**REVIEW ARTICLE**

# Does Spelling Still Matter—and If So, How Should It Be Taught? Perspectives from Contemporary and Historical Research

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## Abstract
A century ago, spelling skills were highly valued and widely taught in schools using traditional methods, such as weekly lists, drill exercises, and low- and high-stakes spelling tests. That approach was featured in best-selling textbooks such as the *Horn-Ashbaugh Speller* of 1920. In the early 21st century, however, skepticism as to the importance of spelling has grown, some schools have deemphasized or abandoned spelling instruction altogether, and there has been a proliferation of non-traditional approaches to teaching spelling. These trends invite a reevaluation of the role of spelling in modern English-speaking societies and whether the subject should be explicitly taught (and if so, what are research-supported methods for doing so). In this article, we examine the literature to address whether spelling skills are still important enough to be taught, summarize relevant evidence, and argue that a comparison of common approaches to spelling instruction in the early 20th century versus more recent approaches provides some valuable insights. We also discuss the value of explicit spelling instruction and highlight potentially effective ways to implement such instruction, including the use of spelling tests. Overall, our goals are to better characterize the role of spelling skills in today's society and to identify several pedagogical approaches—some derived from traditional methods and others that are more recent—that hold promise for developing such skills in efficient and effective ways.

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One of the most successful spelling textbooks of the 20th century, the *Horn-Ashbaugh Speller*, began its print run in 1920. Written by Ernest Horn and Ernest Ashbaugh, both professors of education at the State University of Iowa, the postcard-sized textbook represented the state-of-the-art (at the time) in evidence-based spelling instruction. The *Speller* contained grade-appropriate lists totaling 4578 words and prescribed a daily routine of testing, writing, and word study exercises. Over multiple editions, it became a bestseller in the USA and was, for at least 25 years (Ruan & Griffiths, 2007), a constant companion to millions of 1st–8th grade students.

A century later, spelling textbooks continue to be published, but many educators no longer regard them as essential. In fact, in recent years, a growing number of schools in the USA and at least several schools in the UK have deemphasized or eliminated traditional methods of explicit spelling instruction—that is, pedagogical activities that focus on the deliberate teaching of spelling—such as weekly word lists and spelling tests (Barker & Puente, 2013; BBC News, 2008; Gentry, 2011; Mellon, 2009; Murray, 2015; Shalash, 2011; see also Cheek, 2016; Dewar, 2017; Fry, 2015; Sultan, 2010; Woo, 1997). Approximately 250 schools and counting have implemented these changes (for a partial list, see Table 1). Moreover, measures of spelling ability no longer appear on standardized tests in some US states, and standalone assessments of spelling skills have also been phased out in other cases (Denn, 2019). Some observers even suggest that technological innovations have rendered spelling skills obsolete (Klein, 2013; Trubek, 2012). These developments raise important questions, including: Does spelling still matter in the 21st century, and if so, should schools continue teaching it? Are historically prominent approaches to spelling instruction, including a dedicated spelling curriculum and the use of spelling tests as promoted by the *Speller* and other textbooks, still pertinent today? Or are those practices truly obsolete? In this article, which draws from the vast spelling literature and highlights both contemporary and historical perspectives, we examine relevant research in search of answers.

**Table 1** Examples of school districts or schools that have eliminated spelling tests and dropped traditional methods of explicit spelling instruction

| Location | School district or school | Year changes implemented by | Number of schools affected |
|---|---|---|---|
| Florida, USA | Lee County | 2015 | 2 |
| Kentucky, USA | Oldham County | 2011 | 1 |
| Michigan, USA | Oakland Schools | 2015 | > 140 |
| Missouri, USA | Parkway, Rockwood | 2010 | 38 |
| Ohio, USA | Solon City | 2001 | 3 |
| Texas, USA | Clear Creek Independent, Conroe Independent | 2009 | 31 |
| Virginia, USA | Newport News | 2011 | 24 |
| Northwest England, UK | Holme Community School | 2017 | 1 |
| Southwest England, UK | Whitminster Primary School | 2008 | 1 |

## Are Spelling Skills Still Important to Learn?

The *Speller* advised teachers to introduce the topic of spelling thusly: "Begin by pointing out the importance of spelling. Give cases if possible, where people have been discredited because of spelling errors in letters." (E. Horn & Ashbaugh, 1920, p. xi). That advice reflected a societal approbation of the ability to spell—which at the time could be defined as the capacity to write words that conform to the orthography of a given language—that had been pervasive since at least the 16th century and grew in importance with the rise of the printing press and printed books (Venesky, 1980; e.g., Coote, 1596; Webster, 1783). In the last decade, however, skepticism about the value of spelling skills, including from instructors, school administrators, commentators, and members of the general public, has become increasingly prevalent. Among claims used to justify such skepticism, three of the most common are: (a) incorrect spelling is no longer penalized on many standardized tests (Denn, 2019); (b) widely used technologies that automate the spelling process, such as spellcheck and autocorrect, reduce the need to be a good speller (Stewart, 2013); and (c) the proliferation of different ways to spell many frequently used words, as has occurred via text messaging, email, and other casual forms of communication, obviates the very concept of correct spelling (Trubek, 2012). Perhaps not coincidentally, the propagation of these claims coincides with the decline of spelling instruction in some schools.

The devaluation of spelling skills is exemplified in recent quotes published in education magazines and in the popular press. For instance, in a 2013 *Times Educational Supplement* interview, a professor of educational technology opined, "The emphasis on grammar and spelling, I find a bit unnecessary because they are skills that were essential maybe a hundred years ago but they are not right now," and moreover, "my phone corrects my spelling so I don't really need to think about it" (Stewart, 2013). Regarding job resumés, a *Financial Times* columnist claimed in 2014 that "typos and spelling mistakes don't really matter" except "only if I were trying to hire a proofreader" (Kellaway, 2014). An opinion piece in *Wired* magazine even asserted that "English spelling is a terrible mess anyway, full of arbitrary contrivances and exceptions that outnumber rules," and hence "it would be far better to loosen our idea of correct spelling" (Trubek, 2012; cf. Koerner, 2012).

Throughout much of the 20th century, such comments would likely have been met with skepticism and even horror (with the possible exception of complaints about the irregularity of English spelling, which Noah Webster, Theodore Roosevelt, and others attempted to address). Among most contemporary reading and other literacy researchers, the importance of spelling remains undisputed. Recently, however, not only have comments expressing skepticism about the value of spelling received widespread circulation, but in many cases, those comments have gone completely unchallenged. In tandem with that attitudinal shift, the problem of subpar spelling skills remains fairly widespread: elementary school teachers still commonly report spelling difficulties among their students (e.g., 27% of students according to a national US survey conducted by Graham et al., 2008). Some instructors have also noted increases in error-prone and informal styles of writing among their students, particularly in emails (Epstein, 2006; Flaherty, 2019; Glater, 2006). That trend is partially substantiated by corpus data: Constantinou et al. (2020) and Constantinou and Chambers (2020) found evidence of decreasing formality in writing style (e.g., inconsistent tense use) and a greater use of non-standard English (e.g., lack of subject-verb agreement) in UK student writing samples collected in 2014 versus 2004. The increased use of electronic methods of communication wherein correct spelling and formal writing style are not required may also be a factor: survey data indicate a shift toward informal writing styles among US teenagers (Lenhart et al., 2008), although

such shifts have not yet supplanted traditional approaches to writing (Lunsford & Lunsford, 2008). In an effort to forestall a further deterioration of writing standards, some institutions have recently developed "netiquette" guidelines with reminders to use proper grammar and correct spelling in electronic communication (e.g., Arizona State University, 2020; Bestler, 2015; Oregon Institute of Technology, 2018).

## Psychological Appraisals and Consequences of Spelling Errors

Contrary to the assertions of skeptics, an examination of research on how human beings view spelling errors suggests that the longstanding approbation of spelling skills remains justified. First, consider the employment sector: In industries ranging from accounting to technology services, spelling and other writing skills are frequently used and prized by recruiters (e.g., Christensen & Rees, 2002; Martin-Lacroux and Lacroux, 2017; see also National Commission on Writing, 2004, 2005). Spelling skills may also be considered in promotion decisions. Accordingly, the presence of spelling errors in resumés and other application materials, which are often quickly scanned during an initial screening stage, can be devastating: In a survey conducted by human resources firm Adecco (2013), 43% of recruiters listed spelling errors as sufficient grounds for immediate rejection. Additionally, in experiments wherein professional recruiters rated application forms, the presence of spelling errors significantly damaged applicants' chances at being shortlisted (e.g., Martin-Lacroux and Lacroux, 2017). Spelling errors can also substantially worsen recruiters' impressions of a candidate's professional capabilities (Martin-Lacroux, 2017), including assessments of their level of attention to detail and concern about the quality of their writing (Barker & Puente, 2013). Thus, contrary to claims that spelling skills are rarely considered in the workplace and/or should be regarded as unimportant (Kellaway, 2014), data on hiring and promotion practices suggest that such skills remain valuable.

Spelling errors can also be costly for companies and organizations. If a potential customer notices even one spelling error in an advertisement, for example, then their interest in the advertised business drops (Mozafari et al., 2019). If an online review contains spelling errors, then readers form a less positive impression of the company being reviewed; although the review is, also regarded as less credible (Cooper et al., 2020). Spelling errors on commercial websites can negatively impact sales and consumer attitudes (Everard & Galletta, 2005; Stiff, 2012), with up to half of sales lost because customers doubt the credibility of incorrectly spelled information ((according to some estimates; e.g., Coughlan, 2011). Relatedly, security experts commonly advise treating websites and emails with spelling errors as potentially fraudulent (e.g., Consumer Reports, 2012). Companies and other organizations have a vested interest, therefore, in prioritizing correct spelling in customer interactions and in promotions of products or services that they make or market.

More broadly, spelling errors often negatively impact the perception of writers and their writing. In fact, Varnhagen (2000) found that even 2nd, 4th, and 6th grade students gave lower quality ratings and rated writers more poorly after reading a story that contained spelling errors, as opposed to a story that contained no such errors. Negative ratings increased with both age and grade, suggesting that correct spelling is increasingly valued as individuals mature. Kreiner et al. (2002) found that the presence of spelling errors caused adults to give lower ratings of authors' writing abilities, and in some cases, lower ratings of authors' intellectual ability as well. Further, when told that a writer had access to spellcheck software, readers were still more likely to blame the writer than spellcheck for any spelling errors (Figueredo & Varnhagen, 2005). Hence, the responsibility for producing error-free text remains with the writer. Spelling also matters online: In web forum

discussions, misspelled posts are more likely to be questioned than are correctly spelled posts, with such errors also thought to decrease the credibility of the author (Jeong et al., 2017; see also Liu, 2004; Morris et al., 2012). These findings all suggest that correct spelling confers a "halo effect"—that is, beyond simply aiding a writer's ability to communicate effectively, a lack of spelling errors can improve perceptions of their credibility and qualifications—and, conversely, the presence of such errors can lower such perceptions.

Among educational assessments, the Scholastic Achievement Test (SAT) and other major standardized tests do not assess spelling or penalize spelling errors. Hence, spelling is arguably unimportant when taking such tests. However, the current US Common Core State Standards feature specific spelling benchmarks starting at grade 3 (Gentry, 2013; Reed, 2012), thus giving schools cause to evaluate spelling skills, and some states have added penalties in their standardized tests for incorrect spelling (e.g., the Florida Comprehensive Achievement Test began doing so in 2012). Moreover, 11-year old students in the UK are required to take the Spelling, Punctuation, and Grammar (SPaG) test (Department of Education, 2013). Thus, despite a lack of spelling assessments in some school districts and on some standardized tests (which complicates efforts to systematically track spelling ability over time), spelling still matters in various educational settings where it is directly evaluated.

## Spelling Skills in the Era of Spellcheck, Autocorrect, and Text Messaging

Although spelling errors have historically ranked at or near the top of lists of the most common mistakes that writers make (Johnson, 1917, Hodges, 1941), the advent of *spellcheck* software, which highlight spelling errors and can suggest correctly spelled replacements, and *autocorrect* or *autocomplete* software, which attempts to automatically replace misspellings with correctly spelled words, appears to have changed the nature of those errors. Connors and Lunsford (1988) analyzed over 3000 student papers from across the USA and reported that the most common type of mistake—exceeding all others by approximately 300%—involved incorrectly spelled words. That result was consistent with findings stretching back many decades. Two decades later, however, a follow-up study by Lunsford and Lunsford (2008) found that the overall rate of writing errors (of all types) had not substantially changed (i.e., 2.45 errors per 100 words in 2008, versus 2.26 and 2.11 errors per 100 words in 1988 and 1917, respectively), but the prevalence of incorrectly spelled words had fallen to 5th place among all error types. In its place, the most common error was one that spellcheck does not typically catch—namely, correctly spelled, but incorrect, words (e.g., homonyms such as *brake* in place of *break*). These errors comprised nearly 14% of all mistakes and occurred not only when writers depend solely on spellcheck (that is, without performing additional manual checks), but also when writers select correctly spelled but inappropriate words from the options provided by spellcheck (relatedly, a corpus analysis by Mitton (1987) found that over one-quarter of students' spelling errors consisted of otherwise correctly spelled, but inappropriate, words). These findings reveal that spellcheck and autocorrect, though clearly capable of eliminating typos and other obvious spelling errors, are not foolproof. Further, in some studies, the upper bound of spellcheck efficacy has been about 80% (e.g., MacArthur et al., 1996; see also McNaughton et al., 1994; Montgomery et al., 2001), thus leaving it up to the writer to address the remaining 20% of spelling errors.

Lunsford and Lunsford's (2008) study also highlighted several other error types that software-based writing aids commonly miss and can even exacerbate, including the incorrect use of proper nouns, the incorrect capitalization of words (possibly due to auto-capitalization

functions), and errors in punctuation, apostrophes, dashes, and quotation marks. It is also important to note that in cases of extreme misspellings, spellcheck and autocorrect may be unable to identify the intended word. Thus, although the widespread use of software-based writing aids has indeed reduced the rate of obvious misspellings and other types of mistakes, those aids do not guarantee appreciably better writing. Rather, writers now need to not only attend to the errors that those aids do not catch, but also to the unique types of errors that such aids may generate. A heavy reliance on spellcheck software may even lull writers into a false sense of security, resulting in less vigilance to errors (e.g., Galletta et al. 2005). Although improved programs that integrate contextual data, voice recognition, or machine learning (Greer et al., 2016) promise to attain better accuracy in the not-too-distant future, and the use of some types of spellcheck software might even lead to incidental learning of spelling skills (e.g., Lin et al., 2017), the research currently available indicates that suggestions to relegate the responsibility for correct spelling entirely to software-based writing aids are misguided.

The widespread use of text messaging, email, and other forms of social media (e.g., Twitter) has also resulted in a growing array of *textisms*—that is, abbreviations, acronyms, pneumonic devices, and other words that are commonly used in text messages, tweets, and informal emails (e.g., *IMHO*, *plz*)—entering into the mainstream vernacular. This trend has led some observers to worry that new modes of communication are causing spelling skills to deteriorate (for discussion, see Kemp et al., 2014). Others have even proposed reconceptualizing the importance of correct spelling to accommodate the diversity of textisms and other neologisms (e.g., Trubek, 2012). However, the emerging research literature on text messaging and spelling suggests that fears about negative impacts on spelling ability are, thus far, largely overstated. Drouin and Davis (2009), Kemp (2010), and Massengill Shaw et al. (2007) found that the use of textisms was not predictive of spelling ability in adults; similarly, Plester et al. (2009) found no significant association of textism use with spelling ability in elementary school children. Further, Drouin (2011) and De Jonge and Kemp (2012) reported positive and negative correlations, respectively, between the frequency of text messaging use and spelling ability in adults. Overall, these studies suggest that there is not a consistently negative influence of textisms on spelling skills.

In addition, it appears that most writers generally limit their use of textisms to more casual forms of writing. Lunsford and Lunsford (2008) found no indication of textisms slipping into formal prose in student writing samples, although textisms occasionally appeared in notes or in comments. Similarly, Rosen et al. (2010) found that young adults commonly report using approximately 8 to 10 textisms daily in their text messages, but when tasked with writing both formal and informal essays, the vast majority do not use any textisms (see also Tagliamonte & Denis, 2008). In a nationwide US survey (Lenhart et al., 2008), however, over 25% of teenagers admitted to incorporating textisms into their school writing. Overall, it appears that the increased use of new modes of communication and the proliferation of textisms and other casual orthographic forms, while having some influences on writing behavior, have not (as of yet) materially reduced adherence to conventional spelling. Moreover, despite some indications that writing is becoming less formal (e.g., Constantinou et al., 2020; Constantinou & Chambers, 2020; Lenhart et al., 2008), the existence of standard, universally-agreed upon spellings remains a cultural norm that, in the service of clarity, is generally expected in most writing and may be even more important in the digital era (Koerner, 2012). That expectation remains the case for traditional written communications (e.g., corporate and other official correspondence), and now also applies in various online venues (e.g., news websites, blog posts, and e-mails).

## Evidence of Links Between Spelling, Reading, and Writing Skills

Research on links between spelling, reading, and writing skills provides further insights into the importance of spelling skills, although conflicting evidence complicates interpretation.[1] First consider reading. Misspellings can make text more difficult to read (e.g., Oelke et al., 2012), whereas improvements in spelling ability are associated with enhanced reading skills (for discussion, see Moats, 2005/2006). A recent meta-analysis of 20 experimental and quasi-experimental K-12 classroom studies (Graham & Santangelo, 2014; see also Graham & Hebert, 2010) comparing spelling instruction against no instruction or other learning interventions that did not focus directly on spelling (e.g., Kirk & Gillon, 2009; Ouellette et al., 2013; Rieben et al., 2005) found that spelling instruction was associated with improved reading skills. However, the conclusions of the meta-analytic literature on spelling-focused instruction and reading skills have recently been criticized on methodological and interpretative grounds (for discussion, see Bowers, 2020; Fletcher et al., 2020), which heightens the need for more research to verify the efficacy of such instructional methods. Moderate-to-high correlations of $r = 0.5$–$0.9$ between spelling and reading test scores have also been observed across multiple studies (e.g., Ehri, 1987; Townsend, 1947; for discussions see Graham et al., 2002; Rayner et al., 2001; Shankweiler & Lundquist, 1992), indicating potential links between the two skill domains, but a causal relationship cannot be inferred from such data. It is also more common for skilled readers to be poor spellers than for poor readers to be highly proficient spellers (Bosman & Van Orden, 1997; Frith, 1978), which implies an asymmetrical relationship between spelling and reading. Overall, there are some indications that spelling skills can impact reading ability, but the precise nature of such impacts and the extent to which instruction in spelling impacts reading ability remain to be fully established.

With respect to writing, poor spelling ability has been hypothesized to impair the composition process by taxing cognitive resources and interfering with higher order skills that are needed to produce well-written prose (Graham, 1999). Accordingly, if students have difficulties with spelling, they may then be impaired in developing broader writing skills (Graham et al., 2002). A recent meta-analysis of six empirical studies of the effects of spelling instruction on writing ability (e.g., Berninger et al., 2002; Graham & Harris, 2005; Sussman, 1998), however, found that such instruction yielded modest but not statistically significant improvements (Graham & Santangelo, 2014). Thus, although spelling skills may impact writing ability, evidence for knock-on effects of spelling instruction on writing skills is not strong (even before taking into account the aforementioned methodological criticisms of such meta-analytic data). Additionally, as with spelling and reading skills, moderate-sized positive correlations between spelling and writing skills of $r = 0.4$–$0.5$ have been observed (e.g., Graham et al., 1997; Graham, 2000; see also Abbott et al., 2010; Puranik & AlOtaiba, 2012; Rankin et al., 1993), but again, those correlations do not necessarily indicate a causal relationship. In summary, although there are indications that spelling skills can influence reading and possibly writing skills, the extent of that influence needs further investigation (see also Graham, 2000).

Overall, an abundance of research confirms that spelling remains important in the 21st century. As summarized in Table 2, that importance stems not just from the potential

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[1] A substantial portion of the research literature on literacy skills focuses on students with learning disabilities or difficulties. This article focuses on evidence from normally developing learners. The interested reader may wish to consult relevant review articles (e.g., Galuschka et al., 2020) for further information.

**Table 2** Evaluating the claims of 21st century spelling skeptics

| Claim | Evidence in favor | Counterevidence |
|---|---|---|
| Incorrect spelling is no longer detrimental in various contexts and hence need not be attended to | Spelling has been dropped from some standardized tests, especially in the USA | Spelling is still assessed or has been reemphasized on other standardized tests |
| | Spelling is reportedly deemphasized in some professional contexts | Spelling is critical in job applications and in some promotion contexts |
| | | Spelling affects the efficacy and credibility of advertising, reviews, and websites |
| | | Spelling impacts perception of writers and their writing |
| | | Spelling may influence reading and writing skills |
| Technologies that automate the spelling process reduce the need to be a good speller | Spellcheck software has ~ 80% accuracy at catching incorrect spellings | Spelling aids have not appreciably improved the quality of written work |
| | | Spelling aids do not often catch otherwise correctly spelled, but inappropriate, words |
| | | Spelling aids can suggest inappropriate words |
| | | Spelling aids may incorrectly handle proper nouns, capitalization, punctuation, and other aspects of writing |
| Technology-driven proliferation of different ways to spell renders the concept of correct spelling obsolete | Textisms and other non-traditional spellings have entered into popular use | Text messaging behavior does not appear to strongly influence spelling skills |
| | | Most writers tend to limit their use of textisms to informal modes of communication |
| | | Proper spelling is valued in various online venues |

influence of spelling skills on reading and writing skills, but also from the vital role of spelling in securing employment, in business, and in affecting the perception of writers and their writing. Despite sociocultural, technological, and some attitudinal changes, those characteristics of spelling have not changed substantially in recent years. Moreover, technological innovations have not eliminated the need to learn to spell, nor—outside of texting and other casual modes of communication—have they irrevocably changed the way that words are spelled. Based on these findings, the recent trend towards abandoning or minimizing spelling instruction, which has alarmed some researchers, parents, and observers (e.g., Barker & Puente, 2013; Gentry, 2011, 2017; Petersen, 2010; Spellbound, 2009), appears to be misguided.

## Should Spelling Skills Still Be Taught?

Given that spelling skills evidently remain important, the question follows: Should spelling still be taught in schools? That is, should class time still be devoted to spelling instruction, perhaps including the memorization of difficult words, learning spelling rules, charting the

etymology of words, or other spelling-focused activities? Historically, elementary school teachers have devoted substantial amounts of class time to spelling. For instance, Graham's (2008; see also Fresch, 2007; Hillerich, 1982) nationwide survey of spelling instructional practices in US elementary schools found that instructors spend an average of almost 90 min per week on the subject (which, incidentally, exceeds the 15 min daily amount that has long been recommended in the spelling literature, e.g., E. Horn, 1919; Rice, 1897). Devoting instructional time to spelling might seem sensible given that English is one of the world's most irregularly spelled languages (Vangelova, 2015). In contrast with other alphabetic languages, such as Italian and Finnish, wherein each letter represents just one sound, the 26 letters of the English alphabet can be used to represent 44 different sounds and create over several hundred letter combinations (Gentry, 2010). Moreover, learners typically need to master 6000–12,000 words to write effectively in English (Graham, 2000; Hanna et al., 1966). As discussed next, however, it is no longer the case that all elementary school teachers devote instructional time specifically to the subject of spelling.

## Explicit Versus Incidental Spelling Instruction

Currently, elementary school teachers commonly use either of two primary approaches to teaching spelling (Graham, 1983, 2008): (a) *explicit instruction* (also known as the *spelling-is-taught*, *formal*, or *systematic* approach), wherein some portion of instructional time is focused specifically on spelling, or (b) *incidental instruction* (also known as the *spelling-is-caught*, *informal*, or *naturalistic* approach), wherein little-to-no instructional time is specifically used and spelling is instead learned via reading and writing activities (and in some situations, correct spellings modeled by the instructor and/or discussed in the context of "teachable moments" that arise during those activities; for discussion, see Edelsky, 1990). From an instructor's standpoint, explicit instruction typically entails pre-planned instructional activities wherein spelling is the sole focus (e.g., word study exercises using weekly assigned spelling lists), whereas implicit instruction might involve inserting spelling words into lessons involving other topics (e.g., history and science) and discussing those words in the context of those lessons (for further discussion of different instantiations of the two approaches, see Treiman & Kessler, 2014).[2] Importantly, there are a wide variety of ways in which the explicit and incidental approaches could be implemented (some of which are discussed later in this article). In yet other cases, a combination of the two approaches is used: for instance, when several elementary schools in Lee County, Florida, overhauled their spelling curriculum to eliminate traditional methods, including all spelling tests, school officials suggested that the learning of spelling would be woven throughout all academic subjects, including science and social science units, via a mix of explicit and incidental methods (Fry, 2015).

The explicit approach has been, for more than four centuries, the most common way that spelling is taught. It dates at least as far back as the publication of the first known spelling textbook (Coote, 1596). The incidental approach has existed for well over a century and gained popularity during the 1970s when prominent psycholinguists (e.g., Chomsky, 1971; Zutell, 1978) interpreted the finding that children's "invented spellings" (i.e., incorrectly spelled words that they come up with on their own) eventually give way to more accurate spellings as an indicator that human beings have an innate capacity for developing spelling skills on

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[2] For discussion of yet other approaches to spelling instruction that are not addressed in detail here, such as developmental spelling approaches, see Johnston (2000) and Schlagal (2002).

their own (Read, 1971; see also Chomsky, 1971), including via statistical learning (Treiman & Kessler, 2014). The incidental approach also addressed some instructors' concerns that traditional spelling instruction is too "siloed" (that is, disconnected from reading and writing activities), which has been a recurring theme in anecdotal reports (e.g., Gill & Scharer, 1996). Proponents and detractors of both approaches have debated their relative merits for many decades (Woo, 1997). Since the 1970s, however, there has been a noticeable trend towards dropping explicit instruction in favor of incidental instruction, particularly in some US school districts (see Table 1), and that trend appears to have accelerated in recent years (e.g., Barker & Puente, 2013; Fresch, 2007, Gentry, 2010; Mellon, 2009; Murray, 2015; Schlagal and Schlagal, 1992; Shalash, 2011).

## The Case for Explicit Spelling Instruction

Graham (2000) conducted an in-depth review of the research literature addressing explicit versus incidental spelling instruction. Differences across studies in experimental design, outcome assessment, and control for confounding variables complicated interpretation. There was also insufficient evidence to thoroughly evaluate the merits of either approach. Nevertheless, the tentative conclusion was that explicit instruction should not be replaced with incidental methods. Evidence favoring explicit instruction included: (a) reading can yield some incidental learning of spelling, but such learning is modest compared with explicit instruction, and (b) writing yields modest and inconsistent improvements in spelling ability. It was concluded that the incidental instruction should at most supplement explicit instruction (Graham, 2000).

More recent reviews of the literature have also affirmed the efficacy of explicit spelling instruction (e.g., Joshi et al., 2008; Schlagal, 2002; Treiman, 2018). For instance, Graham and Santangelo (2014) meta-analyzed 23 studies that directly compared the explicit and incidental approaches, including studies that were not available for earlier reviews; explicit instruction was reported to increase spelling skills relative to incidental instruction by an effect size of Hedges' $g$ = 0.43, 95% confidence interval (CI) [0.25, 0.60]. Further, explicit instruction was reported to enhance spelling skills over no instruction by $g = 0.54$, 95% CI [0.39, 0.70], and it was observed that additional explicit instruction led to greater improvements in spelling skills (for related meta-analytic findings involving students with learning difficulties, see Galuschka et al., 2020).

Advantages of explicit spelling instruction have also been observed in authentic educational settings. In 1987, the California Board of Education directed all public schools in the state to switch from explicit to incidental or "literature-based" instruction (Woo, 1997; see also Krashen, 2002). Motivated by the increasing popularity of "holistic" approaches to literacy, that switch served as an early test case for the efficacy of the incidental approach (Gentry & Graham, 2010). Spelling disappeared from required textbook lists and schools switched to addressing the subject via reading and writing activities (Woo, 1997). By the early 1990s, the switch to incidental instruction had been widely blamed for a statewide drop in student reading scores (Colvin, 1995; although for an alternative interpretation, see Krashen, 2002), and reports of incorrectly spelled student letters and essays—including a publicized case wherein over two dozen 8th grade students in Middletown, California, produced nearly as many incorrect spellings of the word "vandal" in letters sent to a local newspaper—led to a public outcry (Woo, 1997). Subsequently, state officials backtracked, endorsing a back-to-basics approach and the restoration of explicit spelling instruction (a practice that some teachers, frustrated with an approach that they believed was ineffective, had already begun to implement

independently). The California state legislature codified that recommendation into law in 1996 (Gentry & Graham, 2010; Woo, 1997). Afterwards, scores on the spelling portion of the Stanford Achievement Test (SAT-9) exhibited incremental year-on-year gains at every assessed grade level, increasing from an average percentile rank of 36–42% in 1998 to 41–55% by 2002 (California Department of Education, 1998, 1999, 2000, 2001, 2002).

Test cases such as the apparent failure of the incidental approach in California reinforce the conclusion that incidental instruction/learning results in poorer spelling skills than does explicit instruction. With school districts in other US states recently making the same switch to incidental instruction that California once attempted, it appears that history is on the verge of repeating itself. Another potential problem with incidental instruction is that assessments for spelling ability are often dropped with that approach, making the efficacy of such instruction difficult to assess and track (Denn, 2019).

In 1919, the *Speller*'s first author proposed as a first principle of effective spelling instruction, "Do not depend solely on the incidental teaching of spelling" (E. Horn, 1919, p. 53). In support of that principle, it was argued that any class time that might be saved via incidental instruction would not translate to improved spelling skills, and that even carefully planned methods of supposedly incidental instruction, as opposed to a haphazard but more genuinely incidental approach, would still be less effective than explicit instruction. A century later, that principle appears to have been proven correct. Ultimately, the advantage of explicit over incidental instruction may stem from the fact that it enables teachers to ensure that their students receive training that actually builds spelling proficiency, rather than waiting for, or attempting to engineer, teachable moments.

## Are Traditional Approaches to Spelling Instruction Still Valid?

Given the evidence that spelling should be explicitly taught, at least in part, the question follows: What methods of spelling instruction are the most effective? That question has occupied researchers since at least the late 19th century, when Joseph Mayer Rice published the first scientific investigations on the topic (Rice, 1897; see also Mann, 1839), and has given rise to one of the most extensive research literatures in all of the language arts (Allred, 1977).[3] Although a comprehensive treatment of that research is beyond the scope of this article, a comparison of spelling research and recommendations from the early-to-mid 20th century with more recent developments reveals four important patterns: (a) shifting views about optimal methods of explicit spelling instruction, (b) changes in the definition of spelling skills, (c) discrepancies between research-based recommendations and common educational practices, and (d) recent debates pertaining to the use of spelling tests. Using the *Speller* as an example of a traditionally popular approach to spelling instruction, those patterns are discussed next.

### Revisiting the *Horn-Ashbaugh Speller*

In 1920, the *Speller* espoused a curriculum wherein spelling was learned on a daily basis using lists assigned weekly. That approach drew from the available spelling literature and empirical

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[3] A non-exhaustive list of relevant reviews and related articles includes Allred, 1966, 1984; Cook, 1957; Fitzsimmons & Loomer, 1977; Graham, 1983; E. Horn, 1919, 1954; Joshi et al., 2008; Mazzio, 1987; Reed, 2012; Schalgal, 2001, 2002; Simonsen & Gunter, 2001; Treiman, 2018; and Wallace, 2006.

research conducted by the first author (key findings of which had been summarized in a book chapter (E. Horn, 1919) published a year prior). As detailed in Table 3, the *Speller* had teachers introduce a word list every Monday and then administer a pretest on that list. On Tuesday, students studied and practiced the words that they had missed on the pretest. A diagnostic test on Wednesday measured the progress that had been made, and after students engaged in additional practice on Thursday, another diagnostic test occurred on Friday. That cycle repeated each week with a new word list. Throughout, students were expected to keep a notebook wherein they documented their progress, wrote down challenging spelling words, and described any spelling difficulties that they had experienced in their own writing activities. That notebook bears resemblance to those still used in some primary schools for math and other subjects (e.g., Numeracy Ninjas, 2015) and was intended to foster the development of a "spelling conscience" (i.e., a sense of responsibility for correct spelling), pride in one's spelling ability, and improved motivation to become a better speller (E. Horn & Ashbaugh, 1920; see also Hillerich, 1982).

Besides introducing a new word list each week, the *Speller* also called for the periodic review of previously learned spelling words. On each Wednesday and Friday test, not only were the words from that week's list assessed, but the words from a list that had been assigned 1 month before were assessed as well. Students were supposed to include any of those "older" words that they had missed on such tests in their practice activities. Additionally, difficult words were to be reviewed at the start of each school year. A contemporary view of these

Table 3 Spelling instruction according to the Horn-Ashbaugh Speller (1920)

| Timeframe | Day | Activity type | Description |
|---|---|---|---|
| Each week | Monday | Lesson | New word list is assigned. Teacher pronounces each word in the list as students follow along and pronounce in unison. |
| | | Pretest | Students attempt to spell each word, one at a time, then exchange papers and correct each other's tests. Missed words are rewritten and assigned for further study. |
| | Tuesday | Word study, practice testing | 1. Look at the word and pronounce it out loud. 2. Close eyes and attempt to visualize the word. 3. Check correct spelling (if not, return to step 1). 4. Cover the word and write it. 5. Check spelling attempt (if not, return to step 1). 6. Repeat steps 4 and 5 twice more. |
| | Wednesday | Test | Students are tested on the word list for that week, plus a word list that was learned one month prior. The words that are missed may be corrected and studied. |
| | Thursday | Word study, practice testing | Repeat as on Tuesday. |
| | Friday | Test | Repeat test as on Wednesday. Words that are missed are studied and the number of errors made over successive tests are compared and logged in a spelling notebook. |
| One month later | Wednesday, Friday | Test | The word list should be tested one month later on the Wednesday and Friday of a given week (as above). |
| One year later | Any | Word study | Difficult words are reviewed at the start of the next grade. |
| Every year | Daily | Record-keeping | Students should keep a spelling notebook wherein they record errors made on spelling tests and in written work, plus track their progress at learning words. |

activities is that they constituted implementations of *distributed practice*—that is, learning across multiple sessions spread apart in time (it should also be noted that the Monday–Wednesday–Friday pretesting and posttesting schedule could be classified as another instantiation of distributed practice). The benefit of distributed practice for learning, which is also known as the *spacing effect*, is now considered to be one of the most robust of all learning phenomena (for a review, see Cepeda et al., 2006; for related discussions, see Ebbinghaus, 1885; Treiman & Kessler, 2014). Distributed or "spaced" practice can improve students' ability to remember information and apply skills across a wide range of conditions (e.g., Bahrick et al., 1993; Rohrer, 2015). Hence, the *Speller* was arguably a pioneer, or at least an early adopter, of one of the most potent learning techniques.

In addition to thrice-weekly diagnostic tests, the *Speller* had students use practice testing to learn spelling. Specifically, after studying a word and attempting to visualize it, students were directed to cover it, attempt to write it from memory, and then check for correctness (Table 3). That process, which was to be repeated three times per word, reflected Horn's belief that testing with corrective feedback constitutes the "most fruitful single learning activity (per unit of time) that has yet been devised" (E. Horn, 1954, pp. 17-18). That assertion has since been supported by various research findings over several decades. In fact, it is now well-established among cognitive and educational psychologists that low-stakes practice testing, or *retrieval practice*, can serve as a more potent "memory modifier" than non-retrieval studying (Bjork, 1975), yielding pedagogical benefits in classroom settings (e.g., Agarwal et al., 2014; Pan, Cooke, et al., 2019) and across a wide range of materials (i.e., the *testing effect*; for reviews, see Pan & Rickard, 2018; Roediger & Karpicke, 2006b; Rowland, 2014), including spelling (e.g., Beseler, 1953; Christine & Hollingsworth, 1966; Cook, 1957; Cohen, 1969; Jones et al., 2016; Louis, 1950; Pan et al., 2015; Schoephoerster, 1962). Thus, in recommending practice testing, the *Speller* incorporated a second learning technique that is now widely regarded as highly potent (Dunlosky et al., 2013; Pashler et al., 2007). Later, spelling researchers have also endorsed similar testing procedures, including the *self-corrected test* and *study-copy-cover-compare* methods (e.g., Allred, 1966; Fitzgerald, 1951; Gentry, 2004; Gilstrap, 1962; Mazzio, 1987; Reed, 2012; Wallace, 2006; Westerman, 1971).

Overall, the *Speller* exemplified an approach to explicit spelling instruction that reflected early 20th century educators' belief in the central importance of spelling skills and required students to invest time on the subject on a daily basis. It was remarkably prescient in its use of two learning techniques (*distributed practice* and *retrieval practice*) that are now regarded as evidence-based and highly robust. However, as described next, other aspects of the *Speller* have since come under heavy criticism, and as a consequence, the textbook is now generally considered to be obsolete.

## Contemporary Criticisms of the *Speller* and Other Traditional Approaches

The *Speller*'s curriculum was largely rooted in behaviorist principles and perspectives, much of which are now commonly regarded as outdated (Hodges, 1982). For instance, the *Speller*'s first author had argued that the acquisition of spelling skills should be regarded as a visual learning task (E. Horn, 1919), which was in alignment with common perspectives at the time (e.g., Gates & Chase, 1926). Although contemporary researchers still recognize that there are visual components to spelling skills, non-visual components have since been established to be involved as well (Gentry, 2004; Rayner et al., 2001; Zesiger & de Partz, 1997). Accordingly, the *Speller*'s heavy reliance on visualization exercises, which reflected a goal of engaging

students in repeated "drill periods" to impress words in memory, was based on an incomplete view of the cognitive mechanisms that spelling engages.

In addition, the *Speller*'s authors did not anticipate many other research-supported techniques that have since gained wide acceptance. E. Horn (1919, 1954) had criticized the study of spelling rules and letter patterns as ineffective due to the apparent irregularity of English spelling, plus dismissed the utility of phonics instruction on the basis of inadequate evidence. Hence, the *Speller* included no such activities. Yet, many spelling researchers now endorse the study of spelling rules, letter patterns, and phonics given empirical research that such activities are beneficial (e.g., Gentry, 2007; Joshi et al., 2008; Reed, 2012; Treiman, 2018). Moreover, the *Speller* did not include age-specific or grade-level spelling skill benchmarks (e.g., successful use of consonant doubling). The absence of such benchmarks is unsurprising given that most research on the developmental progression of spelling ability—which led to stage models of spelling by Gentry (1982), Henderson (1985), Ehri (1986), Bear and Templeton (1998), and others—had not yet occurred. Consequently, the *Speller* did not allow for diagnosing individual students' spelling skills in any systematic way, such as via categorization of the types of errors committed. Rather, progression of spelling ability was simply reflected in terms of "easier" versus "more difficult" words, with levels of difficulty established via frequency counts of errors from an analysis of letters of correspondence that the *Speller*'s authors had conducted (it should however be noted that the use of difficulty-graded lists represents an improvement over more arbitrary lists, which is a practice that persists even today in some schools).

Two staples of the *Speller*'s curriculum, namely weekly spelling lists and the Friday spelling test, remain popular today. Fresch (2007) surveyed US elementary school teachers and found that 84% assign their students to learn a different word list each week in preparation for a posttest (for additional survey data see Graham et al., 2008; McNeill & Kirk, 2014). Yet, it appears that many teachers no longer emphasize distributed practice or practice testing. Rather, students are commonly told to study each word list on their own in preparation for a single, end-of-week posttest (Simonsen & Gunter, 2001), after which the words are no longer revisited. In place of practice testing, non-testing activities such as consulting dictionaries or playing games occur (Fresch, 2007; Graham et al., 2008). Kilzer (1926) and other researchers have described that approach—wherein spelling is learned through the study of assigned lists and no testing occurs outside of a final posttest—as the *study-test* method. Although Sherwin (1969) and others have long suggested (based on empirical data) that the study-test method is inadequate relative to methods that involve practice testing, it remains popular. That popularity appears to stem from ease-of-implementation: At a bare minimum, all the instructor has to do is assign a list on Monday and proctor a test on Friday, with students otherwise left to learn via their own devices.

In a potentially worrisome development, dissatisfaction with traditional approaches to spelling instruction appears to have been growing among teachers, at least anecdotally, since the 1970s. Chief among such complaints has been the observation that the weekly list-test format appears to yield rapid forgetting and poor transfer of learning. The phrase "Friday test, Monday miss" (Putman, 2017; see also Gill & Scharer, 1996)—wherein students study sufficiently to pass a Friday test, but then appear to have forgotten what they have learned as evidenced by misspellings in later writing activities—encapsulates that phenomenon. It should be emphasized, however, that forgetting is ubiquitous throughout many forms of learning and can occur regardless of the training task (and as emphasized in prominent memory theories, including Bjork and Bjork's (1992) *New Theory of Disuse*, learning can be retained but appear to be inaccessible, if only temporarily). Further, some tasks have been shown to not only boost learning relative to other study activities, but also reduce the

rate of forgetting (as in the case of retrieval practice; see Carpenter et al., 2008; Roediger & Karpicke, 2006a). Other complaints target explicit instruction (e.g., the aforementioned claim that the explicit approach results in learning that is too disconnected from reading and writing activities).

Psycholinguists have also faulted traditional approaches to spelling instruction as ineffective at yielding transferrable spelling skills and fostering motivation to spell. For instance, Zutell (1978, p. 848) opined that the weekly spelling list-test format provides "little opportunity for conceptualization," constitutes "rote memorization," and ultimately yields "boredom or frustration" and "a lack of carryover from memorizing the words to using them in written products." Although such complaints most directly reflect the study-test method and not the *Speller*'s more intensive curriculum—and appear to partly stem from a combination of opinions on teaching philosophy and anecdotal evidence—the apparent result of these and other complaints has been, over the past several decades, a growing interest in replacing traditional approaches to spelling instruction with updated versions.

## Alternative Perspectives on Effective Spelling Instruction

In contrast with the perspectives held by the authors of the *Speller* and many others of the same era, many contemporary spelling researchers do not believe that the relative difficulty of English spelling compared with other alphabetic languages necessitates "word-by-word memorization." Supporting evidence for that belief comes from studies showing that most English words have more predictable spellings than previously assumed. In particular, Hanna et al. (1966, see also Hanna and Moore, 1953, Treiman and Kessler, 2003, Kreiner et al., 2002, Ziegler et al., 1997) conducted a series of computer analyses of over 17,000 English words and found that approximately half could be spelled using simple sound-letter combinations (i.e., phonics), over one-third were regular except for one sound, and most of the remainder could be derived using etymological information (e.g., having a prefix of Greek origin). After those considerations had been accounted for, only 4% of English spellings could be regarded as unpredictable (Joshi et al., 2008). That finding led to suggestions that spelling instruction should concentrate on the regularities of English spelling (e.g., Bowers & Bowers, 2017; Moats, 2005/2006; Treiman, 2018), or at least that spelling curricula should be modified to include some instruction on those regularities (e.g., Gentry & Graham, 2010). Such instruction might take many different forms. For instance, Joshi et al. (2008) suggested that spelling instruction should focus on the study of (a) syllable patterns (i.e., open and closed syllables and rules governing their use), (b) morphemes (e.g., prefixes, suffixes, and roots), (c) letter patterns (i.e., rules governing the use of certain letter combinations, such as the letter $q$ always being followed by the letter $u$), and especially for older elementary school students, (d) etymology (including words of Greek, Latin, and French origin). Other researchers (e.g., Adoniou, 2014; Leipzig, 2000; Moats 2005/2006; Treiman & Kessler, 2014) have proposed similar curricula and offered recommendations for effective spelling instruction, including the mixing of explicit and incidental approaches, motivating students to engage in concentrated effort when practicing spelling, and providing students with feedback.

Contemporary researchers have also adopted more expansive and detailed definitions of spelling skills. Specifically, spelling skills no longer simply entail the ability to spell correctly; rather, such skills now include phonological knowledge (i.e., phonemics and phonics), morphological knowledge (e.g., prefixes and suffixes), orthographic knowledge (e.g., phoneme-grapheme relationships), etymological knowledge (i.e., word origins), and visual knowledge (e.g., how letter patterns appear to the eye), many or all of which may develop in stages (Adoniou, 2014; Bear & Templeton, 1998;

Gentry, 1982; and Henderson, 1985; for detailed discussion of the development of alphabetic knowledge and spelling ability, see Treiman & Kessler, 2014). Further, the ability to use a dictionary to check the spellings of words (Graham, 1985; Hillerich, 1982), use spellcheck programs (Montgomery et al., 2001), spell unfamiliar words, and learn the spellings of unfamiliar words found in written text also constitute important spelling skills. In tandem with those definitional changes, the number of ways to learn spelling has also grown (Johnston, 2000; Schlagal, 2002) and now includes a wide range of commercial spelling programs, spelling textbooks, and a variety of ad hoc techniques invented by teachers and others.

From a contemporary perspective, explicit spelling instruction might involve any of at least three different but non-exclusive approaches, each of which might be implemented in diverse ways (Reed, 2012; Simonsen & Gunter, 2001). As shown in Table 4, the most common include the (a) *phonemic* and (b) *morphemic* approaches, which focus on the regularities of English spelling (as emphasized by many contemporary spelling researchers), as well as other instructional techniques, such as self-corrected tests, which can be classified under the (c) *whole word* approach. The phonemic approach focuses on meaningful units of sound and sound-letter correspondences, an example of which involves the study of phonics rules. The morphemic approach involves learning about units of letters that carry meaning, an example of which is the study of morphological rules. The whole word approach involves memorizing the spellings of entire words and especially those that are irregular by at least one sound (Reed, 2012). Under that approach (which should not be confused with the "whole language" approach that promotes incidental learning of literacy skills via immersion in reading and writing activities; e.g., Altwerger et al., 1987), words are not divided into segments and are instead learned in their entirety (e.g., O'Connor & Padeliadu, 2000), such as via self-corrected tests. It should be emphasized that the three approaches summarized here do not necessarily encompass the entirety of contemporary methods of explicit spelling instruction, but rather exemplify widely used methods that many researchers currently endorse. These approaches also represent a marked contrast from the methods espoused in the *Speller* a century ago, including with respect to the use of distributed practice and retrieval practice.

## Research-Supported and Unsupported Instructional Approaches

In the spelling literature, some common implementations of the phonemic, morphemic, and whole word approaches have received empirical support. For instance, a series of meta-

**Table 4** Common contemporary approaches to explicit spelling instruction

| Approach | Objective(s) | Example learning activities |
| --- | --- | --- |
| Phonemic | Learn meaningful units of sound and sound-symbol relationships | Segmenting words into sounds, initially orally and then in written form |
| | Learn consistent letter or syllable patterns | Sorting words by letter or syllable patterns |
| | | Studying letter or syllable rules |
| | | Use of a phonics program |
| Morphemic | Learn units of letters that carry meaning | Studying rules for pluralizing words, such as by using suffixes |
| | | Sorting words by suffixes |
| Whole word | Learn the spellings of entire words, and particularly those that are irregular | Self-corrected test and study-copy-cover-compare methods |
| | | Studying groupings of words that are related in some manner, such as semantically |

analyses involving experimental and quasi-experimental studies have concluded that both the phonemic approach (in the form of phonemic awareness instruction as analyzed by Ehri et al., 2001, 2003) and the morphemic approach (via instructional methods that included an emphasis on morphemes as units of meaning, as analyzed by Goodwin & Ahn, 2013; see also Carlisle, 2010) can improve spelling skills. Qualitative reviews of at least one implementation of the whole word approach, namely the self-corrected test, have also concluded in favor of its effectiveness (e.g., Simonsen & Gunter, 2001). However, the meta-analytic literature on spelling (and reading) instruction may not be as conclusive as has long been believed: Bowers (2020) reviewed 12 meta-analyses purporting to support the effectiveness of systematic phonics instruction for reading skills (and, where documented, spelling skills; e.g., Ehri et al., 2001) and identified flaws in data collection and analysis, including inconsistencies in the implementation of instruction across included studies, comparisons involving heteroge-nous control conditions, mixing of different outcome measures, inconsistent and unexpectedly high variability in effect sizes across studies, and potential publication bias. These criticisms pose a challenge for the spelling and reading instruction literature as a whole and imply that the efficacy of common implementations of the phonemic, morphemic, and whole word ap-proaches remains to be fully established, despite favorable indications in some peer-reviewed research.

Further complicating matters, other instructional techniques that do not enjoy any eviden-tiary support have also emerged in recent years. These techniques are often presented in user-friendly lists of activities to attempt. For instance, a list of 18 "creative and interactive" spelling activities recently published by the commercial education website ThoughtCo features such tasks as playing hangman, using spelling words to make a fly swatter, and play-acting spelling words (Morin, 2020). Although evidently well-intended, these activities do not directly address any of the aforementioned spelling skills or involve any of the research-supported approaches described above. Rather, such activities appear to have simply been designed to be enjoyable and to expose learners to the letters in words. Although some spelling researchers have endorsed games and other fun activities as a way of promoting interest in spelling, those researchers have often emphasized that such activities are only meant to supplement other forms of instruction (e.g., E. Horn, 1954; Graham, 1983), a crucial point that many lists omit. Further, references to the "learning styles" myth (i.e., that instruction should be tailored toward students' preferred mode of learning, such as visual, auditory, or kinesthetic), along with advice to choose activities accordingly, are often included in such lists. Despite popular acceptance of the learning styles myth (for survey data, see Dekker et al., 2012), there are no reliable benefits to arranging instruction according to learning styles (Pashler et al., 2008; see also Coffield et al., 2004; Cuevas, 2015; Coffield et al., 2004, Willingham et al., 2015).

The existence and use of instructional techniques of dubious pedagogical value are not a new phenomenon in the spelling literature. Rice (1897), Cohen (1969), Graves (1977), Fitzsimmons and Loomer (1977), Graham (1983), Cronnell and Humes (1980), and Mazzio (1987) have commented on the disparity between research-supported and common practices. However, the emergence of vastly different approaches to spelling instruction—a trend that generally coincides with growing dissatisfaction with and decline in the use of traditional methods—appears to have led to an unprecedented proliferation of such techniques. Indeed, a Google search conducted for this article using the keyword "spelling activities" yielded approximately 2 million hits, and a partial review of the results revealed that only a portion of those hits involve activities that are grounded in research. Accordingly, when deciding on the manner and method of teaching spelling, today's instructors would be well-advised to take great care to identify and use research-supported methods, which is

admittedly challenging given the plethora of available instructional methods and different levels of evidence regarding the efficacy of each.

## Reconsidering the Role of Spelling Tests

Of all the elements that have been common to traditional forms of spelling instruction, spelling tests have been the most directly targeted for extinction in recent years. For instance, of the approximately 250 schools mentioned at the outset of this article, all have eliminated (or been directed to eliminate) spelling tests. The removal of spelling tests has been justified by claims that such tests are useless for learning, uninformative, only reflect "short-term memory," promote memorization at the expense of transfer, are too stressful or unenjoyable for students, and constitute inauthentic assessments of spelling ability (e.g., Adoniou, 2013; BBC News, 2008; Carreker, 2010; Cheek, 2016; Murray, 2015; Putman, 2017). Although spelling tests still remain dominant—well over three-quarters of primary school teachers report using them (e.g., Fresch, 2007; McNeill & Kirk, 2014)—that trend raises the question: Do tests still deserve a place in spelling instruction? A closer examination of relevant issues and evidence is warranted.

In media reports and other pronouncements regarding the elimination of spelling tests, distinctions between different types of tests are usually unmentioned. Rather, all such tests appear to have been removed indiscriminately. However, despite the stereotypical image of a test as that of a dreaded high-stakes exam, tests can be low-stakes or high-stakes and used for assessment or pedagogical purposes (for reviews, see Roediger & Karpicke, 2006b; Roediger & Butler, 2011). Further, tests can be administered in a variety of formats and taken at different points in the learning process (Benjamin & Pashler, 2015; Pan & Sana, 2021). Three test types are particularly relevant for spelling instruction: (a) pretests, (b) practice tests, and (c) posttests. Each type has specific purposes, at least one of which is unique. A summary of all three types is presented in Table 5.

In spelling instruction, the *pretest*—that is, a typically low-stakes test that occurs before any substantial learning activities have taken place—is intended to measure what students do and do not already know. Such tests may simply involve students attempting to spell words that are dictated aloud, whereas with other implementations, such as a *spelling inventory*, students' spelling skills may be assessed according to developmental stage benchmarks. Pretests commonly enable instructors to focus instructional time on content that students have yet to

**Table 5** Spelling test types

| Type | Description | Examples |
|---|---|---|
| Pretests | Tests that occur before learning activities; used to measure students' existing spelling knowledge and skills | Attempting to spell words that are dictated orally<br>Spelling inventories<br>The first test in the test-study-test method |
| Practice tests | Tests wherein students engage in *retrieval practice* (i.e., retrieving and applying spelling knowledge and skills); used to enhance learning | Study-copy-cover-compare methods<br>Self-corrected test method |
| Posttests | Tests that assess the outcome of instructional activities; used to measure the spelling knowledge and skills that students have attained | Assessments of different components of spelling skills<br>Friday spelling tests<br>The final test in the test-study-test method |

master, as opposed to content that has already been learned. For instance, if a pretest reveals that a student has sufficient mastery of certain morphological rules and not others, then an instructor might engage that student in activities involving the rules that have yet to be learned. In the spelling literature, that "concentrated attack" (Horn & Ashbaugh, 1920, p. viii) on difficult words or materials is thought to be highly beneficial. In fact, Allred (1984) and others have attributed the superiority of the *test-study-test* method (in which a pretest is followed by other learning activities that lead to a posttest) over the study-test method (e.g., Gates, 1931; Fitzgerald, 1953; Kilzer, 1926; Sherwin, 1969) to the diagnostic information that pretests provide. Overall, the consensus among many spelling researchers is that pretests yield useful and often critically important information (Gentry, 2007; Graham, 1983; Harris et al., 2017), contrary to claims that spelling tests are uninformative.

Another potential benefit of pretesting involves its capacity to enhance learning itself. Recent research has demonstrated the *pretesting* or *prequestion effect* (e.g., Kornell et al., 2009; Pan et al., 2019a, b), in which learners exhibit improved memory for information that is encountered on a pretest, relative to information that is simply studied and not pretested. These studies suggest that taking a pretest can lead to enhanced processing of the correct answers, and possibly because such guessing increases interest in the answers (Kornell & Vaughn, 2016; Pan et al., 2020). The opportunity to study the correct answers after a pretest is a precondition for learning benefits to manifest (Treiman & Kessler, 2014). However, pretesting has not yet been applied to spelling in controlled experiments. Hence, whereas the diagnostic capabilities of pretests for spelling are well-established, the extent to which pretests improve spelling ability directly remains to be investigated.

In spelling curricula, a *practice test*—that is, low-stakes tests wherein learners engage in retrieval practice after having had an opportunity to study—is intended to enhance (as opposed to measure) learning. As noted earlier, a large body of literature has shown that taking practice tests yields substantial pedagogical benefits (Bjork, 1975), including enhanced memory and retention, in some cases, better transfer of learning (Carpenter, 2012; Pan & Agarwal, 2018; Pan & Rickard, 2018). Providing correct answer feedback shortly after the test enhances its benefits (Rowland, 2014). A host of spelling researchers, including T. D. Horn (1947), Cook (1957), and Cohen (1969), have shown that practice testing in the form of the self-corrected test and/or the study-copy-cover-compare method yields better memory for the spellings of words than alternative tasks such as segmenting words, studying meanings of words, supplying missing letters, and other methods. Accordingly, many contemporary spelling researchers strongly recommend practice testing as an effective way to learn spelling words (e.g., Harris et al., 2017; Gentry, 2011; Graham et al., 2008; Reed, 2012). Practice testing may be the most helpful for words that are irregular for at least one sound, given that rules or other regularities are not fully adequate to guide correct spelling in those cases. It should also be noted that despite complaints about the stressful nature of spelling tests (though more applicable to high-stakes exams), low-stakes practice tests have been shown to reduce test anxiety rather than exacerbate it (e.g., Agarwal et al., 2014).

Two recent studies provide further insights into the value of practice testing. Across three experiments conducted in US classrooms, Jones et al. (2016) had 1st and 2nd grade students first take a pretest and then learn spelling words using self-corrected tests or a method known as *rainbow writing*. Often appearing on lists of "fun" spelling activities, rainbow writing entails copying words multiple times in different colors. In each experiment, practice testing yielded better ability to spell words on a posttest that occurred 1 day and/or 5 weeks later. Among 1st grade students, the magnitude of pretest-to-posttest improvement from practice

testing exceeded that from rainbow writing by over 300%. Additionally, students consistently reported liking testing more than rainbow writing by an approximately three-to-one margin. These results counter the claim that testing only reflects "short-term memory" (when benefits were observed at extended time intervals, as has occurred in prior work) and refute the suggestion that testing is unenjoyable. One possible explanation for students' preference for practice testing is that the experience of improving across successive tests is intrinsically motivating (for related theorizing see E. Horn & Ashbaugh, 1920). In contrast, rainbow writing did not yield consistent improvements. Overall, the results of Jones et al. reinforce the conclusion that practice testing can be a potent method of spelling instruction.

Possible limitations of practice testing are, however, suggested by Dymock and Nicholson (2017). In their study, 3rd grade students in a New Zealand elementary school learned spelling words across a 10-week period in one of two groups. The "list" group engaged in alphabetizing words, writing them in sentences, and using the study-copy-cover-compare method (i.e., practice testing), whereas the "strategy" group learned spelling rules (e.g., consonant doubling), practiced breaking words into syllables, and learned to identify vowel sounds. On weekly posttests, both groups performed equivalently when asked to spell the words that they had already learned, but the strategy group performed better when asked to spell new words that conformed to the rules that they had previously learned. Although the multi-task design and arguably inequitable access to information during training complicates interpretation (i.e., as the authors note, only the strategy group were directly informed about the rules), Dymock and Nicholson's results lend credence to the criticism that spelling tests support memorization more than transfer (see also Arra & Aaron, 2001). It should be noted, however, that the use of practice tests to learn spelling rules rather than just specific words, which has not been investigated to date, might yield more transferrable learning. Further, in the broader retrieval practice literature, swapping relatively low order practice test formats (e.g., simple cued recall) with higher order formats (e.g., requiring the generation of explanations) and tests with more detailed feedback can yield substantially more transfer (e.g., Hinze et al., 2011; see also Agarwal et al., 2014, Pan, Hutter, et al., 2019), but such tests have also not been investigated in the spelling literature to date.

Finally, the *posttest* (also called a criterial test or final test) is used in spelling instruction to assess the outcome of instructional activities. As Gentry (2011) and others have observed (e.g., Dunn, 2019), posttests hold instruction accountable. Without such tests, it is difficult to identify the aspects of spelling skills that students have successfully mastered or not. Posttests may take the form of the traditional Friday spelling test wherein the ability to spell words from an assigned list is assessed (such a test has face validity given that it involves retrieval of a word's spelling from memory, much as students do during writing). However, critics of traditional approaches to spelling, such as Hilden and Jones (2012), suggest that posttests should instead assess different components of spelling skills, such as knowledge of specific word features. In either case, posttests are often highly informative as to the state of students' spelling abilities. An alternative to posttesting involves analyzing students' writing in their essays and homework; such analyses are arguably the most authentic at measuring spelling ability, but can be more time-consuming and may miss benchmarks that posttests directly target (it should be noted, however, that scoring posttests can also take considerable amounts of time, and particularly when students' handwriting is poor). Overall, a consensus among many spelling researchers is that posttests are useful to help determine the efficacy of any spelling curricula that is being implemented (Gentry, 2011; Wallace, 2006; Westwood, 2014; see also Allred, 1984)—be it explicit or incidental, phonemic or morphemic, or otherwise.

## Concluding Remarks

A wealth of spelling research provides answers to the questions posed at the outset of this article. First, in the 21st century, *spelling does still matter*. In fact, in many respects—from the employment sector to perceptions of writers and their writing, and even in online settings— spelling matters at least as much as it has in prior centuries. Second, there is substantial evidence favoring the explicit teaching of spelling. Although the accrual of spelling ability follows a developmental trajectory, and human beings have some capacity for developing spelling proficiency on their own, it is unrealistic to assume that spelling abilities will develop fully in the absence of explicit instruction. Third, some aspects of traditional spelling curricula, such as the use of spelling tests popularized by the *Horn-Ashbaugh Speller* and other textbooks of the same era, remain valid today, whereas others, such as an exclusive focus on learning individual words rather than patterns common to multiple words, are not.

Importantly, although there are many irregularities in English spelling, the study of the regularities that do exist, which was once derided as ineffective and unimportant, is now recommended by many spelling researchers. Such study might occur via phonemic, morphemic, and other instructional approaches, of which some instantiations enjoy at least some empirical support. Moreover, although the ability to spell is now considered to involve multiple skills ranging from knowledge of spelling patterns to spelling unfamiliar words, the potential exists, based on our examination of the spelling literature, to design curricula that help develop students' proficiency in all of those constituent skills.

The English language's Anglo-Saxon roots, as modified by the influence of other languages, such as Greek, Latin, and French, have led to a language that is efficient by some measures, such as number of words needed to express a request or issue a warning, and which is characterized by competing spelling rules and frequent mismatches between spelling and pronunciation. From an efficiency standpoint, children learning English as a first language and adults learning English as a second language might wish that were not the case, but for a variety of reasons, it is unrealistic to think that some government intervention will redo the English language in a way that aligns spelling and pronunciation to the same degree as other alphabetic languages. Noah Webster, in 1806, in his *A Compendious Dictionary of the English Language*, had the stature to eliminate some inconsistencies in English spelling, which led to some small changes, such as dropping the "u" in *color* and *honor* and the final "k" in words such as *public* and *music*, but it is difficult to imagine any large-scale changes happening in this era. If correct spelling remains important for all of the reasons we have stressed, then our basic message is that we need to draw on what we know across multiple psychological disciplines to optimize the learning process—that is, taking advantage of research-supported tools and approaches where available, including explicit spelling instruction, practice testing, and psycholinguistic approaches. Also, activities that reflect societal approbation of the importance of spelling, such as the long tradition of spelling bee competitions, which have been uniquely popular in the USA, should be encouraged.

Finally, it should be emphasized that there remains substantially more to be learned about the development and bases of spelling skills and how to optimize spelling instruction. In particular, the plethora of instructional techniques now in existence deserve to be subjected to well-controlled and well-powered experimental studies that support strong causal inference (in a literature that has arguably relied too heavily on small-*n* studies). More rigorous research designs are needed to provide more definitive evidence, and alternative instructional methods need to be scrutinized. New systematic reviews and meta-analyses of instructional techniques should attempt to avoid the methodological and interpretative limitations that have affected

prior such efforts. Last but not least, further research to identify any influences of technological innovations on spelling is definitely warranted. In short, there is still more to understand about spelling, which Noah Webster once described as "the foundation of reading and the greatest ornament of writing" (Webster, 1783, p. 26), and which an abundance of evidence indicates remains fundamentally important in modern society.

## Declarations

**Conflict of Interest**  The authors declare that they have no conflict of interest.

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