Getting the Bugs out with PESTS: A Mnemonic Approach to Spelling Sight Words for Students with Learning Disabilities

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Abstract

Difficulties with spelling can impact students' reading acquisition and writing, having a critical impact on overall literacy development. Students with learning disabilities (LD) often struggle with spelling. We describe a case study with three elementary-aged students with LD using a mnemonic approach to spelling sight words. Our approach, called PESTS, included acrostics, pictorial representation, and stories. The instruction was applied to key words in daily instruction and compared to a traditional approach to spelling sight words. Each of the students improved his or her spelling, as measured by a standardized spelling test, a developmental spelling test, and a researcher-developed instrument.

Keywords

learning disabilities, spelling instruction, mnemonic instruction

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The relative importance of spelling is difficult to measure, yet its effects extend to other aspects of literacy including reading acquisition (Adams, 1990) and writing (Berninger et al., 1998). Spelling errors and other factors related to transcription may also influence a reader's perception of the overall quality of a composition. For example, a study by Marshall and Powers (1969) indicated that teachers rated essays without errors in spelling or grammar as higher in quality than those containing transcription errors, when the essays differed only in the number of words misspelled or in the number of grammatical errors. A more recent study by Boynton, Hauerwas and Walker (2003) indicates a link between spelling and grammar as spelling deficits impacted children's ability to spell verbs both in their basic form (e.g., "smile") as well as in their inflected form (e.g., when applying a rule to double a consonant as in the past tense of "slip"). Further, an intervention by Graham, Harris, and Chorzempa (2002) demonstrated that instruction in spelling had a positive impact on children's ability to write sentences.

> **Students with LD do not learn to spell as well as students without learning problems either with or without instruction.**

Students with learning disabilities (LD) in particular, do not acquire the ability to spell words as well as students without learning problems either with instruction (Dreyer, Luke, & Melican, 1995) or without instruction (Graham, 2000). Moreover, they use inefficient procedures to recall the spelling of unknown words (Darch, Kim, Johnson, & James, 2000). Further, their spelling errors, while not qualitatively different than those of normally developing children at the same developmental level, are less mature (Schlagal, 2001). Finally, traditional aids such as the use of spelling checkers and spell check features of word processors often do not work as intended because children with deficits in this domain often are unable to recognize a correctly spelled word from a list of word options (MacArthur, Graham, Haynes, & De La Paz, 1996).

Fortunately, at this time there appear to be many validated approaches to spelling instruction (see Wanzek, Vaughn, Wexler, Swanson, Edmonds, & Kim, 2006). These approaches often include explicit instruction, multiple practice opportunities, and immediate feedback regarding the accuracy of students' spelling attempts. In general, instruction in reading is combined with spelling intervention to provide a strong focus on phonemic awareness and phonological processing. These results indicate clear benefits for teaching children with and without LD common spelling patterns and generalizations. Other spelling interventions that have been well described in the literature include synthetic and analytic phonics approaches (c.f. Adams, 1990), as well as developmental (word study) approaches, in which teachers examine children's invented spellings to determine both the child's stage of development as well as goals for instruction (Bear, Ivernizzi, Templeton, & Johnston, 2004).

However, for at least some children with LD, learning to spell irregular words may require specific study methods that are more intense than those mentioned thus far, due to difficulties that these children have in working memory (Masoura, 2006). If students with disabilities face difficulties in acquiring and remembering information, one remedy in the area of writing may be to combine mnemonics with spelling instruction.

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Mnemonic Approach

Mnemonic instruction has benefited students in general and special education classrooms, ranging from the elementary grades (Uberti, Scruggs, & Mastropieri, 2003) to college students (Rummel, Levin, & Woodward, 2003) when students are required to learn content for academic tasks. Acrostics, a particular form of mnemonic that may be most familiar for their frequent use in stimulating children's interest in poetry (Hopkins, 2004) have also been suggested for helping high school chemistry students memorize factual material (Swain, 2006). With respect to the needs of students with learning difficulties, Margo Mastropieri, Tom Scruggs, and their colleagues have provided extensive research on the use of mnemonics with students with LD for vocabulary instruction (Terill, Scruggs, & Mastropieri, 2004) and factual information required in social studies (Scruggs & Mastropieri, 2001). Others have applied the use of mnemonics to help students with LD learn mathematics facts (Irish, 2002).

In this article we share the first author's method for teaching students with LD to spell sight words using three mnemonic strategies (acrostics, pictorial representation, and a story to link them). The intervention is for sight words only, and is to be used in combination with other spelling approaches that emphasize phonological awareness and recognition of common spelling patterns. For the purpose of this article we also compared the use of the mnemonic approach to a more traditional form of spelling instruction.

PESTS

The PESTS method can be used for any word from across the curriculum, or for any word an individual finds confusing, such as a student's last name; however, it is most applicable for basic sight words. The first author chose the name "PESTS" because it refers to 'words that bug you' (i.e., difficult words to spell). She developed the strategy when working with students with severe dyslexia in primary schools around the south of England. Teachers liked the flexibility of being able to choose which words to focus on as well as its inexpensive format. It was quick to teach and could be adapted to suit any word the student was finding troublesome. Moreover, her homespun pictures were engaging for students. Typically in her teaching, the first author used the PESTS approach with students whenever the need arose; for example, by adding one or two words to a given spelling list from a commercial basal series, or a particular teacher's spelling program. However, in order to compare the PESTS approach against a more standard method of teaching spelling, the first author applied PESTS to targeted spelling words in daily instruction.

Instruction

Although the first author has been using the PESTS approach for teaching spelling for twenty years with success before coming to California, she decided to compare this approach to a more traditional approach with three elementary students (Brandon, a third grader, Alicia, a fourth grader, and Robert, a fifth grader) who were each receiving "pull out" special education services for learning disabilities in a suburban school district serving students primarily from low- to middle socioeconomic backgrounds. For the purpose of the project, each student received individual spelling instruction; however, the intervention has also been used with small groups. The only modification was that when there were several words being studied within a group, each student would work at his or her

own pace and then present their word to the others.

Also for the purpose of this project we developed fifteen lists (five sight words each) of comparable difficulty by consulting a list that had been prepared by Graham, Loynachan, and Harris (1993) to identify potential target words at multiple grade levels. Sight words that were considered to be "words children have difficulty spelling" were selected and distributed evenly into groups of five, with one word each from the second, third, fourth, and fifth grade level (the final word came from an unspecified grade; see Figure 1). Second, each classroom teacher gave additional sight words that would be relevant for our use. The children were tested on the sight word lists, and we discarded any words that they knew before beginning instruction.

During the comparison (i.e., traditional) form of instruction, students practiced spelling the target sight words using a method referred to as "look, cover, write, check" (Nies & Belfiore, 2006). In this condition, students examined each word, one at a time, covered it with a sheet of white cardstock, attempted to write it correctly from memory, and then checked whether the word was spelled correctly or incorrectly. Mistakes were compared with the target and discussed. If an error was made, the student attempted the procedure again. This process typically took 10 minutes, and was repeated once more on a different day before the student took the posttest. The comparison form of instruction was conducted during baseline, in a multiple-probe across subjects design for Alicia (Horner & Baer, 1978) and ABAB design for Brandon and Robert (Richards, Taylor, Ra-

> **Teachers liked the flexibility of being able to choose which words to focus on and its inexpensive format.**

masamy, & Richards, 1999).

We implemented the PESTS procedure (see Figure 2) as a comparison to the more traditional form of spelling instruction. We presented students with mnemonics to facilitate their learning of the words. These mnemonics (acrostic, picture, and story) were presented on a series of worksheets with one worksheet for each target sight word on the first day of instruction (see Figure 3). The PEST worksheet presented the sight word with an acrostic (e.g., "trouble" = "turn right off uncle Ben's exit") and an accompanying picture (a car heading for a sign labeled "last exit"). The acrostic was identified as a story to the children, and together the teacher and child talked about it as the child colored the picture. "Do you have an uncle?" said Alicia; "What direction is he turning?" said Brandon; "Why do you think the uncle is going to exit there?" said Robert, and so on. The children often collaborated in generating questions as they discussed the story. The first author found that the more the children looked at the pictures before tackling the rest of the page, the more they focused on features relevant to the spelling of the word.

The children then were asked to identify the target spelling word, given one choice (e.g., "trubble" vs. "trouble"). The third task was to write the word in capital letters, saying the story, which was followed by tracing it using cursive writing (designated as "write over" on the worksheet), while simultaneously saying the story a second time. Writing in both capital and cursive form gave additional spelling and handwriting practice. The child then wrote it a third time with his or her eyes shut, while saying the story. Finally, the

child generated a novel sentence with the target word in it, and said the story as each letter of the word was written.

This process typically took the entire class period (30-45 minutes), as the child worked on five words (with five worksheets).

On the second day of instruction, the child completed a word search with the five target words that the first author generated using www.WorksheetFactory.com, and the child spent approximately 10 minutes completing the search.

Figure 1: Sight Word Lists.

1	2	3	4	5	6	7	8	9
want	many	use	while	too	first	could	buy	little
sugar	where	thought	balloon	aunt	high	heard	brought	noise
laugh	eighth	build	ninth	clothes	pretty	whose	whole	women
through	decide	usually	among	beautiful	special	surely	attention	piece
practice	circuit	sincerely	nuclear	design	either	fruit	dread	success

10	11	12	13	14	15 (6-weeks later)
brother	some	here	folk	genre	cousin
write	might	world	mirror	issue	guest
trouble	Saturday	caught	pause	health	ancient
future	cousin	receive	answer	guard	bicycle
separate	oxygen	February	prove	pour	suppose

Outcomes

PESTS was developed as an alternative to more traditional spelling interventions because the experience of the first author was that traditional methods did not work for students who had difficulty with spelling. When our evaluation of the intervention began, the students found five words to learn during each session a lot to manage. However, as the routine became established, they would launch into each new word with interest and begin to explain what they saw rather than wait for their teacher to start instruction. When the project was over they wondered why and asked whether they could "bring in words from class" that they had to learn.

In our comparison of the spelling approaches we found that, on average, students did not learn any sight words beyond what they initially knew on the weekly pretest when they were taught using the traditional "look, cover, write, check" method. However, when using PESTS, all of the children improved their spelling. The average gain scores were 1.5 to 2.5 words spelled correctly from the list of five target words. Each child demonstrated a maximum gain in words spelled correctly of at least three words, which may reflect a ceiling effect as they knew 1-2 words on the weekly pretest just over 75% of the time (despite spelling the word incorrectly before the study began). Further, two months

after instruction ended we tested the children on 12 of the words they had learned with the PESTS approach. The students spelled 8, 9, and 10 words correctly.

We also administered the Test of Written Spelling (TWS-4; Larsen, Hammill, & Moats, 1976-1999) and Words Their Way (WTW) elementary spelling inventory (Bear, Ivernizzi, Templeton, & Johnston, 2004) before and 6 weeks after instruction with PESTS. In each case, the students showed progress in their spelling. Alicia went from the 4th percentile on the TWS to the 24th percentile, reflecting an improved score from one standard deviation below average to the low average range. The gap between her spelling and that of her peers diminished by more than one year. Brandon's TWS score went from the 3rd to the 34th percentile; in his case the gap between his spelling and that of his peers also diminished by at least one year. Finally, for Robert the gap between his spelling and that of his grade level peers diminished by two grade levels, as reflected on the TWS; he scored in the 3rd percentile in October and the 17th percentile in June.

Figure 2: Steps in using the PESTS worksheets.

PESTS Cue Card

Step 1: Teacher presents worksheet with word, acrostic, picture, and story to child.
Step 2: Teacher and student discuss the word, its meaning and the story as the child colors the picture and the initial letters of the story one beneath the other.
Step 3: Student is asked to identify the target spelling word given choice of correct and incorrect spelling.
Step 4: Student writes the word in all capital letters, while saying the story aloud.
Step 5: Student traces the word in cursive, while saying the story aloud a second time.
Step 6: Student writes the word a third time, with eyes shut, while saying the story aloud.
Step 7: Student generates a novel sentence using the word, while saying the story as each letter of the word is written.

On the WTW, Alicia's initial developmental spelling level was determined to be at the early-to-middle, within word pattern stage, at the post-test she was at the late-within word pattern stage. Brandon showed progress also, moving from the late-letter name-alphabetic stage to the late within word pattern stage. Finally, before instruction in PESTS, Brandon was at the mid-within word pattern stage, and after instruction he was at the early-syllables and affixes level.

Feedback from the teachers was also positive. Brandon and Alicia's teachers were especially appreciative of the additional focus on spelling instruction. They did not have enough time during regular classroom instruction to focus on spelling, which was clearly needed by these children. Robert's teacher found PESTS so helpful that he used it to teach all of the children in his class to spell difficult social studies words that were going to appear on upcoming unit tests. With respect to the children, they believed they could remember how to spell more using the PESTS method, and Brandon in particular felt that he learned more words using this approach. On the other hand, they agreed that there was more work needed to master the spelling, as compared to the "look, cover, write, check" used in the comparison condition.

Further Thoughts

Students with learning and writing difficulties typically have difficulty spelling (Johnson & Myklebust, 1967), generating far more spelling errors than their normally achieving peers. Before instruction in PESTS, the children in this project were no different. Their daily work contained multiple spelling errors, and performance on both standardized spelling tests and a commonly used developmental spelling test revealed performance two to three years below what was expected given their current grade levels. In contrast, after PESTS instruction, all three children earned standard spelling scores within the low-average to average range on the norm referenced test (appearing one grade level below their peers) and they evidenced measurable growth on a common developmental spelling measure. In an era in which special educators are expected to "close the gap" between children with special needs and their normally achieving peers, the three participants did just that, in one academic content area.

The PESTS method of instruction is intended for use in a somewhat different context than reported here. It should be used for specific words that children consistently misspell, and for high impact words (i.e., items that the child uses frequently in his or her writing). Thus, we do not advocate using the PESTS strategy with five words in a single session. In fact, when not under constraints necessary for data collection, the first author used the PESTS approach whenever needed. However, even in a more controlled context, under circumstances different from those originally intended, students benefited from instruction in PESTS, as evidenced by their scores on the TWS and WTW.

It is important to remember that a mnemonic approach to spelling is only one part of a successful spelling program. To develop a balanced approach to spelling instruction for students with LD, one should consider using rule-based lists from basal programs (Darch et al. 2000), systematic instruction that is linked to students' developmental spelling levels (Invernizzi, & Hayes, 2004 & Templeton, 2002), whole-word multisensory techniques for teaching irregular words (Spear-Swerling & Brucker, 2004), structured language approaches such as those developed by Orton and Gillingham (Schlagal, 2001), as well as incidental learning methods (Graham, 2000).

The first author[1] recently had an occasion to reflect on the utility of her approach when a teenager in the supermarket greeted her. She had last seen him when he was eight. After greeting her with a hug, he proudly reported that he could still spell "because". He then proceeded to say, "Big elephants can act up so easily," as he traced the letters with his fingers on a bag of carrots.

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[1] Readers may request an illustrated copy of Sue Howard's *PESTS* by emailing her at showard@moreland.k12.ca.us.
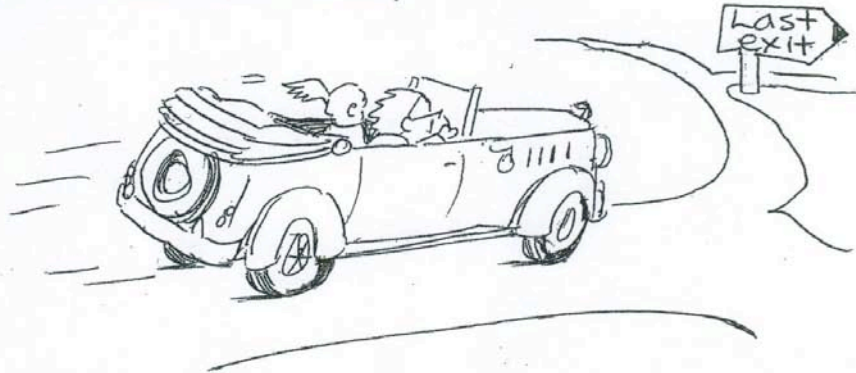
Figure 3: Sample PESTS worksheet.

My Pest Practice Page.   Name:

1.   Color the letters and picture. Remember the story.

turn
right
off
Uncle
ben's
Last
exit

2.   Check the correct word.

truble	trouble

3.   Write in CAPITAL letters.   _____

4.   Write over.   _trouble_

5.   Write with your eyes shut.   _____

6.   This is a sentence with the Pest in.

_____

_____

trouble

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