

Hands-On Decoding: Guidelines for Using Manipulative Letters

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Manipulative objects have long been an essential tool in the development of mathematics knowledge and skills. A growing body of evidence suggests using manipulative letters for decoding practice is also an effective method for teaching reading, particularly in improving the phonological and decoding skills of students at risk for reading failure. The manipulation of the letters serves as a way to make the abstract concepts of blending and segmentation of sounds more concrete. Additionally, paraprofessionals and parent volunteers could readily implement this method with minimal training. In short, teacher-directed decoding practice using manipulative letters offers a promising practice for teaching decoding skills. We provide a brief overview of the research and the specifics on how to implement reading practice using manipulative letters.

Keywords: *response-to-intervention, RTI, learning disabilities*

Abundant evidence demonstrates the role of phonological awareness and decoding skills in the development of proficient reading. Students who acquire efficient decoding skills generally develop reading fluency, whereas children with weak decoding skills are unlikely to become fluent readers (Hudson, Lane, Arriaza-Allen, Isakson, & Richman, 2011; Hudson, Pullen, Lane, & Torgesen, 2009). Furthermore, the ability to decode in first grade predicts later comprehension skills (Kendeou, van den Broek, White, & Lynch, 2009; Torgesen, 2004), and the inability to decode unknown words in print is a primary cause of reading failure (Torgesen, Wagner, & Rashotte, 1997). Although the ultimate goal of reading is to gain meaning from print, the foundational skill of decoding is critical to the development of a skilled reader, who can then access and understand the meaning of the print.

Research syntheses are clear as to the importance of implementing interventions that promote the development of phonological awareness and an understanding of the alphabetic principle. The NRP's report on beginning reading summarizes the pertinent research and provides research generalizations that should guide our implementation of best practices in the primary grades. For example, interventions that promote phonemic awareness combined with letters are superior to interventions that

promote either phonemic awareness or letter knowledge alone (e.g., Fielding-Barnsley, 1997; NRP, 2000; Uhry & Shepherd, 1997; Weiser & Mathes, 2011). Likewise, explicit and systematic instruction should include common letter patterns (Bear, Invernizzi, Templeton, & Johnston, 2012) and build automaticity with these sound symbol relationships (Hudson, Pullen, Lane, & Torgesen, 2009).

Although few would argue with the notion that children need to learn decoding skills and develop automaticity in translating the written word to its spoken representation, the methods for teaching may be debated. The terms explicit and systematic are now used to the point of almost being clichés (Pullen & Hallahan, 2015); however, research substantiates that decoding instruction is more efficient when it is taught in a very transparent way and in a sequence that is justifiable. Explicit instruction does not mean, however, that instruction should focus on teaching phonics rules; instead, explicit instruction focused on letter patterns in words is more effective than teaching phonics rules (Bear et al., 2012). Furthermore, teaching these skills in a meaningful reading context is essential (Adams, 1990), and providing opportunities to apply the skills in meaningful context promotes the generalization of newly acquired skills (Carreker, 1999; Stokes & Baer, 1977).

Evidence for Using Manipulative Letters

Despite the plethora of reading research on decoding instruction, teachers may find it challenging to select engaging, evidence-based strategies to supplement core reading instruction for children with learning disabilities (Lopéz, Thompson, & Walker-Dalhouse, 2011). For many years, researchers and practitioners have recommended using manipulative materials in various aspects of reading instruction, particularly phonemic awareness and decoding (Clay, 1993; Juel & Minden-Cupp, 2000; Montessori, 1912; Orton, 1937; Pinnell & Fountas, 1998). In fact, several successful, evidence-based reading interventions have included the use of manipulative materials (e.g., Bradley & Bryant, 1983; Fielding-Barnsley, 1997; Haskell, Foorman, & Swank, 1992; Kamps et al., 2008; Lane, Pullen, Hudson, & Konold, 2009). However, until recently, the use of manipulative materials in reading instruction has not been examined as an isolated variable.

To address this gap in the research literature, we examined the effectiveness of using manipulative letters to

teach decoding skills in a series of studies (Pullen, Lane, Lloyd, Nowak, & Ryals, 2005; Lane, Pullen, Hudson & Konold, 2009; Pullen & Lane, 2014). The interventions we examined include explicit and systematic instruction in the alphabetic principle, applied in a meaningful context. In particular, we investigated whether the use of manipulative letters to teach decoding skills would be a valuable addition to reading practice and improve phonemic awareness and decoding skills. Across all three studies, the use of manipulative letter instruction improved students' phonemic awareness and decoding skills. The focus of word work with manipulative letters in the interventions we studied was to make the abstract concepts of phoneme blending and segmentation more concrete for struggling readers. Table 1 describes the results of these studies.

In sum, the findings of our three studies provide initial evidence that using manipulative letters is an effective method for improving the phonemic awareness and decoding skills of beginning readers, including those who are struggling readers. Our presumption is that,

Table 1

Research Evidence Supporting the Use of Manipulative Letters in Teaching Decoding Skills

Study	Independent Variables	Dependent Variables	General Finding
Blachman et al., 2004	Letter-sound correspondence practice; blending words with letter tiles and letter cards, fluency; writing sounds	Full battery of reading measures including the Woodcock Reading Mastery Test	Participants in the treatment group performed better on measures of reading than children in the control group.
Bradley & Bryant, 1983	Sound categorization with and without connection to the alphabet.	Reading and Spelling	Children who received instruction in sound categorization combined with letters of the alphabet performed better than comparison groups on reading and spelling skills.
Fielding-Barnsley, 1997	Explicit instruction in encoding and decoding	Pseudoword and real Word decoding and encoding	Students who received explicit instruction in decoding and encoding performed significantly better than those who received whole word instruction
Kamps et al, 2008	Tiered instruction with 3 levels of programming; the tertiary level included the use of plastic letters in a multi-sensory direct instruction program	Nonword Fluency, Oral Reading Fluency, Woodcock Reading Mastery Test	Students struggling to acquire reading skills benefited from direct and intensive programs; the students in the tertiary group made substantial gains after intervention with multi-sensory, direct instruction approach that included plastic letters
Lane et al., 2009*	Tutoring model that included word work with manipulative letters.	Phonemic Awareness, Decoding	In a component analysis, when word work with manipulative letters was removed from the tutoring model, the students performed no better than controls on phonemic awareness and decoding.
Pullen, Lane, Lloyd, Nowak & Ryals, 2005*	Word work with manipulative letters	Decoding real and nonsense words, reading high frequency sight words	Students who participated in using manipulative letters increased their rate and accuracy of decoding.
Pullen and Lane, 2014*	Word work with manipulative letters	Decoding real and nonsense words, reading high frequency sight words	Students who participated in using manipulative letters increased their rate and accuracy of decoding.
Tucci & Easterbrooks, 2015*	Phonics activities for children who are deaf or hard of hearing (DHH) using manipulatives.	Syllable segmentation, letter-sound identification, initial sound identification	In a multiple baseline design, students who are DHH learned syllable segmentation, letter-sound correspondences, and initial sounds.

*Isolated word work with manipulative letters as a distinct variable.

by manipulating the magnetic letters or letter tiles, the student is able to experience a more concrete application of blending and segmenting of sounds with letters. In all three studies, a minimal amount of time manipulating letters, in combination with reading connected text, resulted in improved decoding skills. In a more recent study, Tucci and Easterbrooks (2015) found similar results using manipulative letters to teach decoding skills to children with hearing impairments.

In this paper, we share what we have learned over more than a decade of research and practice about how to implement effective word work with manipulative letters. A method that may appear simple can be made much more powerful if the teacher uses a systematic and playful approach. The teacher guidelines below are made explicit so that paraprofessionals and parent volunteers can readily implement this strategy.

Teaching Phonemic Awareness and Decoding Using Manipulative Letters

We define word work as practice in applying letter-sound relationships through a variety of activities. Although word work activities may employ tools such as white boards with word boxes, we have found that manipulating plastic letters or letter tiles is a particularly powerful tool for helping struggling students develop an understanding of the alphabetic principle. Just as teachers use manipulative objects in mathematics instruction to make abstract concepts more concrete (Carbonneau, Marley, & Selig, 2013), manipulative letters can make abstract concepts, such as sound segmentation and blending, more concrete. Using magnetic letters or letter tiles, the teacher first models how the letters in a word come together to form the word.

Once students learn a new word, their familiarity with the word can serve as a starting point for learning new words and for reinforcing letter-sound knowledge. Using magnetic letters (or other manipulative letters) to demonstrate how the letters come together to form the word and then to show the similarities and differences between the familiar word and other words may help students consolidate the patterns in memory. The following 15 guidelines provide suggestions for the most effective use of manipulative letter instruction to improve decoding.

Use lowercase letters. We recommend using lowercase manipulative letters. Although uppercase magnetic letters may be appropriate for young children to use as they learn to identify letters of the alphabet, lowercase letters are more appropriate for word work. Generally, more than 90% of the letters readers encounter in connected text are lowercase. For example, we calculated the percentage of

lowercase letters in several books at various levels: 90.3% of the letters in *I See Colors*, a simple, predictable leveled book are lowercase. Similarly, 92.3% of the letters in *Green Eggs and Ham*, 90.3% in *Blueberries for Sal*, 96.5% in *Where the Wild Things Are*, 96.6% in *Charlotte's Web*, 96.6% in *Tom Sawyer*, and 97.5% in *Pride and Prejudice* are lowercase. It makes sense for children to practice reading words in a form similar to what they will encounter in text.

Use letters of just one color. We recommend using sets of letters in which all the letters are the same color. Most sets of magnetic letters, foam letters, letter blocks, or letter tiles are compiled of letters of multiple colors. Some sets include many colors, while others have consonants in one color and vowels in another. We recommend sets of just one color because children in the early phases of word reading development are likely to attend to irrelevant visual cues (Ehri, 2005; See Table 2 for a brief description of Ehri's phases of word recognition ability). Furthermore, early research on selective attention demonstrates that children with learning disabilities are often distracted by irrelevant stimuli (Hallahan, Kauffman, & Ball, 1974); and as early as 1961, Cruickshank et al. emphasized using materials that eliminate distracting content. The critical factor in the identification of a letter is that letter's shape (Cruickshank, Bentzen, Ratzeburg, & Tannhauser, 1961). However, young children tend to learn colors and patterns before they learn to identify letters. So, when using multi-colored manipulative letters to read or spell words, children who are not yet firm in their knowledge of all the letters may rely on the letter's color. Using a single color forces the child to rely on the most relevant visual cue: the letter's shape.

Model blendable sounds. It is important to pronounce individual phonemes in a manner that will make them "blendable." In an effort to make short or "stop" consonant sounds more audible, many teachers add a vowel sound to the consonant. This added sound, usually a schwa or *uh* sound, distorts the consonant sound and makes it difficult to blend with other phonemes. For instance, a teacher may incorrectly pronounce *c* as "kuh," and *t* as "tuh." Blending the letters *c*, *a*, and *t* would then result in "kuh-a-tuh," and most children would have significant difficulty identifying the word. It is important to pronounce these stop consonants as quickly as possible, without the confusing "uh." A video demonstration of how to pronounce blendable sounds is available at (insert website url; Author).

Select target words from text. We recommend that word work with manipulative letters begin with familiar words from connected text. The student can find a known word in text and build new words that share characteristics with the known word. The connection with text makes the purpose of the activity clear, and the connecting the new

Table 2
 Brief Summary of Ehri's Phases of Word Recognition Ability

Phase	Characteristics
Pre-Alphabetic Phase	Students' connections to words are linked to visual cues. Students do not make grapheme-phoneme connections. The relationships are semantic rather than grapho-phonemic.
Partial Alphabetic Phase	Students begin to make some grapheme-phoneme connections. Grapheme-phoneme connections are not complete. Students are unable to read new words in print or decode nonsense words.
Full Alphabetic Phase	Students' connect graphemes and phonemes systematically. Students can decode words, particularly single syllable words.
Consolidated Alphabetic Phase	Student consolidates letter patterns (i.e., phonograms) as chunks in memory More reliable decoding skills than the previous phases, including the full alphabetic phase

with the known facilitates learning. For example, a student may begin with the word *cat* from a book, spell that word with magnetic letters, and then change one letter at a time to form new words (e.g., from *cat* to *sat*, *sat* to *sap*, *sap* to *sip*, *sip* to *lip*).

Guide students in moving the letters to represent blending and segmenting sounds in words. One of the advantages of word work with manipulative letters is that moving the letters together or apart can make the abstract concepts of phonemic blending and segmentation more concrete. For example, for a student who is having difficulty understanding how sounds can be segmented in words, it may help to see a word being broken apart and to connect the separation of the letters with the segmentation of the sounds. Similarly, pushing letters together can help reinforce the concept of blending.

Conduct word work with intrasyllabic units. A simple way to begin word work with manipulative letters is to focus on word families. Word families are usually characterized by separation of the onset (i.e., any consonants before the vowel) from the rime (i.e., the vowel along with any consonants that follow it) and changing the onset. So, for example, a student may begin by spelling the word *pet*, then pulling apart the *p* from the *et*, and finally replacing the *p* with other consonants to make new words in the same family (e.g., *bet*, *get*, *jet*, *let*, *met*, *net*, *set*, *vet*, *wet*). Keeping the rime intact makes the new words easier to learn. In addition to onset-rime adjustments, changes

can be made by separating the syllable into its body and coda. The body of a syllable includes the initial consonant(s) and the vowel, and the coda includes the consonant(s) that follow the vowel. Many children find blending a body and coda easier than blending an onset and rime, so it can be a good place to begin manipulative letter work. To make body-coda changes, the student would keep the body intact and change the coda. For example, *bed* could be changed to *beg* and then *bet*.

Conduct word work at the phoneme level. Phoneme-level word work involves changes in different places in the word, rather than keeping one portion of the word intact throughout a series of words. The previous example of changing *cat* to *sat*, *sat* to *sap*, *sap* to *sip*, and then *sip* to *lip* would be considered phoneme-level changes because the initial, medial, and final sounds are all changed. This kind of word work is more challenging and is best implemented only after students have had experience with the manipulation of intrasyllabic units.

Help students encode new words. Research suggests that encoding instruction embedded in reading practice results in greater decoding gains for students (Weiser, 2013; Weiser & Mathes, 2011). Encoding (i.e., spelling) during word work occurs when the teacher asks students to figure out how to change a word to another word. For example, "What would I need to do to change *red* to *bed*?" Students are told the target word, and they are expected to figure out how to change the spelling to form a new word. Although

spelling words is generally considered to be more difficult than reading words, this kind of encoding practice is actually easier because the student only needs to identify one letter that needs to be changed. Encoding requires phonemic segmentation skill and letter-sound knowledge.

Help students decode new words. Decoding (i.e., reading) words occurs when the teacher asks students to figure out the new word formed by changing a letter. For example, “If I change the *o* in *hop* to an *i*, what word do we get?” Students are told the spelling change to make, and they are expected to identify the word by decoding. Decoding requires phonemic blending skill and letter-sound knowledge.

Use both real words and nonsense words. For some children, development of encoding and decoding skill requires extensive practice. Although the goal is always to have students be able to read real words they encounter in connected text, using both real words and nonsense words extends students’ practice opportunities by providing additional occurrences of letter patterns (Cardenas, 2009). Using nonsense words also presents some novelty to keep students motivated and interested. For example, if students are learning the *eg* word family, there are only a few real words to use for practice (e.g., *beg*, *keg*, *leg*, *peg*), so adding *deg*, *heg*, *jeg*, and *zeg* can extend practice considerably. This additional practice makes students

more likely to master that phonogram and more confident in their decoding skills. It also reduces over-reliance on memorization.

Introduce word work using continuous sounds, especially at the beginning of words, and move to stop sounds systematically. Not all sounds are created equal, some are far easier to blend than others. A systematic way to approach word work with manipulative letters is to begin with easier sounds and move to more challenging sounds later. Continuous sounds, or those sounds that can be held out or elongated without distortion, are the easiest sounds to blend, so we recommend beginning with these sounds. Stop sounds, or those sounds that are pronounced quickly and cannot be elongated without distortion, are far more challenging to blend. Unvoiced stop sounds are somewhat easier to blend than voiced stop sounds, and all stop sounds are easier to blend when they appear at the end of a word. So, we recommend introducing stop sounds at the end of words, and when teaching how to blend stop sounds at the beginning of words, begin with unvoiced stop sounds. (See Figure 1).

Focus on both accuracy and automaticity. Although the primary goal of decoding instruction is to develop students’ accuracy in word identification, accuracy is not enough. To become fluent, readers must be able to decode words accurately and automatically. Automaticity

	Continuous	Stop
Voiced	a e i o u l m n r v w y z	b d g j
Unvoiced	f h s	c k p t

Note: The sounds for *q* and *x* are made by combining two sounds, so they don't fit in these categories.

Figure 1. Categories of letter sounds.

in decoding is reached when the reader processes the word almost instantaneously, without conscious attention to individual letters or phonograms. As a student demonstrates the capacity to consistently decode a word accurately, begin encouraging her to decode it more quickly. Change one of the letters in a word and see how quickly the student can read it. In a group, students can challenge one another with single-letter changes.

Expand children's knowledge by helping them form "challenge" words. Word work with manipulative letters need not be limited to simple CVC combinations. In fact, in addition being helpful for practicing various common letter patterns, manipulative letters can be an effective method for introducing multisyllabic words, syllable types, and common affixes.

Plan manipulative letter work carefully. When planning for manipulative letter lessons, consider which letter patterns students know and which patterns they still need to learn. Make your word work systematic by sequencing your instruction logically, from easier to more difficult: (a) begin with sounds that are easier to blend, and move to more challenging sounds; (b) begin with mostly onset-rime level practice, and move to more practice with phonemes; and (c) begin with more encoding practice, and

move to more practice with decoding. To make the most of your instructional time, select the words you'll use and organize your letters in advance. For small-group work, organizing letters on magnetic boards makes them easy to distribute to individual children. Cookie sheets and burner covers make excellent, inexpensive magnetic boards.

Use other types of manipulative letters. Magnetic letters may be the most common form of manipulative letters, but there are many others. Using a variety will keep the activity fresh and serve a range of instructional purposes. Using foam letter boards with foam letters that have velcro backing allows for large-group, small-group, or individual word practice at literacy centers. Letter tiles, cubes, and stamps (See Figure 2) may be appropriate for older students and provide another mode for practice. Blending wheels, in which students move a wheel to change one sound at a time (initial, medial, or final), are used primarily for CVC word building, but can include longer words (See Figure 3; see also Lane & Pullen, 2014). Sound flips, an alternative to blending wheels, are made by attaching letters together like a book, and the student flips one sound at a time to form new words. Although magnetic letters provide children with the important opportunity to feel the letter shape, they can be too expensive to use

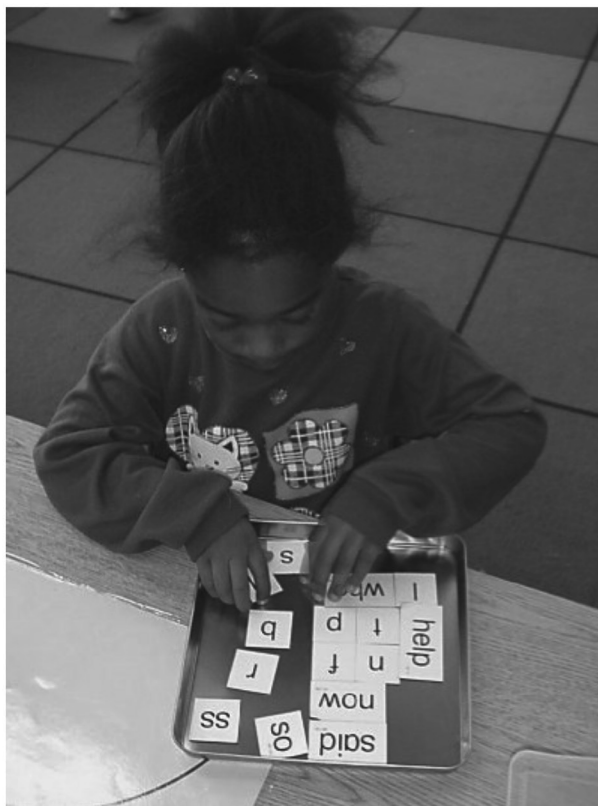


Figure 2. Letter tiles provide another way to provide practice with manipulative materials.

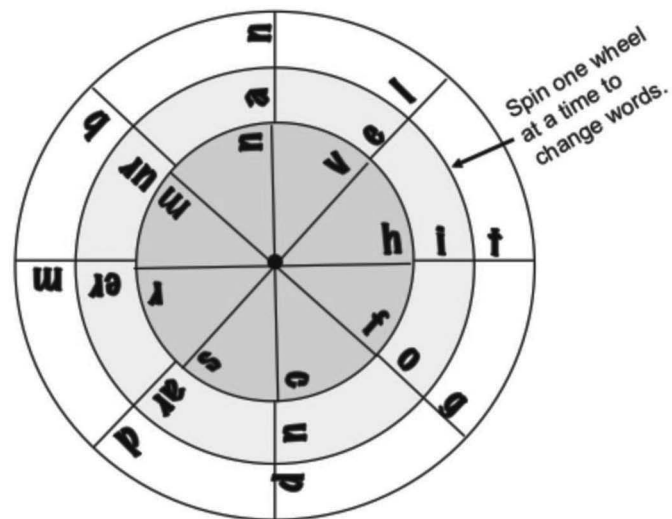


Figure 3. Blending wheels are effective for practice for older and younger students.

for whole-class instruction. Letter cards are a great way to make manipulative letter work into an affordable whole-class activity. Students can store their own letter card sets, or the teacher can store a class set. Tool boxes and tackle boxes with many small compartments work well for this purpose (see Figure 4). Once the letters are distributed, the teacher can then direct the whole class in making and breaking words.

The guidelines above provide a framework for planning hands-on decoding lessons using manipulative letters. To

maximize efficiency and effectiveness, lessons should be planned in advance with specific letters and words already identified. It is difficult for even the most skilled teachers to think of enough words “on the fly.” By planning in advance and using these guidelines, teachers and students can engage in successful word work using manipulative letters in one-on-one, small group, or large group settings. In Figure 5, we provide an example of a brief word work lesson that follows the guidelines outlined above.



Figure 4. Magnetic letters and a craft or tackle box for organizing materials.







<p>Start with a Target word (e.g., man)</p> <p>Find the word man on this page. Let's build the word <i>man</i> with the letters. Now, say the word, sound-by-sound, /m/ /a/ /n/. What's the word? Yes, man.</p>	
<p>Decoding at the Onset-Rime Level</p> <p>If we change the "m" to an "f" at the beginning of that word, what word would we have? (<i>fan</i>)</p>	
<p>Encoding at the Onset-Rime Level</p> <p>Show me how to change can to ran . . . Yes, the 'r' makes it say ran. Say it sound-by-sound.</p>	
<p>Encoding at the Phoneme Level with real words</p> <p>Now, change ran back to fan. This one will be a little harder, so listen carefully. Change fan to fat.</p>	
<p>Decoding at the Phoneme Level</p> <p>Now if I change the 'a' in fat to an 'i'. What word do I have now?</p>	
<p>Challenge Word</p> <p>Now for your challenge of the day. Who can change the word "fit" to "fist"?</p>	

Figure 5. Example of a brief word work lesson.

Final Thoughts

Studies of beginning reading instruction and intervention using manipulative letters indicate that this approach holds promise for promoting the development of phonemic awareness and decoding skills. Multiple studies that include the use of manipulative letters demonstrate improved beginning reading skills, though the researchers were not examining the use of the letters as a specific variable. In more recent studies, the use of moveable letters has been isolated as a separate variable with positive outcomes in phonemic awareness and decoding. These findings support the notion that making the abstract concept of blending and segmenting more concrete by using manipulative instruction is beneficial, similar to that of using manipulative materials in mathematics. Furthermore, the use of manipulative letters supports the

findings of the National Reading Panel's recommendation to include letters with phonemic awareness instruction (NRP, 2000).

Given the promise of this intervention for beginning readers, especially those who are struggling to acquire adequate phonemic awareness and decoding skills, teachers in the primary grades should consider using manipulative letters as a part of their comprehensive reading program. In this paper, we provide a framework for using manipulative letters that is explicit and systematic. The guidelines we suggest have been applied in a series of studies that improved student's phonemic awareness and decoding skills. This hands-on method is not only effective in improving critical early reading skills, but it is engaging and fun for both teachers and students. (See Figure 6.)



Figure 6. Word work with manipulative letters is both rewarding and effective.

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