WORDLY WISE 3000® **Online,**
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(Books 2–12)

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Need for Vocabulary Instruction

The critical importance of vocabulary development was brought to the nation's attention with the publication of the National Reading Panel's authoritative survey of effective strategies for improving reading (National Institute of Child Health and Human Development, 2000). Today, vocabulary development continues to be recognized as essential for academic and vocational preparation.

Wordly Wise 3000® *Online* is an interactive sequential and systematic vocabulary program for 2–12 students. The print edition of *Wordly Wise 3000* continues to provide the direct instruction and practice necessary for balanced classroom and school-wide vocabulary development. Now, for the first time, Levels 2–12 are available in an online format. *Wordly Wise 3000 Online* makes extensive use of cutting-edge technology to engage today's tech-savvy students. It frees up teacher time and resources, allows ongoing progress monitoring and computer-generated individual and class achievement reports, and provides the powerful instructional benefits of technology-based learning.

The design of *Wordly Wise 3000 Online* is based on current research and theory that positions vocabulary learning, with its associated development of concept and background knowledge, at the center of the school curriculum. Whether at the learning-to-read stages of development or at the later reading-to-learn stages that focus on subject areas, word knowledge plays a foundational role, both in success in English/Language Arts as well as in science, mathematics, social studies, and other subject areas. *Wordly Wise 3000 Online* develops word knowledge through carefully planned engaging activities that form the long-term associations necessary for academic success.

Each level of *Wordly Wise 3000 Online* introduces students to new words, then provides feedback-rich interactive practice activities to help the students add these words and their meanings to their long-term memory. In *Wordly Wise 3000 Online,* pre-tests and post-tests make it easy for teachers to track progress. Teachers can remain current on achievement through an online management system and its easy-to-understand reports at both student and class levels.

Wordly Wise 3000 Online is designed to help teachers and schools meet the challenges presented by the Common Core State Standards (CCSS, 2010) and of national efforts to reform education and prepare students for college and career. The new standards recognize the important role of vocabulary throughout the levels. For example, the second-grade standards require students to "use words and phrases acquired . . . including adjectives and adverbs" (p. 27). At the uppermost levels, in grades 11 and 12, students must demonstrate the ability to "Determine the meaning of words and phrases as they are used in text, including figurative, connotative, and technical meanings" (p. 38). In addition, comprehension- and writing-related standards are directly based on the assumption that students have developed substantial word knowledge to support their reading and writing.

In a segment of the school curriculum as important as vocabulary, instruction must avoid a one-size-fits-all approach; it must be organized and implemented in a flexible manner that meets the needs of *all* learners. *Wordly Wise 3000 Online*, with its availability of multiple levels, has been designed to meet Universal Design for Learning (UDL) principles for providing differentiated instruction that will be of maximum benefit for every student (http://www.udlcenter.org).

Vocabulary's Impact on Literacy

The relationship between word knowledge and understanding of text, or comprehension, was demonstrated decades ago and has been repeatedly verified. Vocabulary is also correlated with writing ability and with spelling. The stronger the student's vocabulary, the better he or she performs in comprehension, writing, and spelling. But size of vocabulary also plays an important role in even the earliest stages of literacy development. Knowledge of words promotes phonemic awareness and plays a key role in the development of early decoding, sight word learning, oral language, and spelling skills (Vadasy, Nelson, & Sanders, 2011).

Children enter kindergarten with a wide range of vocabulary sizes, and this has a long-term impact. Hart and Risley (1995) state that by the age of three, children living in disadvantaged homes hear only about one-third as many words spoken as do their more advantaged peers. Also, when students speak a language other than English at home, they tend to have smaller English vocabulary sizes that result in poorer reading comprehension. Children with small vocabularies do not comprehend well when they read, which leads them to read less. Reading less leads them to have smaller vocabularies. This "Matthew Effect" (Stanovich, 1986) creates a gap that continues to escalate unless there is a significant effort—i.e., direct instruction in vocabulary—to help bridge the gap in word knowledge.

Vocabulary interventions are effective in improving the vocabulary sizes of students, both for those with initially low word knowledge and for those with richer vocabularies. When interventions positively impact students'

vocabulary, comprehension is improved as well. Vocabulary instruction plays a particularly important role in the school performance of both English-language learners and struggling readers.

Changing Needs Through the Years

Vocabulary development is an important factor at the heart of the so-called fourth-grade slump (Chall & Jacobs, 2003; Sanacore & Palumbo, 2009), a gap in achievement that becomes apparent as students reach fourth grade and above. At this point, children move from the so-called learning-to-read stages of literacy development to the reading-to-learn stage. They go from reading simple stories almost exclusively to reading content-area materials with challenging vocabulary and new concepts. As the Common Core State Standards begin to take hold in elementary schools, students will be reading more nonfiction text across the curriculum; this will present even more vocabulary demands.

Understandably, vocabulary plays a key role. Connor et al. (2010), for example, found that students with low vocabulary achieved poorly in science no matter how many inquiry-based activities were included in their classes. National reports on achievement, such as the Carnegie Council's *Time to Act* (2010), verify that concepts reflected in vocabulary learning are important to success in content-area learning. Even if younger readers develop good sight word and decoding abilities, as they reach higher levels, the vocabulary demands of classroom reading materials increase. Unless vocabulary development has continued, poor comprehension skills will compromise their learning, and they will spiral down into increasing failure.

Later, at the high school level, preparation for college testing becomes important, and vocabulary size is a key factor in college entrance examinations.

Function in High-Stakes Tests

Many educators will agree that focus on high-stakes test preparation has led down some unexpected and perhaps even unwanted paths. Vocabulary development, however, plays a

key role in both performance on high-stakes tests and, far more importantly, in real-world achievement in reading and literacy. "Preparing for the test" by teaching vocabulary has authentic results in real reading and writing.

Principles of Vocabulary Instruction

The design of instruction in *Wordly Wise 3000 Online* is based on a variety of key vocabulary teaching principles that have been identified by research. These include: encouraging wide reading while recognizing that direct instruction is crucial; providing students with extensive practice for long-term retention; attention to both the breadth (number of known words) and depth (comprehensive understanding of known words) of students' vocabulary learning; strategically choosing vocabulary words; and careful progress monitoring and assessment of growth.

Wide Reading

The indirect learning of vocabulary through wide, independent reading is an important factor in reading development and needs to be encouraged. However, this indirect learning is insufficient for adequate vocabulary growth.

Direct Instruction

The National Reading Panel's (2000) survey of research-based instruction was influential in providing convincing evidence of the importance of systematic and sequential instruction, such as that provided by *Wordly Wise 3000 Online*. More recent research has also found that an explicit, well-organized instructional approach is characteristic of effective interventions (Johnston, Barnes, & Desrochers, 2008). *Wordly Wise 3000 Online* provides this systematic, sequential direct instruction as students move through a lesson and through an entire level.

Direct, systematic, and sequential instruction promotes word learning and incorporates it into long-term memory. It also aids students in developing a sense of *word consciousness*—an awareness of and interest in words—which continues long after any particular course of study.

Direct instruction in vocabulary provides students with tools for lifelong learning and teaches them effective strategies for learning words independently. In *Wordly Wise 3000 Online*, students are given practice in a wide variety of research-based strategies, including using graphic organizers, using word parts to determine meaning, and using context.

Repeated Exposures

Johnston, Barnes, and Desrochers list "multiple opportunities for extended practice and review" (2008, p. 129) as a critical characteristic of effective instruction. However, simple exposure to long lists of vocabulary words has little value. Students need three types of reinforcement and practice for long-term learning, each of which is incorporated into *Wordly Wise 3000 Online:* opportunities to integrate new words with other knowledge, to repeatedly see the words in meaningful contexts, and to use the words through active involvement in learning.

For most students, seven to twelve exposures to a word are necessary in order to learn it. *Wordly Wise 3000 Online* provides a sequenced set of activities that give students sufficient exposure to new words, both in the lessons and through spiraling and review.

Depth and Breadth of Learning

The quality and depth of exposures to words is equally crucial. Too often, superficial rote memorization of words and definitions is used. Looking up definitions in dictionaries, copying them, and copying sample sentences is not quality vocabulary instruction. *Wordly Wise 3000 Online* ensures that vocabulary words are integrated in a variety of contexts, given sufficient repetitions, and used interactively. Word depth is enhanced throughout the program through attention to pronunciation (phonology), spelling (orthography), meaningful parts (morphology), parts of speech (syntax), meaningful use (semantics), appropriate use (pragmatics), and history/derivation (etymology). Moreover, a variety of word meanings and forms are taught. The word *consume*, for example, is part of a larger set of related words—*consumer, consumed, consumption*—that together occur twenty times

as frequently as *consume*. The value of teaching a few words in depth is multiplied many times over. This depth of vocabulary knowledge promoted by *Wordly Wise 3000 Online* lessons is particularly important to comprehension development of English language learners.

Word Choice

Equally important as the number of words taught is the choice of words. *Wordly Wise 3000 Online* has chosen words from grade level–appropriate literature and textbooks, as well as from word banks commonly used on high-stakes tests. The words are typically unknown to students at those levels but have broad general use in school and beyond. Such general academic vocabulary is classified by Isabel Beck and her colleagues as Tier Two words (Beck, McKeown, & Kucan, 2002).

Vocabulary Strategies and Techniques

Using Context

Teaching context-related strategies has been found to be particularly useful. Skilled readers are proficient at making context-based inferences to gain meaning from text. It's true that many unfamiliar words in text have too little relevant context to provide clues to meaning. But for those words that *do* supply context, students' ability to use these clues is a valuable tool. Intervention efforts aimed at improving students' awareness and use of context clues improve reading achievement (Duke & Carlisle, 2011).

One important by-product of developing students' understanding of context clues is that it helps students develop their metacognitive, self-monitoring ability during reading. Readers are more engaged in the process of reading, actively monitoring whether they understand words and using fix-up strategies if they do not, rather than developing a habit of simply skipping over unfamiliar words.

The *Wordly Wise 3000 Online* activities involve contextualized learning. They give students multiple opportunities to see each word being used in meaningful settings. Each lesson concludes with a context-rich passage that helps students make connections with the lesson's words in an on-level, interesting text selection. For this Third Edition, all the passages have been assigned measures using the The Lexile Framework® for Reading.

Using Word Parts (Morphology)

About 60% of words in text can be inferred from their word parts. *Morphology*, or knowledge of meaningful word parts, is one of the major factors in reading. A *morpheme* is defined as a linguistic unit of meaning that cannot be subdivided into smaller meaningful parts. For example, the words *time* and *home* have one morpheme each. The words *timely* and *homes* have two morphemes each, the root word and the suffix. About 4,000 root words must be learned during the primary years. Continuing to teach word parts is particularly important for older students (Duke & Carlisle, 2011), as many new words learned in content areas are composed of meaningful parts. In middle school expository readings, for example, words that contain word part clues to meaning occur twice as often as in narratives.

Direct instruction in word parts, such as roots, prefixes, and suffixes, improves vocabulary knowledge (Nagy, Berninger, & Abbott, 2006). It also improves student ability to make inferences about unfamiliar words (Blachowicz, Fisher, Ogle, & Watts-Taffe, 2006). *Wordly Wise 3000 Online* presents word study activities that focus on roots, prefixes, and suffixes.

Using Word Relationships

Skilled readers are able to access meanings of thousands of words very quickly; words are linked in readers' minds in extensive, complex networks of associations. Not only is memory organized according to inter-word relationships, but the learning of new words and their incorporation into long-term memory involve creating relationships between those new words and existing words and background knowledge. Not surprisingly, questions involving these types of relationships, such as analogies and synonym/antonym items, appear frequently on standardized tests.

Wordly Wise 3000 Online includes analogy and synonym/antonym activities. Teaching students how to think about these word-relationships has been shown to improve test scores (Haynes, 2011). But their importance goes far beyond test-taking skills, promoting the creation of connections within readers' vocabulary memory, thereby playing a powerful role in learning.

Using Etymology (Word Origins)

Learning new vocabulary words is enhanced when learners can use various memory hooks on which they can attach their new learning. One such hook is the understanding of word origins. A Word Study exercise in the upper elementary and high school levels of *Wordly Wise 3000 Online* teaches Greek and Latin origins of pertinent words.

Answering Questions

The National Reading Panel's (2000) survey of research in reading found question answering to be one of the eight most highly research-based teaching strategies in reading. It identified 17 studies that showed positive effects for question answering. Answering questions helps students to recall what they have learned, to connect their learning to different contexts, to make judgments about word use, and to think beyond initial, low-level learning in critical and creative ways. It also helps students focus on key learning material. Question answering plays a central role in *Wordly Wise 3000 Online*'s online instructional sequence.

Practice in answering questions has been demonstrated to raise scores on standardized tests (Haynes, 2011). It has also been shown to provide strong reading improvement for struggling readers (Berkeley, Scruggs, & Mastropieri, 2010).

Wordly Wise 3000 Online: Description

Features

Before discussing the activities in *Wordly Wise 3000 Online*, it is useful to look at some of the features that make the program particularly effective and unique. *Wordly Wise 3000 Online* makes use of several kinds of scaffolding that provide support for many kinds of learners.

Full audio support

Audio support is available for every part of *Wordly Wise 3000 Online*. Students can always choose to listen to words, definitions, questions, and passages. In the Passage, sentence-by-sentence and word-by-word tracking are shown when the audio is activated.

The effectiveness of audio support has been well researched and has been shown to support reading instruction effectively with all learners, especially with struggling readers (Disseldorp & Chambers, 2002). Montali and Lewandowski (1996) show that struggling readers comprehend as well as average readers when provided audio support of learning. Instructional use of audio during computer-based instruction is also associated with learners' positive attitudes toward instruction and with increased motivation (Yu, Jannasch-Pennell, DiGangi, & Kaprolet, 2009). The audio support provided by *Wordly Wise 3000 Online* frees up learners to concentrate on the task of acquiring new vocabulary.

Immediate Feedback

Except in the case of Pre- and Post-tests, students receive immediate corrective feedback as they do the activities. In this way, students are able to correct any errors while the words are fresh in their minds. Correct answers are acknowledged as well, providing reinforcement.

Onscreen Help

One of the benefits of an online program is that assistance is always a click away. In *Wordly Wise 3000 Online,* students always have access to a Help button; clicking on it explains how to do an exercise.

Furthermore, except during assessments, students always have access to the lesson's Word List. By clicking on the Word List icon, they see all the lesson words. Clicking on any word on that list brings up the definition.

A Student-Friendly Interface

In an effort to be attractive, much technology-based learning is cluttered with irrelevant "bells and whistles" that actually disengage learners. These distracting, meaningless special effects

unrelated to learning take students off-task and limit a key factor in learning—the amount of time spent in targeted, engaged learning. *Wordly Wise 3000 Online* has been designed to walk the fine line between engagement and too much distraction.

By Level

Every lesson (there are 20 lessons in Levels 4 through 12 and 15 in Levels 2 and 3) begins with a Pre-test, followed by the introduction of the lesson words in the Word List. After the Word List, the exercises vary, making them appropriate for each level. Each exercise is described in detail below.

Level 2: Words and Their Meanings, Seeing Connections, Applying Meanings

Level 3: Words and Their Meanings, Just the Right Word, Applying Meanings, Word Study

Level 4–8: Finding Meanings, Just the Right Word, Applying Meanings, Word Study

Level 9–12: Understanding Meanings, Using Words, Images of Words, Word Study

After this group of three to four exercises, all levels culminate in the nonfiction Passage section, which is accompanied by a series of questions. Students then do a Post-test, followed, if needed, by a Master Meanings exercise for each word meaning they missed on the Post-test. Finally, there is a series of cumulative reviews in puzzle form, as well as a series of tests.

By Activity

Pre-test: Each *Wordly Wise 3000 Online* lesson begins with a Pre-test to determine students' prior knowledge of 15 words. Pre-tests develop students' self-monitoring behaviors, which are important to success in online learning. They guide students to activate their prior knowledge and to engage in learning by clearly identifying the tasks involved in learning each lesson's new words: "Which of these words do I know? How well do I know them? Which don't I know, and what do I need to do to learn them?" The Pre-test is not a placement test. Vocabulary does not lend itself to meaningful placement measurements since knowing the meaning of one

word does not indicate a level of knowledge of other unrelated words.

Word List (Introduction of New Words): The Pre-test is followed by introduction of the new words and their meanings, as well as a context-rich sample sentence. Various aspects of the word are shown, including its part of speech and related word forms where appropriate. Audio ensures that students hear each word's correct pronunciation. The words are presented in a virtual word card format. Before moving on to the exercises, students must flip the card and demonstrate understanding of each word by completing a quick check question.

The Exercises (Practice for Learning and Retention): Vocabulary instruction is too often limited to superficial connections between terms and their definitions. This results in rapid forgetting or misuse of the words. For long-term retention of new words, students need to learn a variety of things about them, see them in several meaningful contexts, and have the opportunity to integrate them with their background knowledge and existing vocabulary store.

Wordly Wise 3000 Online follows research-based best practices in balancing planned instructional pacing with student choice. Research indicates that providing students *some* degree of choice functions as an empowering, motivating force for learning. Yet research also indicates that direct, systematic, sequential instruction is associated with higher levels of learning; too much learner control over instruction can be detrimental. *Wordly Wise 3000 Online*'s lessons balance these two learning principles to optimize both effectiveness of learning activities and general student engagement in the process.

Exercise Selection: Following the introductory materials, students move on to a series of exercises that reinforce word learning and help them develop the complex, personal associations necessary for understanding and using new words. Students choose from four types of practice activities (or, at Level 2, from three types). They must proceed through all of the activities, but they may choose them in any order, providing an appropriate degree of student

choice. The types of activities change through the levels, reflecting differences in sophistication of achievement levels at each level.

Level 2 Students engage in three exercises:

Seeing Connections Students see four words on the right-hand side of the screen. They circle the word that does not fit with the others by clicking on it. A sidebox provides clues. If students choose incorrect answers, they are guided to the correct choice.

Words and Their Meanings Students match definitions with words in this multiple-choice exercise. As they answer the items, a picture puzzle illustrating one of the lesson words fills in. Again, corrective feedback is given.

Applying Meanings This exercise provides additional opportunities to make higher-level connections related to use and application of the new words. Another illustrative picture puzzle fills in as items are completed correctly.

For example, students might be asked, *Which of the following could use a cushion?* Four options are provided: *pots and pans, your clothes, your head,* and *a doorway*. If a student response is incorrect, feedback provides a clue to correcting the error. If the response is correct, students get confirming feedback.

Application of word knowledge involves a higher level of comprehension than literal and interpretive understandings. When readers understand a word at the application level, they are able to take the literal and interpretive meanings and apply them in new and real contexts. *Wordly Wise 3000 Online*'s Applying Meanings activity gives students opportunities to make such applications and to receive feedback as to the appropriateness of their applications.

Level 3 Both Level 2 and Level 3 students complete Words and Their Meanings and Applying Meanings. Seeing Connections is a Level 2–only exercise. Level 3 students add Just the Right Word and Word Study exercises.

Just the Right Word In this drag-and-drop activity, students are given an awkwardly worded sentence, part of which is bold, and a set of four words from the lesson's word list. Their task is to replace the awkward phrase with the word that means the same thing. For example: *Yesterday's tornado in eastern Kansas completely ruined a trailer park*. Word choices are *acknowledged, devastated, infuriated,* and *evicted*. The student would drag the word *devastated* over the bold phrase to replace it.

The exercise involves reinforcement of the connection between the new word and its definition, but the task is placed in the context of making meaning at the sentence level. Not only is the word-definition connection reinforced, but students are also given practice in analyzing word contexts within sentences. Seeing how new words are used in different contexts is a critical component of word learning.

Word Study The Word Study activity alternates among several types: synonyms and antonyms, Greek and Latin roots, prefixes and suffixes, parts of speech, and (in the upper grades) analogies.

Students learn new words by connecting them to past knowledge. As they grow older, their general vocabulary increases beyond the familiar Tier One words (Beck, McKeown, & Kucan, 2002) that form the foundation of early language. Many new Tier Two words—less familiar, academic words that are used by authors with the assumption that their readers understand them—have meaning connections to previously learned words. One of those connections might be that the new word has a similar meaning to an old word, perhaps with shades-of-meaning differences. Another possible connection is that the new word might have an opposite meaning to an old

word. Synonym/antonym exercises take advantage of these relationships to establish new word meanings in long-term memory.

Wordly Wise 3000 Online's Word Study activity promotes active engagement, in which students must seek out meaning as part of a moderately complex task. For example, students must examine each of four words presented and consider the possible interconnections between them—same-meaning or opposite-meaning. In one item, the words *destroy, increase, devastate,* and *infuriate* are provided. An adult proficient reader might immediately and automatically connect *destroy* and *devastate* as synonyms. This automaticity of performance is a result of a firmly established and extensive body of vocabulary knowledge. In this example, the adult is functioning at an easy-reading, independent level. This lesson, however, is presented at a *student's* instructional level, a level that is appropriately challenging, pushing the edge of the student's vocabulary development. The student needs to carefully and consciously examine and consider each of the words, and might—or might not—recognize the more common *destroy* and *increase* as familiar words and the other two as unfamiliar, new words being studied. The student then must mentally rehearse the meaning of the two new words. If the student has forgotten one of them, clicking on the Word List icon brings up the word and its definition.

All possible interconnections among the four words then must be considered. Any two of the four words can be connected as synonyms, but there is also the possibility that the connection is an antonym relationship. As is common on standardized tests of vocabulary, there may be more than one possible interconnection, but only one will be the best answer.

If the student chooses the correct answer, positive feedback is provided, and the student moves on to the next item. If an incorrect answer is chosen, the student is provided clues to the correct choice. Student engagement in this complex but level-appropriate decision-making task promotes learning of the words.

Levels 4 through 8 In Levels 4 through 8, students complete Applying Meanings, Just the Right Word, and Word Study as described above. They also add Finding Meanings.

Finding Meanings The Finding Meanings exercise is designed to simulate part of the writing process, adding an opportunity for students to strengthen their vocabulary through creating a cross-skill reading-writing connection. Four sentence parts are displayed at the top of the screen, as in this example:

Devastation is   a sticking or holding together.

Precision is   a state of destruction.

Students drag two sentence parts to a box on the lower part of the screen to form a complete sentence that uses the terms appropriately. If they choose the wrong sentence part, it bounces back, and feedback reminds them to check the Word List before trying again.

This activity gives students another kind of interaction with the word used in context. It also involves them in a highly scaffolded writing-like exercise. Until students see new words being used appropriately, the all-too-common classroom method of directing them "to write sample sentences using the words" results in non-contextual sentences and reinforcement of incorrect use of the words.

Levels 9 through 12 At Levels 9 through 12, students continue to complete the Word Study activity described above, as well as three new activities designed to provide the more advanced level of instruction appropriate for older students.

Understanding Meanings An interactive chart presents vocabulary words used in contextual sentences on the left. Students decide whether the usage is correct or not, then check the corresponding box on the right. For example, *To **plumb** a mystery is to understand it by thinking about it correctly* would be marked *Used Correctly* on the chart. *A **vagabond** is a person who lacks the necessities of life* would be marked *Used Incorrectly*.

For words that are used incorrectly, students are asked to write sentences of their own that demonstrate appropriate use of each word. Teachers then use the management system to view and grade these sentences as Satisfactory or Not Satisfactory. NOTE: Teachers can turn off the writing box function in the management system to make the exercise less challenging. In this case, the writing box does not appear and the directions do not tell the students to use it.

Using Words A vocabulary word appears at the top of the screen followed by four sentences with blank write-on lines. If the word or one of its forms makes sense in the sentence, students choose it from a dropdown menu; if not, they choose <blank>. In the box, students then write a sentence of their own using the word. As in Understanding Meanings, teachers can use the management system to view and grade these sentences, and can choose to turn off the writing box and its function.

Images of Words Students answer a set of multiple-select questions to demonstrate their understanding of the words in context. Each question has between one and three correct answers. As students answer each question correctly, a part of a puzzle fills in, providing motivation and illustrating one of the lesson words.

Passage: After students have finished the four exercises, they move on to the reading of a passage in which all the lesson words are used in context. The nonfiction passages are similar to those students would read in content-area texts, in magazines or newspapers, on the Internet, or on tests. For this Third Edition, all the passages have been assigned measures using The Lexile Framework® for Reading.

As with all of *Wordly Wise 3000 Online,* students may choose to listen to the selection if they wish. The passage audio is, like the rest of the program, a good way to provide modeling of fluent reading and correct pronunciation. As students listen to the passage being read, both sentence-by-sentence and word-by-word tracking appear. An image representing the contents of the passage appears as soon as the passage is launched. When students click "Done Reading," the image disappears, replaced by a series of cloze comprehension questions. Students must correctly type a lesson word into a blank space. If students answer incorrectly the first time, they are shown exactly how many letters are in the missing word. After their second attempt, the incorrect letters turn red and fade out, and the correct letters remain. After the third attempt, students are given the answer, but they still have to type it in, thereby reinforcing meaning. Students can check the Word List and definitions at any time by clicking on a screen icon. They can also reread relevant parts of the passage. When they correctly type in the word, the question is read aloud so students get a chance to both read and hear correct use of the word.

The typing of the word in this activity and in other *Wordly Wise 3000 Online* activities reinforces correct spelling. Orthographic knowledge—awareness of spelling patterns in words—is one of the main factors in reading development.

Post-test: Testing plays an important role in learning. Students actually have greater retention and perform better when they are tested on content rather than simply studying it, a psychological phenomenon called the *testing effect*.

In *Wordly Wise 3000 Online*, students finish each lesson with a Post-test in the same format as the

Pre-test. As on the Pre-test, all meanings studied are tested, and the results are immediately available to the teacher in the reporting system. Students are also given their scores, and then see a Master Meanings screen indicating not only which words were mastered, but also which meanings of which words. Students do the Master Meanings activities—a restatement of the word's meaning, a new sample sentence, and a new quick check question—for each word or meaning they have missed until they get all correct. Upon finishing this review, a printable Certificate of Completion screen appears, and the student is finished with the lesson.

Review: An interactive crossword puzzle review appears after every fourth lesson (more frequently in Levels 2 and 3). The puzzle presents a selection of words from previous lessons and provides another opportunity for students to cement and retain learning. Review puzzles are configurable in the management system; that is, teachers can choose to turn them off.

Cumulative Tests: Cumulative Tests appear halfway through each level and are labeled Midterm Tests. (They appear more frequently in levels 2 and 3.) A Final Test appears at the end of each level. Like the review puzzles, these are configurable, and may be turned off.

Online Management and Reporting Systems for Data-Driven Instruction

Rigorous assessment and data-driven decision-making are foundational factors in efforts to reform schools for 21st century education. Decisions about student performance and teacher-based instruction should be dynamic, based on continuing monitoring of data for evidence of student needs. The Carnegie Corporation, in its *Time to Act* report, concludes that rigorous assessment and reporting are critical components in school success; gathering relevant information and making this data readily available, both to educators and to the general public, will be crucial to re-engineering schools to support adolescent literacy (p. 30).

Williams, Rosin, and Hirst (2011) report a wide variation in quality of access to data and in its use in schools. They call for greater efforts in this area. Two of the fifteen instructional improvements recommended by the *Reading Next* report focus on assessment, one on formative and one on summative (Biancarosa & Snow, 2004). "Formative assessment provides information that helps us develop instruction that in turn provides experiences that further influence students' development . . . In contrast, summative assessment measures student achievement in relation to reading curriculum goals and district or state learning standards" (Afflerbach, 2007, p. 49). *Wordly Wise 3000 Online* provides many opportunities for both formative and summative assessment, both easily administered and reported in its management system.

The potential of computer-based reporting systems as teacher tools for vocabulary instruction has been recognized since the earliest days of computer instruction. More recently, the Carnegie Foundation's *Reading Next* report called for reporting systems in which "data should be cataloged on a computing system that would allow teachers, administrators, and evaluators to inspect students' progress individually and by class" (Biancarosa & Snow, 2004, p. 19). Yeh (2009) argues that that the major contribution of educational technology to student achievement will be its ability to provide day-by-day formative assessment in a cost-effective, efficient manner.

Wordly Wise 3000 Online offers students frequent feedback, providing awareness of their own progress. In their survey of effective reading interventions, Johnston, Barnes, and Desrochers list such student involvement, "self-regulation strategies where students monitor their own progress" (2008, p. 129), as an important characteristic.

Wordly Wise 3000 Online presents a cutting-edge approach to monitoring and reporting on student progress and achievement. Brown and Green (2010) report that the rising popularity of online instruction is due in large measure to the availability of management systems, such as the

one used in *Wordly Wise 3000 Online*. *Wordly Wise 3000 Online*'s reporting system supports Response to Intervention (RTI) efforts, which calls for data that allows educators to analyze student performance and to make adjustments to teaching based on that performance.

In their study of computer-based instruction that included a reporting system, Koedinger, McLaughlin, and Heffernan found an interesting result: classroom use of the technology resulted in achievement gains even on the part of students who were not using the computers. They interpreted this data as a result of teachers' use of the reporting system. Feedback on student learning to teachers resulted in their improved understanding of the learning of their specific classes. "Teachers learn from the… diagnostic system…how they can best utilize the information to enhance student learning" (2011, p. 506).

Research on technology-based education highlights the importance of the teacher's involvement in monitoring student progress in online lessons and in modifying instruction and interventions as needed (Johnston, Barnes, & Desrochers, 2008). Teacher monitoring "keeps the learner from feeling isolated, which assists in the successful completion" of online instruction (Gagné, Wager, Golas, & Keller, 2005, p. 334). *Wordly Wise 3000 Online*'s reporting system provides ease in monitoring and readily allows creation of individual, classroom, and school reports on achievement progress.

The *Wordly Wise 3000 Online* management system provides a variety of tools to support learners and teachers. Teachers can use the management system to access student records of performance, add students to classes, and change the level of their lessons. The Snapshot Report, for example, provides performance data that includes information about the number of lessons completed, time-on-task, percentage correct for each activity, and average Post-test scores. While the actual instructional activities typically guide students through each item until they obtain the correct answer, the Snapshot Report gives teachers the percentage correct on the students'

first tries at answering the items. This adds to the complete picture of student learning and gives the teacher another way to assess progress. In the Levels 9–12 Understanding Meanings and Using Words activities, students write open-ended responses—contextual sentences demonstrating appropriate use of the vocabulary words. Teachers view and grade these student responses through the management system.

The Class Test Results Report gives teachers an easy-to-understand report of overall student results on the Pre-tests and Post-tests for each lesson. The time-on-test, average percentage score, and number of students tested so far are all reported. If class averages fall below criterion levels, color-coded icons highlight areas of concern. A similar report is available at the student level, clearly and quickly identifying student results on the Pre-tests and Post-tests.

This report also gives teachers useful feedback in terms of students' learning of each word in the lesson. A chart graphically portrays average class performance on each word. Teachers can quickly identify those words with which students struggled and incorporate additional attention to them into class lessons. A similar chart is available at the student level, identifying how well each student performed on each word on the Pre-test and Post-test.

In addition, the management system includes a collection of student and teacher resource materials, providing the tools necessary for continuing and enriching vocabulary instruction.

Technology-Rich Instruction

Digital technologies and online communication provide powerful new tools for teachers and schools in their efforts to renew and reform education for the 21st century. Research surveys, national position papers, and reports published by independent education foundations consistently call for increased use of information and communications technologies (ICTs) in schools.

Technology-based learning is supported by a long history of research in curriculum, methodology, and learning outcomes. As the Internet has become more of a day-to-day part of students'

lives both within and outside the classroom, online learning—any learning experiences that occur partly or wholly online—is developing into an integral part of schooling. Schools recognize the technological promise of online education for achieving a student-centered, personalized vision of education.

Benefits and Research Basis of Technology-Based Learning

Technology-based education has been the focus of efforts to establish and demonstrate its effectiveness since its inception. Kulik (1994), for example, carried out a meta-analysis of over 500 studies to find that, on average, students completing a computer-based instructional program perform at the 64th percentile, compared to traditional instruction control groups at the 50th percentile. The National Reading Panel (2000) found that all computer-based studies in its analysis reported positive results.

Online learning is a more recent addition to the field of technology-based learning, but it is increasing in popularity, with an over 50% rise in public school student use in the past several years. It is well supported by over a thousand research studies: Students who engage in online learning perform "better, on average, than those taking the same course through traditional face-to-face instruction" (U.S. Department of Education, 2009, p. xiv).

One important attribute of technology-based learning is the potential to extend the amount of time per day on learning, an important factor in studies, which demonstrates the advantage of online learning to traditional instruction. Newer developments in technology, such as those employed in *Wordly Wise 3000 Online*, offer the promise of even better results than those shown by past research.

Perhaps the most clearly substantiated results from computer-based learning involve those related to students' motivation, which is higher with technology than with traditional instruction (Cosden, 1988). Other affective factors, such as self-esteem, are enhanced by the use of technology in the classroom.

Computers give immediate feedback to students on their performance. In their survey of research on instructional feedback, Hattie and Gan conclude that "the average effects of feedback are among the highest we know in education" (2011, p. 249). Practice involving immediate feedback, the kind provided by *Wordly Wise 3000 Online*, has been shown to effectively improve achievement (Kealy & Ritzhaupt, 2010; Roediger & Karpicke, 2006). Computerized feedback yields stronger effects than non-computerized feedback (Kluger & DeNisi, 1996). As students engage in *Wordly Wise 3000 Online* activities, feedback is consistent, individualized, and immediate. When students are correct, their on-target answers are immediately reinforced. When students are wrong, *Wordly Wise 3000 Online* provides guidance and clues to help them give correct responses.

Connected to the computer's unique ability to give feedback is the personalized, private setting it provides. In traditional instruction, students often respond to questions only when they are sure that they are correct. In order to maximize student engagement in the kind of risk-taking that promotes learning, there has to be a high degree of safety. No one enjoys being wrong in front of peers or teachers. *Wordly Wise 3000 Online*'s technology-based instruction provides the privacy and safety that encourages engagement and risk-taking.

One additional advantage of technology-based learning is its inherent motivational appeal. Students using computers enjoy their classes more and develop better attitudes toward learning. Student engagement is enhanced by use of digital technologies. Not only is overall motivation increased by use of computers in the classroom, but self-esteem, a key factor in individual progress in learning, is improved. *Wordly Wise 3000 Online* takes advantage of this increased motivation and engagement provided by online learning.

These direct instructional effects on achievement are the primary reason for using technology in the classroom. However, the use of technology

also improves students' understanding of their increasingly technology-rich society and of its new vocational opportunities. Students will be graduating to a world in which computers play a central role. In fact, the major goal of the Common Core initiative is college and career readiness (CCR). School use of computer technology provides them with an increased familiarity and assurance.

Technology-Based Vocabulary Instruction

The usefulness of technology to enhance vocabulary instruction has been recognized since the early days of computer use in classrooms. *Wordly Wise 3000 Online* provides these long-recognized enhancements: repetition and practice, immediate feedback, self-paced instruction, varying levels of difficulty, motivation, and reporting systems.

A wide variety of individual studies have looked specifically at using technology to teach vocabulary. Kim, Capotosto, Hartry, and Fitzgerald (2001) found that technology-based learning improves both vocabulary and comprehension. Proctor et al. (2011) carried out a 16-week online vocabulary intervention with both English speakers and Spanish-English bilingual students. Post-tests found positive effects on vocabulary growth in measures of both breadth and depth.

Assessment and Accountability

In the current environment of Response to Intervention (RTI)—where research also validates vocabulary instruction in these tiered settings (Vadasy, Nelson, & Sanders, 2011)—assessment is at the heart of the instructional program. Approaches to RTI include frequent formative assessment progress monitoring. This formative assessment, the day-to-day monitoring of student achievement that is used by teachers to make changes in their instructional interventions, has been shown to be a powerful tool in school reform.

Wordly Wise 3000 Online provides extensive opportunities to monitor student progress and to report on results. The unique characteristics of online instruction allow teachers to strategically

decide on the level of monitoring necessary. They can monitor general results, such as overall student performance on subtests. They can also diagnostically examine individual and class results on a word-by-word basis.

NEW *Wordly Wise Science and Social Studies*

Wordly Wise 3000, whether Print or Online, is a *general academic* vocabulary program, one that teaches the kinds of words students need to achieve in school. But students also need to understand the *domain-specific* vocabulary of content-area subjects, particularly the challenging terms they meet in science and social studies. *Wordly Wise Science and Social Studies* is an online program for grades 4 through 8 that focuses on these content areas. The Common Core State Standards state that students should be able to "Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade [level] topic or subject area." (2010, p. 14) Used in combination with *Wordly Wise 3000, Wordly Wise Science and Social Studies* provides a rich, wide-ranging vocabulary curriculum.

Conclusion

There are two major groups developing assessments for the Common Core State Standards. These are to be introduced in the 2014–2015 school year. PARCC (Partnership for Assessment of Readiness for College and Careers) and Smarter Balanced Assessment Consortium are developing tests that are to be taken on a computer or tablet. While there are pen-and-paper versions, as well as accommodations for students with a variety of needs, the vast majority of students will be taking the Common Core assessments on a computer or tablet.

Wordly Wise 3000 Online is a technology-based online program designed to provide vocabulary learning for students of varying abilities and skills, from Response to Intervention Tier 1 students—the average- and above average-performing students—through Tier 2 struggling readers and English Language Learners. Lessons focus on the learning of vocabulary words in meaningful

contexts based on a wide variety of practice formats and on engaging, age-appropriate readings, as well as the use of meaningful word parts. The program is correlated with statewide and Common Core standards for reading and literacy. For more information, go to epsbooks.com/commoncore

Wordly Wise 3000 Online's instruction provides the 21st century's generation of students with cutting-edge applications that fit their comfort zones in a technology-rich society. It has been designed according to research-based principles of computer-based learning, capitalizing on the unique strengths of technology and keeping teachers well-informed as to student progress. It enables teachers to track individual and class vocabulary growth and to intervene and supplement when necessary, making the computer-based learning cohere to classroom instruction.

Feedback-rich practice activities in *Wordly Wise 3000 Online* ensure that word learning is permanent, that students' vocabulary knowledge grows not only in breadth, that is, vocabulary size, but also in depth of learning. Record-keeping is carried out automatically online. This frees teachers from the all-too-commonly overwhelming burden of assessment and paperwork tasks. Reports for students and teachers are easily generated and clearly presented for quick and efficient analysis.

Wordly Wise 3000 Online's assessment system supports teachers and schools by giving them the tools necessary for data-based decision-making. Assessments allow teachers to track learning across the school year in order to better differentiate instruction. Frequent formative assessments allow close monitoring. Regular summative assessments give overall general reports on progress. All this assessment occurs, not as an extra, time-consuming activity, but as a smoothly integrated, seamless piece of the instructional program itself.

National calls for school reform have uniformly called for instruction to be based more firmly on methods and strategies that are research-based. *Wordly Wise 3000 Online* provides instruction that conforms to current educational research and theory by being both highly effective and highly interactive and engaging for all students.

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For more information about this and other research-based materials from EPS Literacy and Intervention, visit epsbooks.com or call 800.225.5750.

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