony*, Ms. Link had students listen to Alanis Morrisette's "Ironic" (Ballard &

Morrisette, 1995, track 10) and Emerson, Lake, and Palmer's "Lucky Man" (1970, track 6). The lyrics of both selections describe events that turn out contrary to what would be expected; for example, an old man wins the lottery only to die the next day. Students also looked for examples of irony in works of art, placing post-it notes on classroom posters and illustrations in art books, and then explaining the irony in the imagery. For instance, students analyzed an illustration of the Mona Lisa wearing camouflage and smoking a cigarette, discussing the feelings elicited from the juxtaposition of the classic image and the contemporary props. Students also juxtaposed art and text to create ironic statements of their own. While students were exploring irony in art class, they were also learning (or had learned) about the term in English class. Thus, students had multiple contexts within and across courses for building a rich representation of the term.

Thematic Art. The Thematic Art course is also an elective open to students in grades 9 through 12. Ms. Link designed this course to engage students in exploring units about a diverse array of art forms: from pencil portraiture and abstract landscape to pastel still life and plaster work.

For this course, Ms. Link encouraged students to think about vocabulary in a number of surprising ways. Her approaches were influenced by the synectics approach described by Roukes (1984, 1988). The term *synectics* refers to the process of connecting different things in a variety of ways. As Ms. Link explained it (12/09/04):

> I learned about [synectics] years ago in college. . .
> [It] has really helped me with conceptual connections . . .
> bringing different things together in a united connection. . .
> and it goes through how you can use analogy,
> transformations, symbols and stuff . . . . It's got
> tremendous ideas for vocabulary—way out there!

For example, Ms. Link asked students to connect a word to colors and sensory experience. In a unit about plaster work that included *isolation* as a vocabulary word, she asked students to respond to these questions: What does isolation feel like? What color is it? What taste do you have in your mouth? What sound is it? What texture? She also invited students to create anagrams and analogies for terms.

As a final assessment of students' understanding, Ms. Link developed a test that engaged students in an array of activities that

reflected their diverse learning experiences across the semester. Sample items from the assessment are displayed in Figure 2.

Figure 2. Sample items from Donna Link's Thematic Art course assessment.

View the example above. When it is unclear whether the black shapes are on top of the white, or the white shapes are on top of the black, we say the work is:

a. nonlinear   b. elusive   c. optical   d. ambiguous

Juxtapose an image and a word in the space provided. Create a *juxtaposition* that is thought-provocative and **controversial.**

How is the word "*ambiguity*" like the word "*objectivity*?" Cite two ways.

Make up an acronym for **motif** that explains or defines what a **motif** is.

   M   –
   O   –
   T   –
   I   –
   F   –

Sort the following words. Then, tell why you sorted them the way you did:

concentric	radial	shape	form	placement	structure	directional
negative	positive	ambiguity	motif	symmetry	radial	conceptual,
cyclical	traditional	functional	panoramic	perspective	objectivity	

In addition to completing the assessment, students created electronic portfolios of their work and crafted written descriptions of each piece they chose to include. Vocabulary words included in these descriptions were highlighted. For examples, you can visit Ms. Link's website at: http://www.alleghany.k12.nc.us/link. The website also includes the syllabus for Ms. Link's art courses with vocabulary and related activities.

In all of her courses, Ms. Link provided students with rich, multifaceted, and unexpected experiences with vocabulary. Activities and assessments revealed multimedia and cross-curricular connections that were also relevant and sensitive to student interests.

Linda Miller: Encircling Earth Science Terms

Although Linda Miller had taught for 4 years in an alternative learning center, the professional development year was her first experience teaching in a traditional high school science classroom. When she heard about Literature Circles in the summer workshops, she immediately began thinking about how the approach might be used with students in her earth science class, an elective for students in grades 10 through 12. The idea of small groups of students working together to investigate specific features of a vocabulary word intrigued her. In a blog entry (09/07/04), she described her plan:

I took the idea of Literature Circles . . . and decided to use this approach with my students. I kept them in groups of three or four (basically their lab groups) and assigned each group an even number of the vocabulary terms for the new chapter we are beginning. I told each group to choose a Vocabulary Enricher [who would craft a definition as well s provide information about word features such as the etymology, roots, and affixes], an Illustrator [who would create a diagram or illustration], a Connector [who would relate the word to current events or situations] and a Discussion Director [who would pose questions about the word]. I informed the students that they [were] to define, discuss, illustrate and connect the terms in ways that the rest of the students [would] be able to understand. Most of the students have been very excited about this project. They did not appear to have any problems in deciding their role within the group. I told

them they had to present the terms to the whole class. I will then copy all of their work and the work from the other groups . . . . From these pages, they will create their own glossary of terms for the chapters we are studying.

Ms. Miller organized students into groups and assigned specific terms from each chapter in the earth science textbook. She arranged for class sessions to be held in the media center so students could consult a variety of references including the Internet. For each term, each of the four students in a group created a page with role-related information. For example, there was a list of questions on one page, the definitions and related word feature information on another, an illustration on another page, and notes about connections between the word and current events on another page. With more than 30 terms per unit, however, the number of pages to be duplicated was considerable: 120 for each student! So, Ms. Miller decided to revise her plan in several ways.

First, Ms. Miller decided to assign related terms to a group rather than just a specific number of terms. Thus, what students found out about one word could be used to help them understand another. For example, students in a group might be working on a set of words related to winds and the movement of heated and cooled air such as the following: *trade winds, jet stream, horse latitudes,* and *doldrums.*
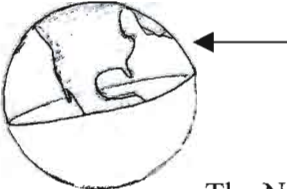
Second, Ms. Miller decided that each group member would be responsible for assuming all the roles related to creating a glossary entry. That is, each student would complete the tasks of the Discussion Director, Vocabulary Enricher, Illustrator, and Connector. To organize their work, she and university faculty brainstormed a template and example for students to use as a model (see Figure 3).

Third, Ms. Miller called on students in a group to present their words as the words were encountered in class readings, lectures, experiments, demonstrations, and discussions. Students shared what they had learned when that learning could enhance and support what other students were trying to understand.

The templates reduced the number of pages to be duplicated for the class glossary. The templates also provided each student with opportunities to create multiple representations of a word (visual as well as verbal) and to use multiple resources in developing those representations (for example, Internet, dictionary, reference books, and textbook). In the course of creating their glossary entries, students were also learning about features of words such as part of speech, affixes, and

roots. And they were encouraged to generate related words, elaborating the network of connections around each word even further.

Figure 3. Sample template for earth science glossary entries.

Vocabulary Term/Concept: hemisphere

Found definitions: 1. Half of a spherical or roughly spherical body (as a planet). 2. Half of the celestial sphere divided into two halves by the horizon, the celestial equator, or the ecliptic.

Your own definition: A hemisphere is one half of the Earth

Illustration: The Northern Hemisphere

Part of speech	Word root(s)	Prefix/suffix	Related words
noun	sphaera = Latin, globe hemi = Greek, half	hemi = half or partial	spherical atmosphere biosphere

Connections, Questions, Examples, and/or Additional Information
How many hemispheres are there? What are they?
4 hemispheres: northern, southern, eastern, western

**Lucas Pasley: English Wordsmithing
and the Exploration of Etymological Worlds**

Lucas Pasley, a second-year teacher, developed two approaches to vocabulary instruction in his English classes. He used both approaches with sophomores. The first approach involved students creating entries for words to record in their vocabulary notebooks. The entries highlighted multiple dimensions of a word: its etymology, or history, its relationship to other words—synonyms and antonyms, and its multiple forms (noun, adjective, verb, and adverb). The second approach involved students in

learning about word roots and prefixes (a state curriculum standard for English).

Highlighting Word Meanings and Word Features.   Mr. Pasley chose five words for students to learn each week.   The words were selected from the literature that students were reading as well as from a list of words that had appeared in versions of the Scholastic Aptitude Test (SAT).   Students had to create an entry for each word that included the features indicated by the acronym *DASER* as shown in Table 3.

Table 3
Entry for Vocabulary Words Using DASER Format

PEEVISH		
D **definition**	hard to please; irritable	
A **antonyms**	easy-going; good natured; cordial, genia	
S **synonyms**	cranky; disagreeable; displaying annoyance	
E **etymology**	Perhaps from Latin *perversus,* meaning "turned around, improper"	
R **related forms**	**noun**	peevishness: state or condition of being peevish or irritated; peeve: cause of annoyance (pet peeve)
	adjective	peevish
	verb	peeve: to annoy, irritate, vex
	adverb	peevishly: in a peevish way, or in a way that shows irritation

In an interview (12/08/04), Mr. Pasley commented on his decision to focus on just five words per week:

[W]hat I have really enjoyed about this experimenting is really exploring *a* word and all the possibilities that [the] word opens up, whether it's different forms of the word, different parts of speech, or whether it's the world of etymologies that might be opened by the root. . . . I carefully selected words, words that would open etymological worlds.

Inviting students to generate related forms of words also provided students with opportunities to widen their understanding of the world of words. For each vocabulary word, students had to generate forms of the word for each part of speech. Then, they had to use the different word

forms in sentences. Table 4 shows the forms of words students developed for the words *antagonist, allusion,* and *beneficial.*

Table 4
Forms of the Words Antagonist, Allusion, and Beneficial

Noun	Adjective	Verb	Adverb
antagonist	antagonistic	antagonize	antagonistically
allusion	allusive	allude	allusively
benefit	**beneficial**	benefit	beneficially

In a blog entry (09/08/04), Mr. Pasley noted:

My students seem to be really benefiting from the [forms of words] aspect of our vocabulary work. In the fourth week now, they're finally catching on that adverbs usually end in *–ly.* I was thinking about this kind of work compared to standard grammar lessons where students just learn the definition of the various parts of speech and get some examples. The repetition involved in going through all the parts of speech with a particular word, new words every week, really seems to be making a difference.

To align assessment with instruction, Mr. Pasley's weekly tests included items that specifically required students to demonstrate their grammatical understanding, as in the following example.

Choose the sentence in which the italicized word is used most appropriately.

a. The official spoke with the *beneficial,* and they came to an agreement.
b. The drug was only *beneficial* to people with certain symptoms.
c. Somebody yelling at me is always *beneficial* to my headaches.
d. The *benefit* medicine was just what I needed.

By discovering a word's etymology as well as its synonyms and antonyms, students were forging multiple connections and associations to that word. By generating related forms for a word, students were able to begin developing insights into how words worked. For example, they could see how certain suffixes (such as *–ist* in *dramatist* and *antagonist)*

were characteristic of nouns. As the corpus of words expanded, the opportunities for detecting such patterns increased.

Word Roots and Prefixes. Mr. Pasley's second approach to vocabulary instruction focused specifically on word roots and high-frequency prefixes. Students not only had to find the meanings of specifically assigned roots and prefixes, but also the meanings of words with those roots and prefixes. The roots were grouped so that related roots were learned as a set. For example, roots related to people including *andr/anthr, gyn, dem, hom, gen,* and *pop* were in one group. Words related to shapes and shaping—*morph, gon, ortho, fig,* and *form*--were in another group. (Mr. Pasley's website (http://www.alleghany.k12.nc.us/ahs/english/pasley includes the weekly word lists.)

Students not only had to learn the meanings of the roots and prefixes, they also had to demonstrate their learning through performance. For the final exam, Mr. Pasley assigned students to teams of partners or small groups. Each team had to review all of the word roots and prefixes studied throughout the semester and come up with a skit or tableau that would convey the meaning of the root or prefix to others quickly and correctly. No talking was permitted, but students could make use of items in the classroom as props. The final performances would be videotaped as documentation of student learning.

Students had several class periods to prepare and to rehearse. During the final exam, Mr. Pasley called out a prefix or root for each group. Students were quick to respond with an appropriate scenario. For example, the group that was given the root *biblio-* reached for books and acted as if they were reading them. The group assigned the prefix *syn-* demonstrated synchronized marching.

Mr. Pasley's approaches to vocabulary instruction focused on students learning traditional aspects of words-- roots, prefixes, parts of speech--but the activities used to teach and assess those words were innovative and motivating.

Emerging Principles and Instructional Implications

The studies evaluated in the NRP report on vocabulary, which was mentioned at the beginning of this article, suggest that the most effective methods for instruction "emphasized multimedia aspects of learning, richness of context in which words are to be learned, active student participation, and the number of exposures to words that learners will

receive" (2000, p. 4-27). These features were evident in the approaches developed by the four teachers described in this article.

In addition, the importance of the following aspects of vocabulary instruction also came to the fore:

- Teacher commitment to vocabulary development in terms of planning and class time
- Willingness to experiment with a variety of instructional approaches and to adapt those approaches as needed
- Setting learning goals in terms of developing rich representations of word meanings as well as an understanding of how words work
- Facilitating student access to multiple sources of information
- Providing support and encouragement for students to discover connections among words, including forms of words and related words
- Giving students opportunities to create multiple representations of words
- Highlighting cross-curricular connections
- Sustaining commitment to activity-based approaches
- Acknowledging the social dimension of classrooms by providing chances for students to work together and to present and perform with and for their peers
- Developing interesting assessments involving multiple contexts for focusing on word meanings and features of words

The four teachers whose efforts are described here provided enthusiastic reports of their experiences in an end-of year survey. Ms. Hash noted that involving students in expanding the information available for thinking about vocabulary, especially the information about word roots, enhanced her students' learning of mathematical terms. Ms. Link and Ms. Miller emphasized the importance of the diversity of vocabulary-related activities on student motivation. Mr. Pasley also commented on the importance of developing lessons and assessments that involve students in creative problem solving and group work. The experiences and insights of these teachers should provide specific examples for incorporating vocabulary instruction into secondary courses, examples that have not previously been available.

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A Professional Development Initiative for Developing Approaches to Vocabulary Instruction With Secondary Mathematics, Art, Science, and English Teachers

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Abstract

During a yearlong collaborative effort to enhance vocabulary instruction in secondary classrooms, high school teachers and university faculty developed and implemented a variety of approaches to support students in building rich representations of word meanings as well as an understanding of word features such as roots, affixes, and parts of speech. This article describes those approaches and provides specific examples.

According to the Report of the National Reading Panel (NRP) (2000):

> A great deal is known about the ways in which vocabulary increases under highly controlled conditions, but much less is known about the ways in which such growth can be fostered in instructional contexts. There is a great need for the conduct of research on these topics in authentic school contexts, with real teachers, under real conditions (p.4-4).

The NRP Report (2000) challenged educational researchers to develop and document approaches for supporting vocabulary development, and the current professional literature reveals that the