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Employing Web 2.0 Technologies to Support Students' Academic Vocabulary Acquisition

by Sue Ann Sharma
and Susan Unger

"Web 2.0 technologies have the potential to provide an opportunity to promote vocabulary learning in meaningful participatory ways that are engaging and relevant to students."

Sue Ann Sharma

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Introduction

The room is abuzz with conversations as students discuss words and concepts that intrigue them in their current unit of study. On their iPads, students are using the app *Popplet* to create graphic organizers with hyperlinks to images that represent key concepts and words found in the unit. Following this activity, these same students present to their peers an explanation of the text that includes visual representations utilizing *Popplet*.

Contrary to traditional vocabulary activities where students write vocabulary definitions and sentences in vocabulary notebooks, this scenario provides a glimpse of adolescent learners mediating their own vocabulary learning in authentic ways through the affordance of Web 2.0 tools (Wolsey, Smetana, & Grisham, 2014). This also represents research in practice—students conversing about the meanings of words and concepts in an iterative process (Beck, McKeown, & Kucan, 2013; Blachowicz & Fisher, 2006; Castek, Dalton & Grisham, 2102; Wolsey, Smetana, & Grisham, 2014). In addition, this task aligns with the Common Core vocabulary standards for English Language Arts and Literacy standards in History/Social Studies, and Science & Technical Subjects. In the Common Core State Standards (2010), the expectation is for students to *"acquire and use accurately grade-appropriate general academic and domain-specific words and phrases"* (L.6–8.6) and *"present the relationships between information and ideas clearly and efficiently"* (WHST.6—8.6). These two standards, in tandem, require students to develop and thoughtfully use domain-specific vocabulary with flexibility and clarity while reading, writing, and speaking in the disciplines. In essence, word ownership results in having a productive vocabulary that links learning to real world application in a digital society (Biemiller, 2012; Castek, Dalton, & Grisham, 2012).

Academic Vocabulary Instruction

Gaps in vocabulary knowledge, between low and high achieving students, are estimated to range between 4,500 to 5,400 words (Biemiller, 2012; Marzano & Pickering, 2005). Moreover, students most in need of vocabulary instruction are least likely to infer meanings (Blachowicz & Fisher, 2006; Ford-Connors & Paratore, 2014; Nagy & Townsend, 2012) and have limited success judging word meaning (Miller & Gilda, 1985; Scott &

Nagy, 1997). Researchers (Graves, 2006; Nagy & Scott, 2000) have identified five challenging facets of word knowledge. These include *multidimensionality*, that is, various word knowledge forms, usage and understanding of metaphor, idioms, and analogy; *polysemy*—words with multiple meanings; *heterogeneity*—how parts of speech differ or change based on the context & discipline; and *interrelatedness*—how words are linked by semantic domain; lastly, words are learned *incrementally* over time. Studies have shown that whether a student comes from a home with a limited amount of literacy experiences or one that is literacy-rich, all students can benefit from enhanced vocabulary instruction (Sprenger, 2103; Wolsey, Smetana, & Grisham, 2014). It is crucial that students receive opportunities to acquire and practice academic vocabulary in authentic ways given the complexity of word knowledge.

These word knowledge complexities elevate the importance of providing instructional conditions that "garner and support meaning of technical or theoretical ideas" (Nagy & Townsend, 2012, p. 47). The impact of dictionary use on vocabulary growth (Nist & Olejnik 1995) in traditional vocabulary learning tasks often entail copying definitions and composing sentences with unfamiliar terms; thus, Marzano and Pickering (2005) propose that teachers leverage student and text interactions that promote understanding of academic vocabulary with the six research-based practices below. Such activities include asking students to:

1. Describe, explain, or give an example of the new term when it is introduced, which provides multiple sources to develop heightened word awareness (Blachowicz & Fisher, 2000; Ford-Connors & Paratore, 2014: McKeown, Beck, Omanson, & Perfetti, 1983);
2. Restate the description, explanation, or example (Ford-Connors & Paratore, 2014), which accounts for contextual information (Stahl, 1983) as well as discovery information and manipulation of words (Beck & McKeown, 1983; McKeown, Beck, Omanson, & Pople, 1985; Stahl & Fairbanks, 1986);
3. Represent the term through a picture, symbol, or graphic (Ermis, 2008; Fisher, Frey, & Williams, 2002; Heimlich & Pittleman, 1986; Herber, 1978);
4. Organize knowledge of terms in notebooks to enhance memory and foster independent vocabulary study (Fisher, Frey & Williams, 2002; Schmitt & Schmitt 1995; Walters & Bozkurt, 2009);
5. Engage in discussion on words they are learning (Stahl & Vancil, 1986; McKeown et.al., 1983; McKeown et. al.,1985; Fisher & Frey, 2014); and
6. Play games to reinforce terms in a natural way (Beck, Perfetti, & McKeown, 1982; Fisher & Frey, 2014; McKeown et al., 1983) and to develop the skill to manipulate and be metacognitive about words (Fisher & Blachowicz, 2007).

This six-step process can be grouped into two categories: (a) introduction to and understanding of terms, which includes: description, restatement, and picture construct of the vocabulary; and (b) engagement of students in activities, discussion, and vocabulary games to deepen understanding of terms. Immersing students in activities enhanced with digital technologies, like *Popplet*, can help deepen student understanding of academic vocabulary.

Reading comprehension, writing ability, and test scores are linked to vocabulary knowledge (Marzano & Pickering, 2005; Zwiers, 2014). The Common Core State Standards (CCSS) underscore the importance of vocabulary knowledge and skills in reading, writing, speaking, listening and language (CCSS; National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Additionally, there are English Language Arts CCSS in History/ Social Studies, and Science & Technical Subjects,

which include vocabulary standards for the various disciplines. Content area literacies, specifically vocabulary instruction and development, are essential for understanding academic content as presented in Table 1.

Table 1

Vocabulary Acquisition and Use and the Production and Distribution of Writing

CCSS Vocabulary Standards for English Language Arts: Language (Standards 6–12)	CCSS Writing Standards for Literacy in History/Social Studies, and Technical Subjects (Standards 6–12)
L.6–8.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.	WHST.6–8.6. Use technology, including the Internet, to produce and publish writing products and present the relationships between information and ideas clearly and efficiently.
L.9–10.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.	WHST.9–10.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
L.11–12.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.	WHST.11–12.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Note. From the *Common Core State Standards for English language arts and literacy in history/social studies, science, and technical subjects* (pp. 53, 55, 56) by the National Governors Association Center for Best Practices & Council of Chief State School Officers. Copyright 2010, Washington, DC.

Moreover, the International Society for Technology in Education (ISTE) challenges teachers to "incorporate contemporary tools and resources to maximize content learning" (ISTE, 2008, para. 2). In other words, the ISTE standards emphasize that teachers design lessons and assessments that include digital-age learning experiences for students. Web 2.0 tools allow students to become aware of and acquire new vocabulary. Studies indicate that Web 2.0 tools have the potential to transform instructional practices, which may be isolated, rote, and obligatory, into authentic learning opportunities that provide motivating knowledge and the building of experiences in social environments (Wolsey-DeVere, Smetana, & Grisham). Web 2.0 technologies provide the opportunity for vocabulary learning in meaningful participatory ways that are engaging and relevant to students. Thus, it is critical for teachers to understand how best to provide academic vocabulary instruction and to apply this understanding to Web 2.0 technologies in 21st-century classrooms and with 21st-century learners.

Traditional Academic Vocabulary Instruction

In many classrooms, vocabulary instruction and tasks do not reflect word learning in the real world (Haggard, 1982). Too often the teaching of vocabulary in content areas is sparse; teachers often presume that students can manage and decode academic vocabulary on their own. However, it is these domain-specific, Tier 3 words (Beck et al., 2013) that are key to building knowledge and conceptual understanding (Sprenger, 2013). This knowledge of Tier 3 words reinforces the emphasis of content literacy standards in the Common Core and begs one to consider: how might technology address this discrepancy?

Web 2.0 Technologies

Technology has developed substantially from the time of the National Reading Panel (2000) report that acknowledged the potential of technology as a means to support direct vocabulary instruction and provide additional practice. Most teachers and students, however, are familiar with only Web 1.0-type websites that are static in terms of the presentation of information. Aghaei, Nematbakhsh, and Farsani (2004) define Web 1.0 as mono-directional or read-only web tools. An example of Web 1.0 learning is using the Internet as a stand-alone application in, which a student looks up and reads the definition of a vocabulary word. Web 1.0 resources are still highly prevalent, but they do not offer the ability to interact or collaborate in the ways of Web 2.0 tools. For example, these tools allow for user-created content (Handsfield, Dean, & Cielocha, 2009).

Unlike static versions of Web 1.0 tools, the term Web 2.0 indicates a two-way interactive platform. Dale Dougherty coined the term Web 2.0 as a *read-write web* (as cited in O'Reilly, 2005). We operationalize Web 2.0 as any tool from the Internet that is known for usability and functionality, and is participatory in nature (Basishtha, 2014). An easy to use web or app-based tool, such as *Kahoot!*, illuminates the versatility. It utilizes an engaging game-like format for students to review key concepts.

Thus, Web 2.0 tools have the potential to both enhance academic vocabulary learning and increase student achievement test scores by providing user-centered opportunities to extend vocabulary and expand into learning in new and meaningful ways (Souter, 2002). The growing array of digital tools affords students opportunities to customize how they engage in learning new words (e.g., graphic representation, games, discussion, etc.) and individually determine what tool (e.g., mind map, word clouds, video, etc.) will best meet their purpose. Digital tools provide a means for independent practice, collaborative study, and individual exploration.

Building an Academic Vocabulary Program with Web 2.0 Technologies

Web 2.0 technology has the potential to move students beyond the initial exposure of academic

vocabulary and on to engaging them in activities that become a meaningful part of their domain-specific schema, knowledge, and conceptual understanding (Marzano, 2004; Sprenger, 2013). Researchers report such technology to be useful, in particular, as a medium for the construction of picture and graph representations, interactive content tools, and multimedia presentations (Brown, 2013; Klopfer, Osterweil; Raines & Clark, 2011). Many of the applications are designed with gaming features, such as individualized feedback, that make the tools ideal for learning academic vocabulary. Sprenger (2013) stated that actively processing vocabulary through word games in multiple ways makes retrieving information easier.

Notably, many Web 2.0 technologies correspond well with Marzano and Pickering's (2005) recommended six-step process for a rigorous academic vocabulary program. For example, Table 2 presents a sampling of Web 2.0 tools that teachers can consider integrating with research-based instructional strategies to foster vocabulary development. We draw the examples from Clarke and Watts-Taffe's (2014) heuristic, which the scholars extended from Marzano and Pickering's (2005) elements for the

Table 2

Web 2.0 Tools for Teaching Vocabulary

Instructional Activity	Web 2.0 Category	Web 2.0 Tool	Instructional Method
Description	Presentation/ Podcast Tools	PowerPoint Prezi iTalk	Students are introduced to terms using a multimodal representation
Restating	Mind Maps/ Screen Capture	Popplet Jing Wonderopolis	Students are to demonstrate word understanding through multimodal representations
Graphic Representation	Word Clouds/ Virtual Posters	Tagul Easel.ly ThingLink	Students construct pictures, pictograph or symbolic representation of images related to terms
Academic Notebooks	eBinders/ Annotation	Livebinders Google Docs	Students create personalized e-notebooks to organize and anchor and study vocabulary
Discussion	eBoards/ Forums	Padlet Blogger Edmodal	Students are able to engage in discussion using these online collaboration resources
Games	Games/ Quizzes	Kahoot.it Quizlet FreeRice	Students are able to reinforce word learning through interactive games and activities

acquisition of academic vocabulary. As illustrated, Web 2.0 tools can be very effective in facilitating academic vocabulary learning in a variety of authentic ways. Digital tools offer multiple opportunities for students to read and use academic language in a variety of contexts (Blachowicz & Fisher, 2000; McKeown, et al., 1985; Stahl & Fairbanks, 1986). These Web 2.0 tools are malleable and can also be applied in other ways.

Potential Affordances and Constraints to Integrating Web 2.0 and Vocabulary Learning

Possibilities. Web 2.0 technologies not only offer new opportunities for teaching and learning academic vocabulary, but they also generate formative data that teachers can utilize to determine an individualized plan of instruction for students that will expand student word knowledge (Tallerico, 2013). Engaging students in discussions empower them to take ownership of their learning and to further promote the development of metacognition (Hicks & Graber, 2010).

The use of Web 2.0 technologies affords a wider palette of teaching and learning choices. This plethora of technologies requires complex thinking by the learner and, hence, often results in instructional alignment of multiple standards. Robust instruction goes beyond rote memorization (Daniels & Zemelmann, 2004). Instead, meaningful vocabulary instruction should position students to grapple with word associations including word nuances and shades of meaning (Beck et al., 2013). Web 2.0 technologies allow students to explore academic vocabulary in interactive, collaborative ways (Castek, Dalton, & Grisham, 2012). For example, using *Jing's* screencasting technologies, students can create 30-second vocabulary videos, or *vocab vids*, for their peers (Dalton & Grisham 2011). Not only does this technology afford an authentic audience for students, but it also offers an opportunity to communicate word meaning through multimodal expression, such as the dramatization of a word situated in a specific context. Multimodal expression connects verbal language with visual, audio, and movement forms of communication through digital media and the Internet. Therefore, the utilization of digital media and vocabulary strategies expands the capability of students to communicate with precise expressions of complex ideas, as required in academic discourse (Scott et al., 2008).

The dialogic nature of Web 2.0 technologies also supports student learning and empowerment. For example, Hajhosseiny (2012) stated that dialogic interaction, facilitated by these tools, improves the critical reasoning of students, as they are encouraged to apply the academic vocabulary to ideas expressed during discussions and other interactions. This interaction, in turn, improves students' self-confidence, and they are empowered as agents of their own learning (Castek, Dalton, & Grisham, 2012).

The melding of multimodal expression into vocabulary instruction with digital tools supports student acquisition of vocabulary (Castek, Dalton, & Grisham, 2012). When instructors use digital tools such as *PowerPoint, Popplet, Tagul, LiveBinders, Padlet,* and *Kahoot!* for the creation of multimodal products, students become engaged in active word learning. Using the example of the Preamble to the Constitution of the United States, with the Web 2.0 tools mentioned above, we describe six research-based instructional practices that are effective in developing a student's sensitivity to shades of word meanings as well as practical understandings in a meaningful context (Allen, 2007; Harmon, J.M., Wood, K. D., Hedrick W.B., Vintinner, J., & Willeford, T., 2009).

Presentation Tools. We based the majority of the vocabulary words chosen for this unit on the abstract nouns often taken for granted as part of the "typical" middle school student lexicon. Figure 1 provides an example of some of these words illustrated with a description, explanation, and visual

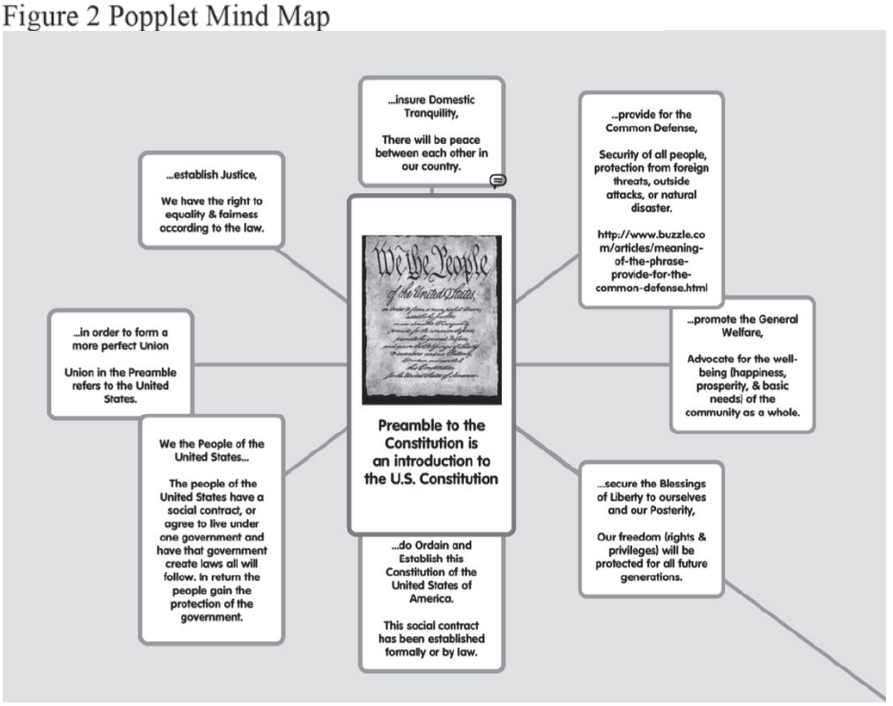
representation employing the Web 2.0 tool *PowerPoint*. Web 2.0 tools offer expanded ways of engaging students in explicit vocabulary instruction, which includes the provision of definitional, contextual, and usage information (Stahl, 1999).

Figure 1 Vocabulary PowerPoint Presentation

DESCRIPTION	NOUN	EXPLANATION	EXAMPLE
Introduction to the U.S. Constitution	Preamble	Captures essential American values embodied by the U.S. Constitution.	
Entrust the federal government with the security of the United States.	"Provide for the common **defense"**	Provide protection and security for all Americans.	

Mind Maps. Using *Popplet*, a mind-mapping tool, we asked groups of students to create a semantic map of essential understandings of abstract nouns within the Preamble to the United States Constitution (Heimlich, & Pittelman, 1986). See Figure 2.

Figure 2 Popplet Mind Map



Word Clouds. Figure 3 illustrates the morphological family associated with the headword "constitute" using *Tagul*, a Web 2.0 tool for building word clouds (Vacca, Vacca & Mraz, 2011). We recommend that, before reading the Preamble to the United States Constitution, teachers introduce the word "constitute" and its definition to the students and ask them to predict the meaning of the word, "constitution" based upon the meaning of "constitute" and their prior knowledge of the United States Constitution. Then, have the students create a word cloud using thirteen other words from the morphological family of constitute.

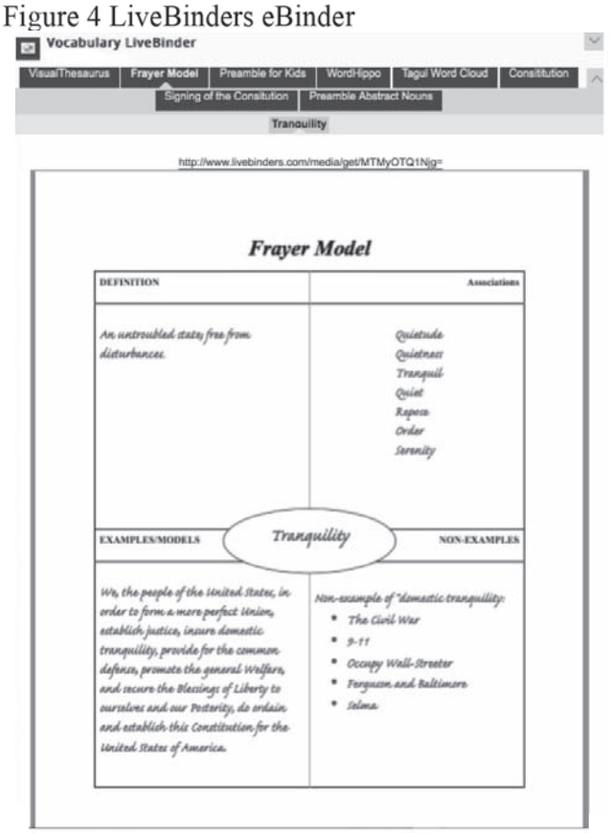
Research suggests that morphological awareness and vocabulary size correlate (Wagner, Muse, & Tannenbaum, 2007), and that both help students problem-solve and acquire new words (Blachowicz & Fisher, 2004). Coxhead's (2000) *Academic Word List* is a helpful resource for vocabulary instruction as it provides the 570 morphological relatives most frequently found in academic texts. The headwords found in this list enable "students to infer the meanings of the other members of the morphological family" (Nagy & Townsend, 2012, p. 97).

Figure 3 Tagul Word Cloud

eBinder. It is important that teachers provide students with the opportunity to create personalized academic vocabulary notebooks (Marzano, 2004). *LiveBinders*, illustrated in Figure 3, is a Web 2.0 tool for creating digital eBinders that teachers can utilize. *LiveBinders*, therefore, provides an online platform for anchoring, demonstrating, and organizing students' understanding of academic vocabulary. Students work together to complete a Frayer Model, a graphic organizer for building vocabulary (Frayer, Frederick, & Klausmeier, 1969; Graves, 1985). This strategy provides a structure for students to define and apply their knowledge of targeted vocabulary with examples and non-examples. In this case, they completed a Frayer model of an abstract noun from the Preamble, which was adapted from a *VocabGrabbing* lesson on the Preamble to the United States Constitution (https://www.vocabulary.com/articles/lessons/vocabgrabbing-the-preamble-to-the-u-s-constitution/).

Using Vocabgrabber, an online Visual Thesaurus (http://www.visualthesaurus.com/vocabgrabber/), the students are directed to select the definition that best fits the historical context for the Constitution. They then make a list of word associations in the two upper quadrants of the Frayer

Figure 4 LiveBinders eBinder

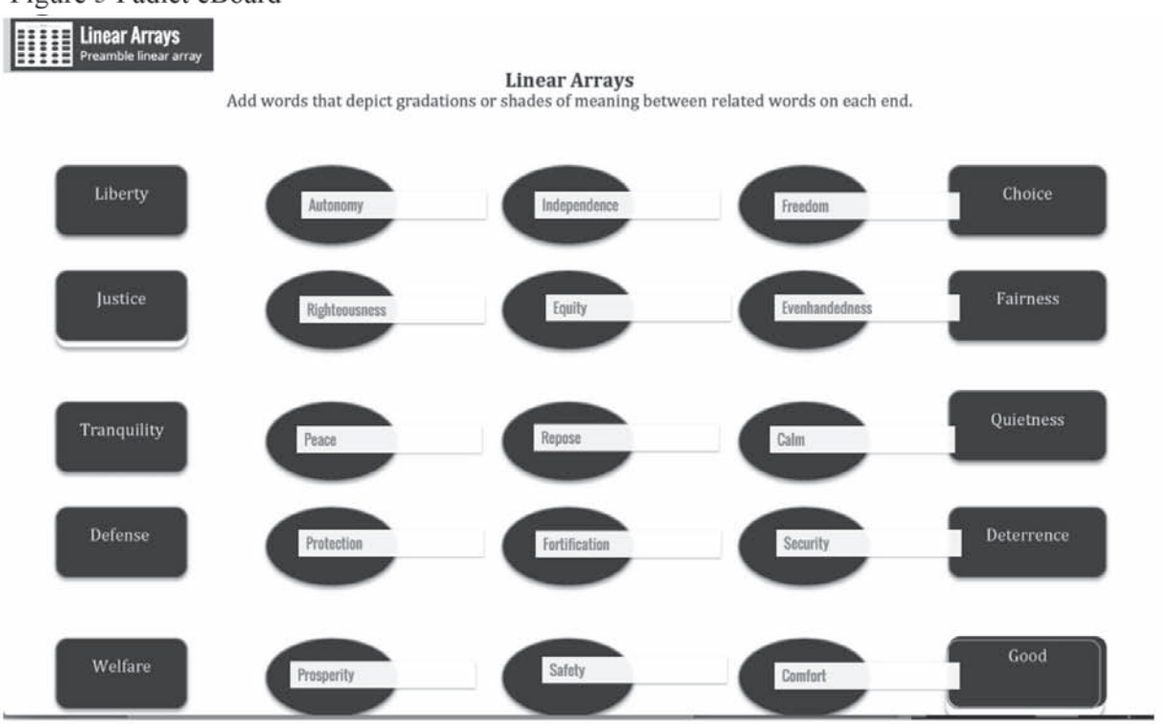


Model. In the two lower quadrants, students are asked to provide examples and non-examples from school textbooks, from the Internet, and from what they know about past or current events. The substantive conversation that takes place as students share and debate examples and non-examples is beneficial to vocabulary growth (Duke & Bennett-Armistead, 2003).

eBoards. *Padlet* is an online Web 2.0 tool that creates a virtual word wall, or eBoard, which offers unique ways to extend the proven effectiveness of Word Walls (Beck et al., 1982). Figure 5 illustrates an eBoard students created in *Padlet* to display synonym sets in a linear array.

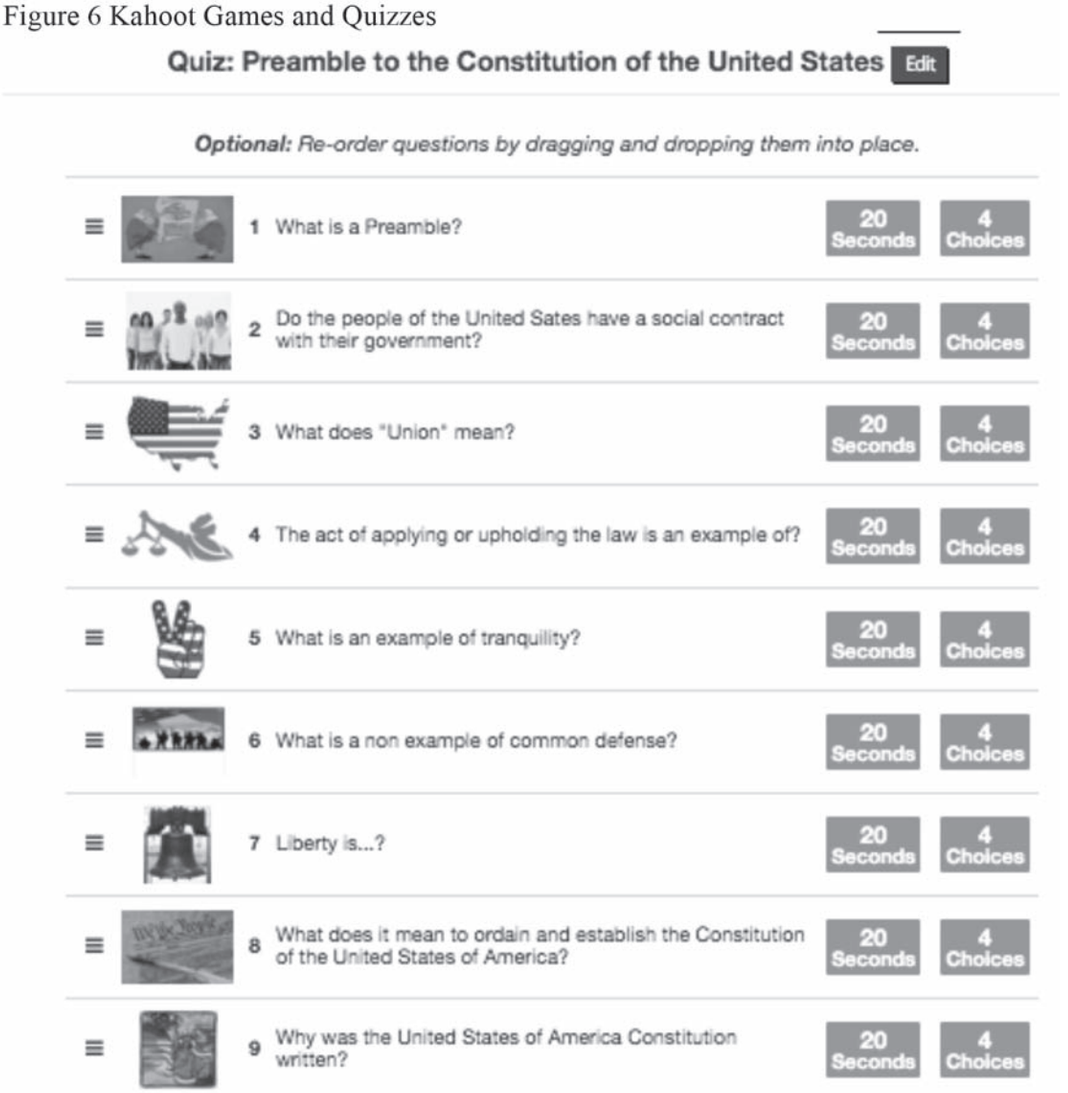
One of the unique features of *Padlet* is that it combines discussion boards with Word Walls, allowing teachers to combine the instructional strategy of creating linear arrays of words with discussions. Students pose questions to one another as they discuss the relationship among words and their definitions while completing a linear array of abstract nouns found in the Preamble. Blachowicz and Fisher (2004) suggest that this kind of word play supports children bin developing a metacognitive understanding of how words work.

Figure 5 Padlet eBoard



Games and Quizzes. Figure 6 illustrates a vocabulary quiz using the Web-based game *Kahoot!* as an anticipation guide for the Preamble to the United States Constitution. We developed this particular anticipation guide (Merkley, 1997) using the Web based game *Kahoot!* to help students understand the meaning of the text found in the Preamble to the United States Constitution. Games with built-in quiz features serve to anticipate important words in the text before, during, and after reading, as well as to reinforce student mastery of words by engaging students in word games (Blachowicz & Fisher, 2004).

Figure 6 Kahoot Games and Quizzes



Challenges. Among the hurdles that may arise in using Web 2.0 technologies, there are two that currently require resolution in many U. S. schools: infrastructure itself and technology funding (Zakaria, 2011). Hardware upgrades may also be required to take full advantage of ever-expanding Web 2.0 technologies. Many districts do not have the necessary funds required to maintain technology. One way to mitigate these challenges is to strongly advocate for a *Bring Your Own Device* policy at the district and/or building level. Additionally, raising awareness with community stakeholders may ultimately help secure the support needed for future technology initiatives that are crucial for optimizing student learning.

Summary

Potentially, Web 2.0 technologies have the capacity to support meaningful long-term vocabulary learning and retention. This vocabulary learning, in turn, deepens comprehension, eliminates misconceptions, and accelerates learning time to support practical application of the content. Notably, there are many options when incorporating Web 2.0 technologies into academic vocabulary lessons. It is, thus, crucial that teachers develop the knowledge and skills to provide multimodal academic vocabulary instruction through the integration of Web 2.0 technologies in the classrooms. It is our hope that the potential learning benefits for students will provide the impetus to overcome potential obstacles.

Action Steps

When considering which Web 2.0 tools to use, we recommend that teachers take into consideration the following:

- Choose meaningful activities to engage students that will facilitate acquisition of domain-specific schema, knowledge, and conceptual understandings of the concepts presented.
- Consider the potential application of Web 2.0 technology to the learning task.
- Determine whether the Web 2.0 technology provides opportunities for vocabulary acquisition beyond mere exposure to the selected terms.
- Determine the Web 2.0 tool's capability and usefulness for constructing picture or graph representations, interacting with domain-specific content, and supporting multimedia (multiple forms of media) presentation, including video clips or music.
- Consider whether any gaming features of the Web 2.0 tool include individualized feedback.

Connections to Explore

- ReadWriteThink.org provides teachers with a plethora of resources. One such resource focuses on acquiring new vocabulary through book discussion groups (http://www.readwritethink.org/classroom-resources/lesson-plans/acquiring-vocabulary-through-book-170.html).
- VocabularySpellingCity.com provides resources for spelling and vocabulary for students in the elementary and middle school grades (http://www.spellingcity.com/middle-school-vocabulary.html).
- Vocabulary.com provides 1,000 free English vocabulary-building games (http://www.vocabulary.co.il/vocabulary-lesson-plans/).
- Educational Technology and Mobile Learning is a resource of educational web tools and mobile apps for teachers and educators (http://www.educatorstechnology.com/2013/02/16-websites-to-teach-and-learn.html).
- The Association of Supervision Curriculum and Development (ASCD) website offers a variety of vocabulary resources, including options to personalize learning pathways for building academic vocabulary (http://www.ascd.org/research-a-topic/building-academic-vocabulary-resources.aspx).

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