

Technical Report # 1227

**Phoneme Segmenting Alignment with the
Common Core Foundational Skills
Standard Two:
Grades K-1**

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Abstract

In 2006, the easyCBM reading assessment system was developed to support the progress monitoring of phoneme segmenting, letter names and sounds recognition, word reading, passage reading fluency, and comprehension skill development in elementary schools. More recently, the Common Core Standards in English Language Arts have been introduced as a framework for outlining grade-level achievement expectations, to guide reading instruction and assessment across the United States. The purpose of this study was to examine the extent to which the easyCBM Phoneme Segmenting assessment contains items aligned with the Common Core Standards. Alignment analyses focused on expectations stated in Standard Two, *Foundational Skills*, for kindergarten and first grade. One hundred and sixty-nine words from the Phoneme Segmenting assessment were reviewed, comprising 98.2% of the unique words on the kindergarten assessment, and 100% of the unique words on the first grade assessment. Study results indicated that kindergarten Phoneme Segmenting items were weakly or not aligned with any of the Standard Two expectations. First grade Phoneme Segmenting items were strongly aligned with one Standard Two expectation (i.e., segmenting single-syllable words), but weakly or not aligned with the others. Reviewer errors and specific test item issues found were also discussed.

Phoneme Segmenting Alignment

In 2010, the Common Core State Standards (CCSS) were introduced as a way to incorporate national standards for instruction and assessment. Because the easyCBM reading assessment system (Alonzo, Tindal, Ulmer, & Glasgow, 2006) was developed four years prior to the advent of the Standards, we examined the extent to which existing Phoneme Segmenting test items are aligned with the skills and knowledge expected of students, as reflected in the CCSS for kindergarten and first grade students (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010).

The easyCBM Phoneme Segmenting assessment was designed to exclusively measure phoneme segmenting across 20 forms within a grade. A preliminary examination of the CCSS indicated that only some components of Standard 2 would be relevant for analysis because they specifically refer to phoneme segmentation activities (see RF.K.2 D, and RF.1.2 C and D below).

Reading: Foundational Skills Standard 2

RF.K.2. Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

- A. Recognize and produce rhyming words.
- B. Count, pronounce, blend, and segment syllables in spoken words.
- C. Blend and segment onsets and rimes of single-syllable spoken words.
- D. **Isolate and pronounce the initial, medial vowel, and final sounds (phonemes) in three-phoneme (consonant-vowel-consonant, or CVC) words.¹ (This does not include CVCs ending with /l/, /r/, or /x/.)**
- E. Add or substitute individual sounds (phonemes) in simple, one-syllable words to make new words.

RF.1.2. Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

- A. Distinguish long from short vowel sounds in spoken single-syllable words.
- B. Orally produce single-syllable words by blending sounds (phonemes), including consonant blends.
- C. **Isolate and pronounce initial, medial vowel, and final sounds (phonemes) in spoken single-syllable words.**
- D. **Segment spoken single-syllable words into their complete sequence of individual sounds (phonemes).**

Phoneme Segmenting Alignment

Traditionally, examinations of test and standards alignment entail the use of a rating scale to judge the degree to which items correspond with standards of interest. Because of our narrow focus on only particular components of Standard 2 within each grade, we used an alternative method for evaluating alignment that we believed would be a more informative approach than traditional methods. Specifically, we had reviewers provide item-level information associated with each component of interest, so that we could simultaneously examine reviewer agreement (similar to typical alignment methods) *and* background knowledge underlying reviewer responses.

For example, according to the first grade CSS Standard 2, students are expected to engage in segmenting activities using single-syllable words (see components A & C). Rather than have reviewers judge how well Phoneme Segmenting test items reflected single-syllable words (as in typical alignment), we had reviewers identify the number of syllables for each word test item, which we used to calculate the proportion of single-syllable words. We reasoned that the more test items resembled expectations outlined in the CCSS, the stronger the alignment between the assessment items and the standards.

We also examined the background knowledge of reviewers by having them decompose the same words into their constituent syllable parts. We anticipated that this step would inform our understanding of reviewer agreement concerning the number of syllables identified for each item by revealing the strength of word syllabication knowledge among participants. Because previous research has indicated that beginning literacy knowledge may be weak among K-3 teachers (Cunningham, Perry, & Stanovich, 2004), we wanted to account for weak knowledge that might lead to underestimates of correct agreement among reviewers. For example, although a teacher reviewer may accurately provide the number of syllables in a word, s/he may not

Phoneme Segmenting Alignment

precisely know the sound parts that comprise each syllable, as a consequence of incomplete knowledge. By inspecting reviewers' responses in this way, we were able to better capture the knowledge base underlying the information provided. We followed the same logic and practice for obtaining phoneme information about test items.

An additional benefit to using this alternative alignment method was that it illuminated how well test items reflected instructional practice. Items found to be problematic for teacher reviewers likely indicate sources of test error variance that warrant further investigation because such items potentially measure something other than student phoneme segmenting skill. For example, these items may reflect factors that extend beyond the measurement of student skill such as limited exposure to particular types of words for segmenting practice, or gaps in teacher knowledge that diminish measurement precision and offer less useful test information for making instructional decisions. Thus, items identified as problematic may suggest a test element that could potentially weaken the link between CCSS expectations, reading measurement outcomes, and instructional implications for helping students demonstrate expected knowledge and skills.

Methods

Participants

Between November 2011-March 2012, 9 teachers were trained to do the following as part of their item review:

- a) Indicate the number of syllable word parts and decompose each word into syllables.
- b) Indicate the number of phonemes and segment each word into phonemes.

Teacher participants comprised four current kindergarten teachers with $M = 3.25$ years of experience (range = 1-5 years) and three current first grade teachers with $M = 11.33$ years of experience (range = 3-25 years). In addition, two current special education teachers also

Phoneme Segmenting Alignment

participated in this study, with $M = 3.5$ years of experience. The majority of the participants were teaching in the state of Oregon; two participants were teaching in Iowa and Ohio.

Procedures

Because a majority of items on the easyCBM Phoneme Segmenting assessment were repeated across kindergarten and first grade level test forms, to minimize redundancy of item reviews, words were combined into a single item review pool and reviewed once by each of three reviewers. The unique word count, instead of the total word count (which would include repeated word occurrences across all test forms), was used for reported calculations. Three words were unexpectedly not reviewed (“scale” and “trip” on kindergarten form 10, and “straight” on kindergarten form 8). Therefore, 170 words were reviewed, split across seven review measures of approximately 25 words each (see Table 1). This comprised 98.2% of the unique words from the kindergarten easyCBM assessment (i.e., 173 words), and 100% of the unique words used from the first grade assessment (i.e., 159 words).

Each teacher reviewed items on two measures for a total of approximately 50 words (see Table 2; each teacher is represented by a different alphabetic letter, followed by his/her current instructional placement). Where possible, teacher reviewers with different instructional placements were counterbalanced across measures to control for potential differences in background due to prior teacher training and classroom instruction experience.

Reviews were conducted using an online review website designed for evaluating test item bias, sensitivity, and alignment to standards. As part of the review, teachers were shown one word at a time and provided requested information for each test item (e.g., number of syllables, syllable decomposition, number of phonemes, phoneme decomposition). A sample review question for the word *cover* is shown below.

Phoneme Segmenting Alignment

TEST ITEM

cover

ITEM REVIEW QUESTIONS

Number of syllables:

1 2 3 4

Type each syllable part into the text box. Separate syllables using a slash (/).
 Example: dinner: din / ner

Additional text box features enabled teachers to list any resources that were used to support their reviews, as well as the opportunity to express concerns (either regarding the certainty of their responses or particular items). Although few teachers listed resources, the following were reported as resources used with challenging items: *Merriam-Webster* dictionary, *Wikipedia*, *Direct Instruction* teacher manual, an English phoneme chart (retrieved online), and consultation with a reading specialist at the reviewer's school.

Pre-review training was required of participants through a 30-minute webinar, in which teachers were briefed about study logistics, relevant reading terminology, and use of the online review system. Teachers were given one month to review items, commencing the day after training. They were compensated for their completed review with a \$25 gift card.

Reviewer response accuracy was examined by the first author, a reading researcher and former special education teacher. The following resources were referenced as support materials during the data analysis phase of the project: an online dictionary, easyCBM Phoneme Segmenting answers (not available to reviewers), and a language text (Moats, 2000).

Results

Although 170 words were reviewed, one word was dropped from analysis because two reviewers misread the word (i.e., “yam” was misread as “yarn”), reducing the number of kindergarten words reviewed to 169 and first grade words reviewed to 158. Only 11 words were unshared between grades, reflecting significant overlap in words used on measures across both grades.

The majority of words reviewed were one-syllable words (i.e., 78.7%). Table 3 displays the frequency distribution of one-syllable words across grade –level forms, and also shows the large item overlap across both grades. The remaining 36 words reviewed comprised two-syllable words (e.g., apron, city, flowing, open, and repeat). The number of word phonemes ranged from two to seven. Of the 169 words reviewed, 3 words contained two phonemes, 66 words contained three phonemes, 74 words contained four phonemes, 17 words contained five phonemes, 8 words contained six phonemes, and 1 word contained seven phonemes.

Alignment-specific findings by grade are presented below, with text bolding used to highlight findings and conclusions specific to each Standard expectation component under study. We also present findings related to reviewer agreement and problematic words, and conclude with a brief summary.

Alignment with Kindergarten Standard 2 Components

Standard RF.K.2D: Isolate and pronounce the initial, medial vowel, and final sounds (phonemes) in three-phoneme (consonant-vowel-consonant, or CVC) words.¹ (This does not include CVCs ending with /l/, /r/, or /x/).

Of the 169 kindergarten words reviewed, 3 words contained two phonemes (2.2%), **65 words contained three phonemes (48.5%)**, and 66 words contained four or five phonemes

Phoneme Segmenting Alignment

(49.3%). **Only seven of the three-phoneme words were identified as CVC (i.e., cup, fit, hid, lag, mom, tap, win), and one word (box) was identified as a three-phoneme word that ends with a /l/, /r/, or /x/.** The three-phoneme CVC words comprised less than 5% of the unique words reviewed. The extent to which students “isolate and pronounce” phoneme sounds cannot be directly assessed by the Phoneme Segmenting assessment; however, indirectly, the ability to isolate the initial, medial vowel, or final sounds can be inferred from student errors when the test is administered (e.g., an error analysis could indicate whether a student demonstrated sensitivity for isolating beginning or final sounds). **Therefore, weak evidence of alignment with this kindergarten Standard expectation was found.** In general, the level of segmenting difficulty exceeded the expectations outlined in Standard 2 (i.e., nearly half of the kindergarten items contained more than three phonemes).

Alignment with First Grade Standard 2 Components

Standard RF.1.2.C: Isolate and pronounce initial, medial vowel, and final sounds (phonemes) in spoken single-syllable words.

Of the 158 first-grade words reviewed, 127 were single syllable words (79.9%).

However, as previously mentioned, the extent to which students demonstrate the ability to isolate only initial, medial vowel, or final sounds can only be inferred indirectly from student errors (e.g., when attempting to segment “shout” only responding with the /sh/ sound would provide informal evidence that while the student can isolate the first phoneme, s/he lacks sufficient phonemic awareness to fully segment the word). Therefore, **weak evidence of alignment with this first-grade Standard expectation was also found.**

Standard RF.1.2.D: Segment spoken single-syllable words into their complete sequence of individual sounds (phonemes).

Phoneme Segmenting Alignment

As previously mentioned, nearly 80% of the items on the first grade assessment were single syllable words and all test items required students to segment these words into their complete sequence of individual sounds. Of these words, 3 contained two phonemes (2.2%), 62 contained three phonemes (46.3%), and 69 contained four or five phonemes (51.5%). Therefore, **strong evidence of alignment with Standard 2D in first grade was found.**

Reviewer Agreement

In general, there was moderate agreement among reviewer responses. However, one reviewer committed mistakes on more than half of the words she reviewed, which weakened the overall percent of correct agreement among reviewers. Therefore, the percent of agreement found among all three reviewers, as well without this reviewer, are presented.

The number of syllables comprising each test item was correctly identified 75.6% of the time (97.0% with reviewer removed). Correct syllable decomposing occurred 68.0% of the time (94.1% with reviewer removed). The number of phonemes comprising each test item was correctly identified 75.1% of the time (86.4% with reviewer removed). Correct phoneme segmenting occurred 75.7% of the time (89.9% with reviewer removed). Table 4 displays the types of syllabication and phoneme segmenting errors committed by reviewers.

The extent to which errors were similar across reviewers varied (see Table 4). In some cases there was agreement regarding the quantity of sound parts, but how the words were composed of either syllables or phonemes indicated different reviewer misconceptions. Combined, these findings suggest that these particular test items are especially challenging to segment, and may be either too difficult for students or not relevant to beginning reading instruction intended to teach word segmenting at the syllable or phoneme level.

Problematic Words

Phoneme Segmenting Alignment

Thirty-one words (18.3%) were identified as problematic for the following reasons: a) non-representativeness of typical kindergarten or first-grade vocabularies (i.e., developmentally or instructionally inappropriate words); b) extreme segmenting difficulty as evidenced by teacher errors or the quantity of sound parts; and/or c) pronunciation concerns that could adversely impact student response accuracy. Five words were identified as potentially problematic by teachers: *bide*, *gnat*, *omen*, *snare*, and *thoughtless*. The first author identified additional words based upon reviewer accuracy and qualitative assessment of items using the previously mentioned a-c criteria: *box*, *chalk*, *city*, *flowing*, *futile*, *glitch*, *hire*, *hour*, *jobless*, *lame*, *leaping*, *lice*, *omit*, *rear*, *remote*, *rental*, *repeal*, *Roman*, *scan*, *sealer*, *slab*, *spouse*, *theft*, *trait*, *wrath*, and *wren*. In selecting these words, careful attention was paid to the appropriateness of segmenting these items and the validity of inferences made regarding how well students can segment developmentally and instructionally appropriate words. Extremely difficult words to segment that are not practiced as part of typical instruction to build phoneme awareness, or words unfamiliar to student examinees, add construct irrelevant variance to the measurement (as discussed in the introduction), and are concerns to be considered when examining the appropriateness of measure use in relation to the CCSS and instructional practices.

Conclusion and Study Limitations

The easyCBM Phoneme Segmenting assessment was developed prior to the adoption of the CCSS. Consequently, the assessment was not designed to directly align to expectations set forth by the CCSS. The results from this study suggest that the first grade Phoneme Segmenting assessment is most aligned with the Standard 2, Component D. Nearly 80% of the unique words used for the first grade assessment were identified as single-syllable words, and the test (by design) requires students to demonstrate that they can segment words into their complete

Phoneme Segmenting Alignment

sequence (consistent with the Standard 2D expectations). However, alignment with the other components was either weak or absent. In contrast, only weak or absent evidence of alignment was found for the kindergarten Phoneme Segmenting assessment.

A number of study limitations must be considered in conjunction with reported conclusions. First, the number of item reviewers per word was three, which limits the generalizability of these findings to the larger population of kindergarten, first-grade, and special education teachers. Therefore, we consider results related to reviewer agreement and problematic items preliminary. In addition, although we recruited participants nationally, the final sample for this study over-represented the state of Oregon. Teacher drop-out and our inability to recruit replacements with the same teaching background from other states in a timely fashion weakened the alignment review design.

Phoneme Segmenting Alignment

Table 1. *K/1 Phoneme Segmenting Test Items by Measure Reviewed*

M1	M2	M3	M4	M5	M6	M7
able	cows	globe	letter	owner	shade	sneaky
apron	crew	glows	lice	pack	shed	tail
bake	crowd	glum	lime	paid	shiny	tap
bend	crumb	gnat	listen	pounce	shirt	theft
bent	cup	graph	loaf	race	shout	theme
bide	desk	green	lobe	rack	silent	then
black	dimmer	hid	lump	raid	skin	these
blood	dive	hire	main	ramp	slab	tint
blur	down	home	male	rank	sled	trait
boast	draw	hound	mass	rant	slowly	trap
bold	drip	hour	mean	read (<i>ee</i>)	smile	treated
bone	dunk	huddle	mess	rear	snag	wear
bow	fair	include	metal	regrow	snail	win
box	fit	inspire	mine	release	snake	wind
brace	float	jobless	mint	remote	snare	word
brand	flowing	jokes	moat	rental	sneak	wraps
bunk	fold	jump	mom	repeal	snout	wrath
cane	foul	kettle	must	repeat	soak	wren
chalk	found	knives	neater	Roman	span	wrist
chap	fray	lag	nine	rule	spoken	yam
chef	free	lamb	nurse	scan	spouse	
city	futile	lame	omen	scoop	stack	
clearest	gift	leaping	omit	seal	strap	
clink	glass	left	open	sealer	street	
clown	glitch	lend	ouch	send	thoughtless	

Phoneme Segmenting Alignment

Table 2. *Teacher Reviews by Measure*

M1	M2	M3	M4	M5	M6	M7
A-1st	B-1st	A-1st	B-1st	D-1st	E-K	D-1st
C-K	C-K	E-K	F-K	F-K	G-1st	G-1st
H-SPED	I-1st	J-SPED	H-SPED	I-1st	J-SPED	K-K

Table 3. *Distribution of One Syllable Words Comprising the Kindergarten and First Grade Assessments*

Frequency of Presentation Within Grade-level Forms	Kindergarten	First Grade
1 Form	Bake Bend Black Blur Clown Cows Crumb Down Dunk Float Fold Found Gift Glass Graph Green Hound Hour Jokes Jump Knives Lag Lend Lice Loaf Lobe Lump Nine Rank Rant Rear Rule Scan Send	Bend Black Blur Chalk Chef Clown Cows Crumb Down Float Fold Found Free Gift Glass Graph Hound Hour Jokes Jump Lag Lend Lice Loaf Lobe Lump Nine Race Rank Rant Rear Scan Send

Phoneme Segmenting Alignment

	Skin Sled Snag Snake Snare Snout Span Street Theft Then These Tint Trait Trap Wear Win Word Wraps Wren Yam		Skin Sled Snag Snake Snare Snout Span Street Theft Then These Tint Trait Trap Wear Win Word Wraps Wren Yam	
2 Forms	Blood Boast Bold Bone Brace Brand Bunk Chalk Chap Chef Clink Crowd Desk Dive Drip Foul Fray Free Globe Glum Hire Lame Left Main Mass Mess	<i>N</i> = 41	Blood Boast Bold Bone Brace Brand Bunk Chap Clink Crowd Desk Dive Drip Fray Globe Hire Lame Left Main Mass	<i>N</i> = 34

	Mine Moat Race Ramp Read Seal Shade Slab Sneak Spouse Stack Strap Tail Theme Wrath	Mine Mint Moat Ramp Read Seal Shed Sneak Spouse Stack Strap Tail Theme Wrath
3 Forms	Bent Box Cane Draw Fair Glitch <i>N = 21</i> Gnat Hid Home Lamb Lice Mint Mom Nurse Rack Scoop Shed Shout Snail Tap Wind	Bent Box Cane Cup Draw Fair Foul Glitch <i>N = 24</i> Gnat Hid Home Lamb Lime Mess Mom Must Rack Scoop Shade Shout Slab Snail Tap Wind
4 Forms	Cup Glows	Fit

Phoneme Segmenting Alignment

	Male Must <i>N</i> = 7 Ouch Paid Smile	Male <i>N</i> = 7 Nurse Ouch Paid Raid Smile
5 or More Forms	Bide Bow Crew Fit Mean Pack <i>N</i> = 10 Pounce Raid Shirt Soak	Bide Bow Crew Glows Mean <i>N</i> = 9 Pack Pounce Shirt Soak
Total Single Syllable Words	133	127

Phoneme Segmenting Alignment

Table 4. *Reviewer Errors by Syllable and Phoneme Word Part*

Word Part	Correct Decomposing/ Segmenting Response	Reviewer 1 errors	Reviewer 2 errors	Reviewer 3 errors
Syllable				
bake	1- bake		3-b/a/ke/	2-b/ake/
hour	1-hour	2-hou/r/	2-ho/ur/	
male	1-male	2-ma/le/		2-ma/le/
Phoneme				
box	4-b/o/k/s/	3-b/o/x/	2-b/o/x/	2-b/ox/
chalk	3-ch/al/k/	3-ch/a/lk/	4-ch/a/l/k/	
crowd	4-c/r/ow/d/		3-c/row/d/	3-cr/ow/d/
snare	4-s/n/a/re/	3-s/n/are/		3-s/n/are/

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