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The Monster in the Classroom: Assessing Language to Inform Instruction

Submitted to Reading Teacher

by

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Abstract

The current study describes Monster, PI which is an app-based, gamified assessment that measures language skills (knowledge of morphology, vocabulary, and syntax) of 5th-8th graders and provides teachers with interpretable score reports to drive instruction that improves vocabulary, reading, and writing abilities. Specifically, we describe why an assessment of language is important to include, the components of language that are assessed by Monster, PI, and how Monster, PI uses gamification to add enjoyment and motivation to the assessment experience. We then explain how to use Monster, PI to inform instructional decisions, specifically explaining the overall instructional framework, what each score means, and examples of instruction that link to each area assessed by Monster, PI. Links to Common Core Standards are included. We conclude with sharing teachers' feedback on the assessment and how they used it to support instruction in their classrooms.

Teaser Text

Assessing language is important because language skills underlie literacy success. This article explores Monster, PI, a computer-adaptive, gamified language assessment for 5th-8th graders and links to instruction.

Pause and Ponder

1) How and why should I assess the language skills of my students? How can data on language inform instruction in ways that can support my students?
2) How can instruction that supports language be integrated into what I am already doing to support my students additionally?
3) How can data on language inform differentiation to meet the needs of all my students?

The Monster in the Classroom: Assessing Language via Monster, PI to Inform Instruction

Recently, we asked middle school students (*N*=1100) in grades five to eight to describe their experience with Monster, PI (see Figure 1), which is a gamified, standardized, computer-adaptive assessment of language recently developed for middle school students grades 5-8. Students said the following things:

S1: “I like that you learn new things, but it's also fun because you get to do games.”

S2: “I like how it actually made me think and how it used different words.”

S3: “It teaches you things you never knew.”

S4: “It helps me to understand things about words and their meanings.”

S5: “It was challenging and fun.”

S6: “It makes learning and studying more interesting.”

These comments would be rare responses from middle school students describing an experience taking a test, but they proved to be the norm during our work across four years with more than 3,000 students to develop Monster, PI. In fact, Figure 2 shows a word cloud that highlights trends in student responses. As shown, “make”, “clues”, “end”, “enjoyed” and “fun” were dominant with responses involving “make” and “end” referring to the creation of characters at the end of the game. Additionally, students (*N*=2033) ranked Monster, PI in terms of number of stars with 93% rating it as 3 stars or higher (out of 5), 74% rated it 4 stars or higher, and 33% rated it as 5 stars. Clearly, Monster, PI was an enjoyable testing experience for students.

Currently, students take many tests so that teachers can adjust instruction to meet their needs, yet most tests assess literacy outcomes like decoding, vocabulary, reading comprehension,

or writing and, even when delivered digitally, are delivered in a traditional testing format. This article describes why an assessment of language like Monster, PI is needed, its development and link to standardized reading comprehension, and how it can be used the classroom. More information can be found on our website: www.worddetectives.com.

Why a Language Assessment like Monster, PI

Assessing language means targeting skills like vocabulary, morphological, and syntactical knowledge. Overall, language provides the foundation for literacy (Dickinson, Golinkoff, & Hirsh-Pasek 2010). As students read, they face the challenge of determining meaning from text. They must access lexical and sentence level meanings. Yet language is rarely included in a school's yearly assessment battery except for the occasional vocabulary assessment that tends to be delivered as part of a larger standardized reading test. In fact, in Hart et al.'s (2015) comprehensive analysis of testing, the only language tests noted are those given to English language learners assessing language proficiency or those end of course exams assessing English language arts, which typically focus on outcomes like reading and writing. This occurs despite national and state educational standards highlighting the importance of language as part of ELA instruction (National Governors Association, 2010). For example, Monster, PI was designed to support the following Common Core Standards:

- Reading Foundational Skills: Phonics and Word Recognition RF.5.3.A: Use combined knowledge of all letter-sound correspondences, syllabication patterns, and morphology (e.g., roots and affixes) to read accurately unfamiliar multisyllabic words in context and out of context.
- Language: Vocabulary Acquisition and Use: L.5-8.4.B: Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word

(e.g., *audience*, *auditory*, *audible*) and L.5-8.5.B: Use the relationship between particular words to better understand each of the words.

The lack of detailed data on language can make it difficult to understand what might be underlying literacy challenges and successes, which also makes designing instruction based on students' individual profiles hard. For example, a study of 8- and 9-year-old children found vocabulary to be an area of significant weakness for poor comprehenders and showed that vocabulary was related to the ability to read exception words (words that cannot be decoded easily; Ricketts, Nation, & Bishop, 2007). Detailed data on this component of language (i.e., students' vocabulary knowledge) would help teachers adjust instruction to improve this component, which would support students' word reading and reading comprehension. Also, language skills are important predictors of later success with kindergarten and third grade language skills uniquely relating to high-school reading comprehension (Stanley, Petscher, & Catts, 2018). Content that is assessed is content that often gets taught, so creating an assessment that can fit within yearly assessment batteries to provide a more complete picture of language strengths and weaknesses is needed.

There are a plethora of language assessments, so why are more not being included in yearly assessment batteries? Demands related to time and resources tend to be to blame. Current standardized language assessments tend to be long with multiple subtests that test each area of language, often which involve individual administration, and often which are designed for more clinical settings and populations. For example, the CELF's (Clinical Evaluation of Language Functions, Semel, Wiig, & Secord, 2004) purpose is to determine the presence and describe the nature of a language disorder and plan for intervention, but that gives it less value for screening for risk and less relevance in guiding instruction for a classroom of students. Also, students tend

to be tested quite a bit, so the idea of another standardized test can be overwhelming. Monster, PI was developed to address these concerns as a gamified, computer-adaptive assessment that can provide instructionally relevant data that is gathered while students are playing a larger game and hence, don't consider this to be just another test.

The Multiple, Multidimensional Aspects of Language

Assessing language is complex. Tasks may tap into different aspects of language—assessing phonology (i.e., sounds), orthography (i.e., spelling), semantics [vocabulary] (i.e., meaning), morphology (i.e., word formation principles), or syntax (i.e., how words are put together into clauses and sentences). See Table 1 for examples of different ways to assess the word *notation*.

Research suggests that there are multiple components of language, and these components relate. Following theory and earlier studies (Foorman, Koon, Petscher, Mitchell, & Truckenmiller, 2015; Goodwin et al., 2018; Kieffer, Petscher, Proctor, & Silverman, 2016), Monster, PI was developed to assess three key language components which reveal the critical thinking and language knowledge that must be applied to accessing lexical and sentence level meanings. These three components are *morphology*, *vocabulary*, and *syntactical* knowledge. Monster, PI assesses them in a detailed way because research also indicates these components themselves are multidimensional (Goodwin & Cho, 2016; Goodwin, Petscher, Carlisle, & Mitchell, 2017; Goodwin et al., 2018; Kieffer & Lesaux, 2012), which means that there are different parts or skills within each that matter to overall language abilities.

Overall, Monster, PI vocabulary items move beyond just assessing whether a word's meaning is known to considering meaning knowledge as it relates to different concepts, ranges

of meanings, and word relations. Our morphology items assess students' knowledge about units of meaning and how they are combined and used to support various language and literacy endeavors. Syntax items assess how students access the meanings of these words when combined in larger phrases and sentences, providing data on student performance connecting meaning to word order, grammatical markers, phrases, clauses, etc. These constructs together tap what Gough and Tunmer (1986) describe as "the process by which given lexical (i.e., word) information [and] sentences … are interpreted" (p. 7).

As mentioned above, there are many ways to assess language, both in oral and written forms. Because Monster, PI is designed for students in grades 5-8, we take a developmental view that acknowledges by middle school, language's relationship with literacy largely relates to more formal literacy instruction. Here, we consider the written orthography, or how language is conveyed in print. English, for example, conveys meaning in different ways in writing than via oral language. For example, *magic* and *magician* overlap in spelling but not in pronunciation. As such, Monster, PI assesses students' abilities to analyze how language conveys meaning in print.

Integrating Assessment into a Computer-Adaptive Game-format

While we knew that it was important to assess language, we also believe there are too many standardized tests being administered currently in schools. We, therefore, wanted to capitalize on computer-adaptive testing which allows students to take the subset of items that are at their ability level rather than taking all items, which means that the assessment can gather more meaningful (i.e., more valid and reliable) data in less time (Olsen, Maynes, Slawson, & Ho, 1989). In this way, Monster, PI can assess language in 20-40 minutes. We also wanted to gather this important language data via a game where students might not experience the test as a typical standardized test. We, therefore, designed Monster, PI to incorporate some of the features that

research has found encourages engagement (Clark, Tanner-Smith, & Killingsworth, 2016). We used technology to support an interactive and immersive fantasy environment (Prensky, 2001): Monster, PI has students take on the role of detective to hunt down a Monster who is wreaking havoc on the city. We focused efforts on ensuring rich visual and spatial aesthetics (Poole, 2000): students visit various scenes (e.g., library, museum, school, sports arena, amusement park, detective station), which are portrayed via vivid graphics and music (see Figure 1 and visit www.worddetectives.com for more images and sounds). Lastly, research indicates the importance that "Games are played to win or achieve a goal" (Becta, 2001, p. 1): students' goal in Monster, PI is to gather clues to identify and put the mischievous monster in jail.

Monster, PI's Development

We developed Monster, PI across four years, working with a diverse sample of more than 3,000 middle school students (*N*=1,026 fifth, 742 sixth, 715 seventh, and 731 eighth graders) and more than 50 teachers (Year 1 =15, Year 2 = 38, Year 3 = 37; Year 4=3, although some teachers overlapped across years) from seven schools within a large urban school district in the Southeastern United States. Years 1-3 were primarily spent developing the assessment and then Year 4 involved an implementation study with three case-study teachers. We also piloted the assessment with third and fourth graders in Year 3. As mentioned above, there are a few key criteria that we kept in mind during development. The first is the importance of assessing language for 5th-8th grade students. The second is the importance of assessing multiple components of language (morphology, vocabulary, and syntax) and assessing each in a detailed way. For this, across our study we piloted 15 morphological, five vocabulary, and three syntax tasks and utilizing more than 1000 items to build a valid and reliable assessment. The third is creating a practical assessment that can be used by researchers and teachers. This meant creating

something that was relatively short, hence the need for computer-adaptive testing (CAT). Lastly, after piloting the assessment the first year in a traditional testing format on iPads, we realized the importance of gamifying our assessment to make this experience not just another test.

The result is that Monster, PI is an app-based, gamified, computer adaptive assessment of language. The game features a mischievous monster who is wreaking havoc on different areas of the city, including a school, museum, library, sports arena, and amusement park. In each area of the city, students solve word puzzles, which are the items on the assessment. Each area provides students with one clue to identify the monster, such as its color or the number of legs it has. After completing all the areas, students use all five clues to identify the monster and save the city! Throughout the assessment, there are 30-60 second mini-games to help students refocus and to make the game engaging and fun. We describe findings related to Monster, PI's validation and links to standardized reading comprehension below. We then focus on connecting our findings to the classroom with the goal of making it clear how Monster, PI can inform instruction.

Findings

We report the four main findings that are most relevant to Monster, PI's use in the classroom. More information on our validation work is described in more detail at Goodwin et al. (2019).

Finding 1: As mentioned previously and shown in Figure 2, the game storyline and mini-games seemed to be popular with the middle school students. Out of the 2033 students who provided feedback on Monster, PI in Years 2 and 3 (when the assessment was gamified), 93% of students who took the assessment rated it as 3 stars or higher (out of 5), 74% rated it 4 stars or higher, and 33% rated it as 5 stars.

Finding 2: We found evidence of the importance of considering morphology and vocabulary in a detailed, multidimensional way, although syntax was found to be unidimensional. In other words, our results showed that we had to assess different components of morphology and vocabulary to get the full picture, though we also discovered that syntax only needed to be assessed on one component to get its full picture. Modeling this way allows Monster, PI to identify students' overall performance and also their performance on teachable skills that are instructionally relevant. For morphology, we identified four teachable skills:

1. Students can identify units of meaning—This skill focuses on students' awareness of morphemes in general and their ability to find them in words.
2. Students can use suffixes to gain syntactic information—This skill focuses on students' understanding of the syntactic properties of morphemes—that is, how they shift words' parts of speech.
3. Students can use morphology for meaning—This skill focuses on students' understanding of the semantic properties of morphemes—that is, what they mean.
4. Students can read and spell morphologically complex words—This skill focuses on students' understanding of the orthographic and phonological information conveyed by morphemes.

For vocabulary, scores communicate performance on definition, synonym/antonym, analogy, and polysemy skills, but in a broad, holistic construct of vocabulary knowledge. In other words, they communicate the quality of student's lexical representations (Perfetti, 2007). Syntax scores communicate the ability to parse and put together multiple ideas within a single sentence as represented by combining multiple clauses into the same sentence. We will explain what each of these scores means and how to interpret them in the next section below.

Finding 3: Monster, PI produced reliable and valid scores that can help teachers trust the data and also frame their students' performance within the performance of other students in their grade (i.e., presenting percentile ranks). Teachers in our study found this helpful, with one mentioning that Monster, PI "did provide me with information on where the students are compared to other students in their grade. That was beneficial." As part of this, we found that how students performed on Monster, PI linked closely with their performance on a widely used standardized reading assessment (the Measures of Academic Progress [MAP] reading assessment). There are two important parts of this. Performance on the full Monster, PI measure explained between 56% and 75% of variance in student performance on the MAP. This both confirms the large role of language in reading comprehension and also highlights that Monster, PI scores are meaningful measures of the language skills that underlie reading comprehension skills. Also, considering the components of language in a detailed way was important because taking into consideration each additional skill (i.e. each language component) explained significantly more variance in comprehension. As such, it is important that Monster, PI and other language assessments assess multiple components of language and consider the different parts of these components (i.e., their multidimensionality).

Finding 4: Monster, PI was also able to analyze how students performed at each grade level, identifying profiles of strengths and weaknesses. Monster, PI takes this data and groups participants into instructional groups based on the performance characteristics they share with other students in the same grade. We found five instructional groups best fit the data and these tended to represent a range of weak to strong performance. Particularly helpful, though, is that profiles include relative strengths that teachers can build upon when addressing student weaknesses. For example, grade 6 profile 1 includes students who although they are performing

below average in all language areas, they are particularly weak in morphology and vocabulary, and hence syntax and word reading and spelling are relative strengths upon which to build. We suggest educators visit our website for more information on the instructional groupings and how to adjust instruction accordingly (http://worddetectives.com/instructional-groupings).

Monster, PI Scores & Links to Instruction

The purpose of this paper is to explain what Monster, PI scores mean and how they can inform instruction. Monster, PI scores provide data on how students are performing relative to other students in their grade on four morphology skills, their overall vocabulary knowledge based on four different features of word knowledge, and their syntax knowledge. While we will detail what each score means and give some examples of instruction that can support their development, we start with an overview of the instructional frameworks that guided Monster, PI. While we will discuss general instruction here, we suggest going to our website (http://worddetectives.com/instructional-resources) for more information and to get specific ideas, links to lesson plan scripts, example games, instructional materials, and differentiation ideas.

We remind readers here that Monster, PI is linked to the Common Core Standards, which highlights the idea that educators should build from what they are already doing (see Figure 3). In other words, teaching language in addition to everything else in the curriculum can feel overwhelming, but our work with teachers suggests integrating these ideas into the curriculum is more manageable. Can educators add a column to a vocabulary graphic organizer that develops morphological understandings? Can they show students about how clauses are put together in a tough section of text as part of reading comprehension instruction—or as a model text for writing instruction?

Additionally, instruction should be thought to include motivation, isolated instruction that draws attention to language principles, and integrated instruction that shows the code of language in action (see Figure 4). We emphasize motivation because research consistently shows that direct instruction that is interactive, playful, and social results in deep learning. Our work with teachers and students implementing Monster, PI has gotten students moving, reasoning, and making sense of the code of language.

We suggest some isolated instruction because drawing attention to words that highlight the aspect of the code that reflects a student's needs as suggested by their Monster, PI scores tends to require this important first step. As part of isolated instruction, interaction is key. Educators might ask students to cut word parts from larger words, build words from parts, box familiar units, draw, act words out, and make up their own words. The idea is to help them get interested in the code that language uses to express meaning. The games (see www.worddetectives.com) mentioned above are examples of this instruction.

When integrating these ideas, a focus on how these principles work in conveying meaning in text and talk is important. Can educators create a system where students search for cool words that they don't know or that might showcase a large word family? Might educators create a flag or sticky note system for students to note areas of the text where they can use the language code (syntax, morphology, and vocabulary knowledge) to help them comprehend or write better? Would learning stations where students can explore words and find as many relatives as they can and as many ways to use those relatives in their own writing support these ideas? Can technology help? Can students use the internet to research ways words are used or figure out if words are related?

Remember, all of this can happen as part of whole class and small group instruction. For whole group instruction, Monster, PI scores can guide instructional decisions regarding 1) what to integrate and 2) what and how to differentiate (see section below and https://worddetectives.com/instructional-resources/#differentiation-ideas). For small groups, Monster, PI results can suggest 1) groupings, 2) things to integrate into small group work like guided reading, and 3) additional instructional goals to include to address language needs. Next, we describe what each Monster, PI score means and links to instruction.

Morphology

Monster, PI assesses morphology using seven measures modeled as four teachable skills.

Skill 1: Students Can Identify Units of Meaning. Performance on Skill 1 indicates whether students can identify units of meaning both via breaking words down and connecting to larger words. In other words, they can analyze how language conveys meaning via morphemes, which are units of meaning. This is important because there are over 200,000 words that students encounter in academic texts (Nagy & Anderson, 1984), which is too many words to learn one-by-one. Being able to analyze the units of meaning in words means that students can use the code of language to figure out unknown words. This means that given three similar-looking words like *season, seashore,* and *seaweed*, a student would be able to find the words that share meaningful parts (*seashore* and *seaweed* both relate to *sea* whereas *season* has nothing to do with *sea*). Students with this skill could analyze an unknown word like *seaworthy* to figure out that it's meaning has something to do with being good enough (*worthy*) to sail on the sea. Students with this skill could also think about units of meaning or even a morphologically related word that can help in figuring out an unknown word's meaning. For example, a student might

not know *astronomy* nor *astro*, but they may be able to use knowledge of *astronaut* to figure out that *astro* and *astronomy* have to do with space.

Instructionally, this skill highlights that we need to help our students think about morphological overlap between words. We need to constantly challenge students to think about how the word's form and sound conveys links to other words in their morphological family. We have observed instructional work where students eagerly look up word origins to find overlap, play go-fish with morphologically related words and morphemes, build words from morphemes and cut words apart into morphemes, create word webs to identify morphological word families, and find imposters where tricky spellings look like morphemes but are not (see Goodwin & Perkins, 2015 for examples).

Skill 2: Students Can Use Suffixes for Syntactic Information. While we tend to think about the semantic roles of morphemes, the syntactic information conveyed by morphemes is important as well. In other words, knowing how to adapt or interpret the form of *detect* to fit the phrase 'the *detection* of evidence' is important for helping students deal with the complex syntactical structures involved in text, particularly related to academic language. Students with this skill can think about the information the suffix is conveying within a morphologically complex word to either choose the correct form of the word (*historic, history, historian, historically*) or identify the form (*historic*) to complete the sentence '*It was a* _____ *occasion when Barack Obama was elected President.'*

This skill highlights the ability to use the syntactic information in a suffix as another clue to a word's meaning within a larger phrase. Instruction that supports this provides many different phrases and then asks students to adjust the form of the word to fit the phrases or encourages students to play with words like this in their own writing, which draws attention to

the syntactical role of the suffixes. The big point here is that suffixes are often hard to teach because their meanings are abstract, but talking about the role they play in conveying meaning is important.

Skill 3: Students Can Use Morphology for Meaning. This skill is perhaps the one that most often comes to mind when we think about uses of morphological knowledge in supporting literacy: the ability to use the semantic information in morphemes to figure out meanings of related words. Students with high levels of this skill can read a sentence that contains an unknown morphologically complex word and then use their knowledge of the meanings of morphemes to figure out the meaning of the full word. For example, if a student reads, '*The experiment required materials to be equidistant,'* that student could identify the two units *equi* and *distant* and put those meanings together to figure out that the materials had to be spaced apart equally.

Instructionally, teachers can support development of this skill in various ways. In previous work (see Goodwin & Perkins, 2015; Goodwin, Lipsky, & Ahn, 2012), students benefited from practicing this skill both in isolation and then applying it when reading texts. For example, students were shown words on PowerPoint slides and then encouraged to figure out the meanings using morphemes which were highlighted in different colors on the slides. Another example involved presenting students with two words that overlapped in meanings, one which was familiar and one which was not. Students had to use morphological knowledge to figure out the unknown word. Also important was integrating the skill in reading. An example is that when students were reading, they flagged unknown words. They then analyzed the words on sticky notes (alone or with a partner), boxing units like root words that they were more familiar with.

They then summed the meanings of the morphemes to estimate a meaning of the unknown word and then put it back into the text to determine whether their hypothesis makes sense.

Skill 4: Students Can Read and Spell Morphologically Complex Words. The final morphological skill identified from our work is the ability to apply morphological knowledge to support reading and spelling morphologically complex words. This skill connects to the orthographic and phonological information conveyed via morphemes. For example, knowing the spelling of the word *know* can help a student to spell *knowledge* (not *nolidj*). Similarly, knowing how to read *finance* can support reading *financially.* Much work has shown these relationships (see Goodwin, Gilbert, & Cho, 2013), and the reason is that students' experiences building and applying knowledge of these patterns in reading and spelling builds higher quality lexical representations, which they are able to use in their literacy endeavors (Goodwin, Gilbert, Cho, & Kearns, 2014). Students strong in this skill can use morphemes to help them figure out how to read an unknown word (which in our CAT assessment was assessed by listening to three pronunciations and choosing the correct pronunciation) and how to spell an unknown word.

Educators can support the development of this skill by highlighting the overlap between morphological patterns and spelling and phonological patterns. In other words, if a student doesn't know how to spell a word, they may support sounding out the spelling with consideration of the units of meaning within that word. For example, rather than asking students to sound out *knowledge,* the teacher may ask the student if they know how to spell the root word or any part of the word like *know*. Similarly, if faced with reading an unknown word, highlighting or boxing the known parts like *know* can help students apply their morphological knowledge to word reading, activating phonological, orthographic, and semantic language systems.

Measuring Vocabulary Knowledge

Monster, PI assesses vocabulary via four measures that while modeled as four constructs produce a single score that is most informative for teachers to work with. We recommend educators use this main vocabulary score to guide their instruction and then consider the subscores as additional information to add nuances to their instruction. The subscores relate to definition knowledge, knowledge of related words like antonyms and synonyms, relating words to other words via analogy, and knowledge of multiple meanings (i.e., polysemy). A student who receives a strong vocabulary score would have high quality lexical representations (Perfetti, 2007) where definition knowledge for multiple meanings is linked to a network of words where relationships to those words, like antonyms and synonyms, are modeled as part of that network. What is important here is that Monster, PI helps teachers look beyond whether students can define or choose a definition for the word, but rather assesses the broader set of word knowledge that is needed to support high quality literacy endeavors.

Instructionally, this indicates the importance of teaching multiple aspects of word knowledge when teaching words. To build vocabulary knowledge, we need to move beyond just defining words to build rich lexical networks of words. As such, vocabulary activities should include building of knowledge like a basic definition, but then compare and contrast words and networks of words to develop a nuanced understanding of how the words can be used to convey knowledge. We highlight here the multi-pronged approach to building word knowledge and the importance of considering networks of words to highlight degrees of meaning. Ideally, this instruction should be integrated with the morphology instruction described above as both help students attend to the code of language as words are both made of units of meaning and also can serve as units of meaning to build other words. For example, Nagy and Anderson (1984) describe the idea of a related ancestor such that when considering a word like *archeoastronomer*,

it may be more helpful to consider the largest unit related to the full word (*astronomer*) versus breaking the word into the smallest units of meaning. We also remind readers that vocabulary instruction that builds high quality lexical representations considers the general frames shared above: motivation, isolated instruction, integrated instruction, and word choice. As vocabulary researchers, we cheer when we see students figuring out meanings from contexts, creating multimodal definitions, and building webs of words to highlight relationships between words rather than a word wall that merely lists the words. Vocabulary instruction should be active!

Measuring Syntactical Knowledge

Syntax is assessed by a single measure because our pilot Monster, PI work indicated that syntax was just one skill—even though we tried different kinds of syntax assessments, they were all measuring the same thing. Hence, Monster, PI syntax scores communicate whether and how students can manipulate or judge word order within the context of a sentence based on the application of grammatical rules (Cain, 2007). A student with high levels of syntactical knowledge would be able to take two or three ideas communicated in separate sentences and then choose or produce a single sentence that conveys those three ideas accurately. For example, a student would take the sentences *'Gabby spent most of the summer at a camp. She liked it. She was eager to return home.'* and then identify that the best way of combing these sentences into one bigger idea would be *'Although she liked it, Gabby was eager to return home after spending most of her summer at camp.'* rather than '*After spending most of the summer at camp, Gabby was eager to return home, although she liked it.*' To do this, the student needs to use five types of connective signaling words, including additive (e.g., and), adversative (e.g., however), causal (e.g., therefore), logical (e.g., because), and temporal (e.g., next) signal words. These need to be used to connect ideas or to reference back to previously identified objects or ideas.

In terms of instruction, the idea here is to draw attention to how words and clauses are combined to convey meaning. One might start with basic playful fun like Madlibs that highlight the appropriateness, or more often the inappropriateness, of the fit of words into phrases and ideas. Instructional activities can then emphasize how clauses are put together by identifying clauses and ideas and mapping these to the bigger meanings being conveyed. Circling, drawing meanings for, matching, and manipulating clauses can all support syntax instruction.

Differentiation Thoughts

Differentiation is key to successful instruction. Monster, PI data is designed to help teachers differentiate. While we have more specific ideas on our website, for students who need support we suggest:

1. Underline words that are important or convey the code of language in the text. This will draw attention to that word and to using strategies like word solving to figure out the meaning.
2. Give out flags, sticky notes, word journals, and word webs to help students physically note the code of language within text.
3. Use student work exemplars as models of how to apply the code of language to literacy endeavors.
4. Adapt organizers or assessments to provide examples and models.

For students who need enrichment:

1. Provide opportunities to build rich networks of words. Underline words that could be improved. Have students find strong words in texts. Add components of assignments that encourage students to add related words to their lexicon.

2. Talk about the code of language and use students' explanations and work as models.

Discussion

Our four years of work developing and studying Monster, PI indicates the assessment provides valid, reliable, and detailed scores regarding students' language performance. This is important because language underlies success with literacy endeavors. In our work with teachers, we discovered two truths. First, teachers were generally unhappy with their current language assessment choices or did not have a specific assessment that assessed language in a detailed, but fun and easy to administer way. Second, teachers appreciated using Monster, PI because they felt that it helped them design productive instruction and their students seemed to enjoy it. The three teachers in our case-study work reported that Monster, PI, "confirmed the major problems that students have struggled with throughout the year"; "helped with intervention instruction to meet each student at their point of need"; and "included more specific information on vocabulary skills." Examples of how these teachers used the data included, "to create small group lessons, mini lessons, or flipped lessons for individuals"; "to add into center rotation or use as an intervention tool"; and to design "mini lessons that focus on the specific type of data that was collected." Lastly, evidence of links to reading comprehension scores included statements like: "Vocabulary continues to be an area of weakness for them [students]. Informal assessment grades rose when vocabulary strategies were implemented." To support success with Monster, PI, teachers and the research team had coaching conversations surrounding much of the content in this article. This article shows what Monster, PI is, why it is important to assess language in classrooms, and how to link Monster, PI to instruction.

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Table 1

	Phonological (pronunciation)	**Semantic (definition)**	**Syntactic (grammatical class)**	**Morphological (units of meaning)**	**Orthographic (spelling)**
notation	/noteʃən/	record, the process of noting in writing	noun	note+ate+ion	n-o-t-a-t-i-o-n

Figure 1. Poster showing graphics and worlds that students visit as part of Monster, PI.

Figure 2. Word cloud representing trends in student feedback regarding Monster, PI.

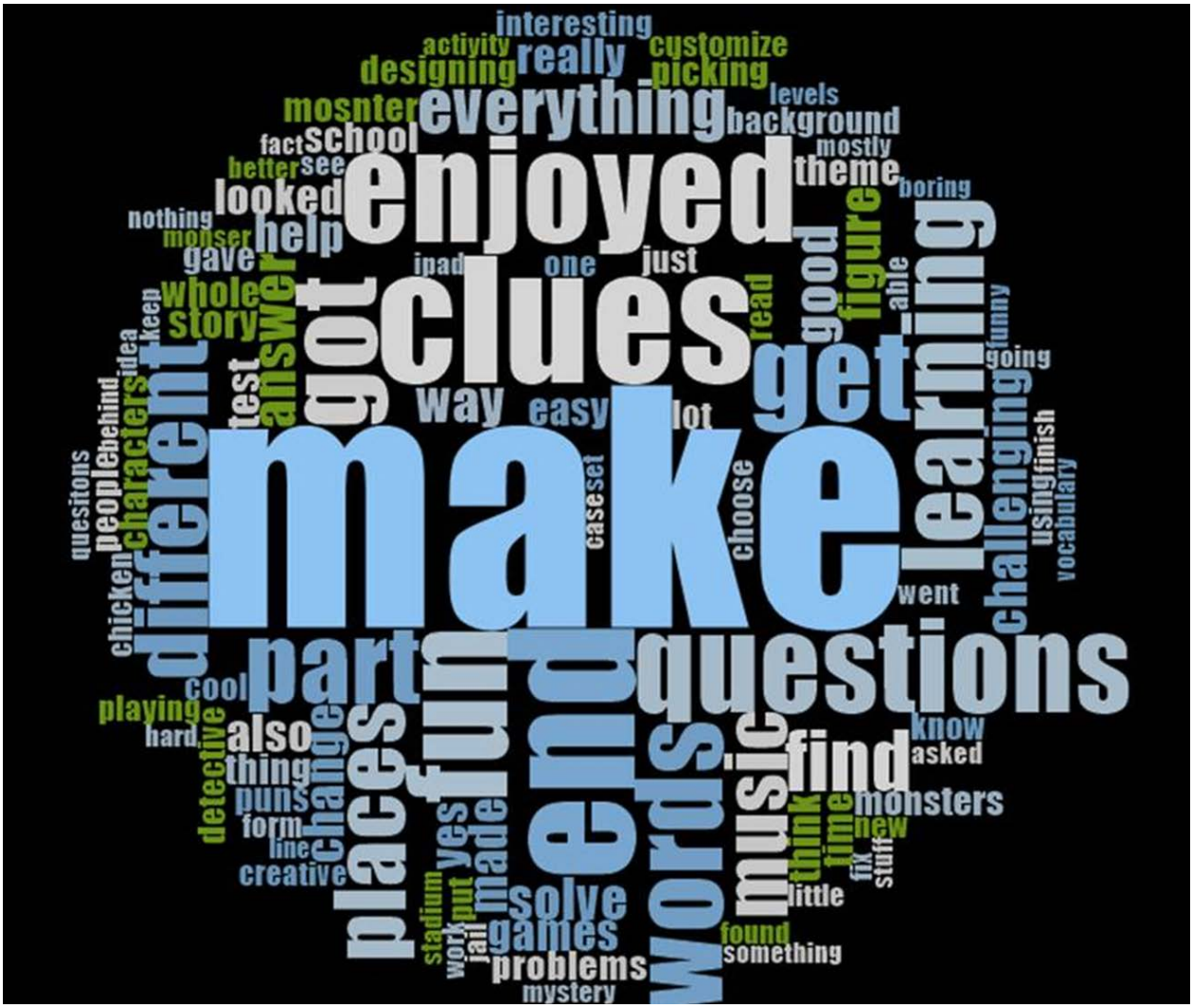
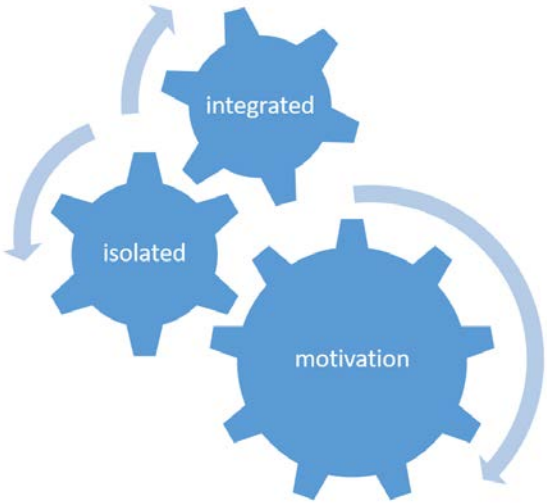


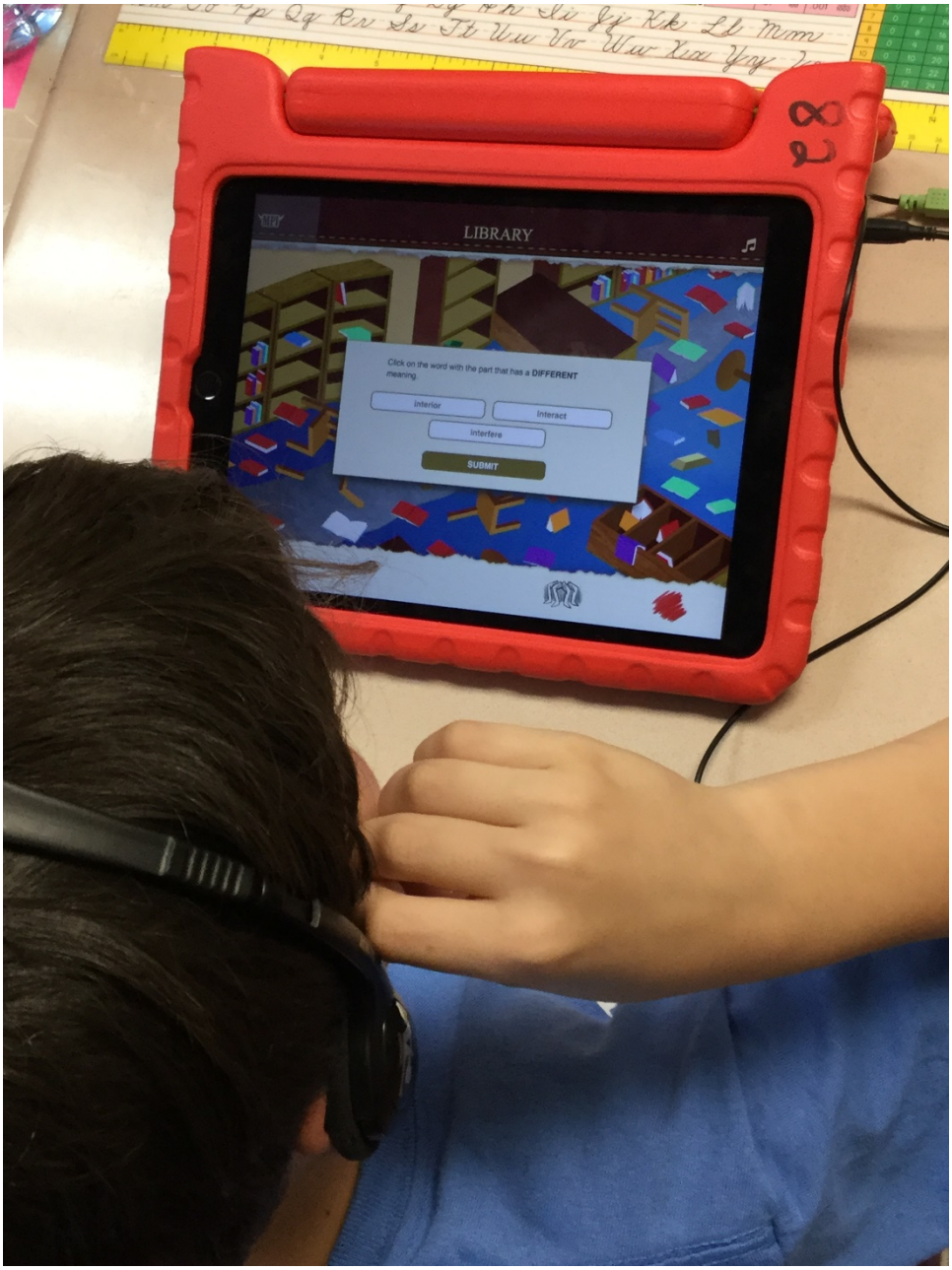
Figure 3. Figure showing how to build instruction from what is already being done

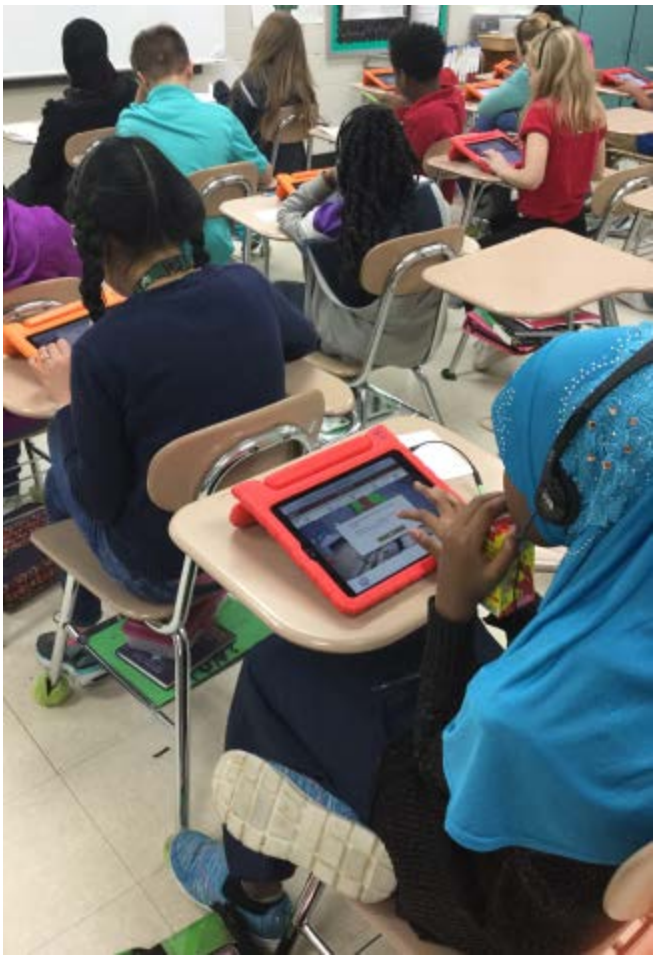
Figure 4. Framework highlighting importance of instruction attending to motivation, isolated instruction that draws attention to language principles, and integrated instruction that shows the code of language in action.



Appendix

Images collected as part of Monster, PI work to be used to supplement layout if needed.





Take Action!

(Steps others need to follow to apply ideas**,** Numbered list, <200 words)

1. Visit www.worddetectives.com. Explore the content and play some of the games.

2. Build your own lexical network. Choose a root to explore and build a large word family and rich lexical representation for that root. Use online resources like dictionaries, word origin websites like https://www.etymonline.com/, google's word origin feature (type word origin 'word'), and then try typing into a search engine 'words that include' the chosen root. Then explore how that word family is used in text by searching the internet and classroom texts.

3. Create some learning stations that support this learning. One might include cards with affixed words that students can cut apart. Another might include roots and affixes to build into words. Another might include words that can be organized into lexical networks.

4. Listen to podcasts and skype interviews for more information. See https://www.youtube.com/watch?v=mHyMixkd4tM where Liz Hadley discusses depth of vocabulary and Kyle Levesque discusses morphology at https://www.youtube.com/watch?v=4RnGUNQ4qG0.

5. Join professional organizations and talk about these topics. International Literacy Association has twitter posts @ILAToday and journal editors like @DrGoodWin4Lit post new research updates on these topics. Also, join the Reading Research Quarterly Facebook page where topics like these are discussed in professional networks.

More To Explore

[5-6 additional resources (articles, blog posts, podcasts, etc.) ***not*** already cited]

- Listen to a podcast with author Amanda Goodwin describing the role of morphology for adolescent readers : www.voiceofliteracy.org/ posts/50213
- Explore Peter Bowers work on teaching morphology in classrooms. See http://www.wordworkskingston.com/WordWorks/Home.html
- Browse the list of frequent root words and affixes found at Reading Rockets website. See https://www.readingrockets.org/article/root-words-roots-and-affixes
- Learn about roots, prefixes, and suffixes from BrainPOP ’ s Tim and Moby : www.brainpop.com/ english/grammar/rootsprefixesandsuffixes/ preview.weml
- Explore newsela.com. Pay attention to how language (syntax, vocabulary, and morphology) change as text complexity (or lexile levels) increase.