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Morphological Knowledge and Self-Efficacy of SLPs and Educators

Keisey Fumero, PhD[1], and Carla Wood, PhD[1]

Abstract

The current study examines the morphological knowledge (MK) and self-reported MK self-efficacy of speech-language pathologists (SLPs) and educators in an effort to inform professional development and preservice training related to MK and skills in implementing morphological instruction. This sample of 850 U.S. participants consisted of SLPs (n = 406), English language arts teachers (n = 178), special education teachers (n = 201), and reading specialists (n = 65). A survey elicited professional experience, self-efficacy related to the application of MK, and a MK measure. Correlations and analyses of variance (ANOVAs) between the groups that differed by disciplinary backgrounds were conducted to assess differences in MK and MK self-efficacy. The results yielded two key findings: (a) MK differs by profession, with SLPs performing with higher accuracy in morpheme counting and nonword derivation tasks and (b) MK self-efficacy differs by profession with reading specialists rating themselves significantly more confident than all other professions.

Keywords

evidence-based practices, intervention strategies, survey, research, speech-language pathologists (SLPs), language/linguistics

Historically, researchers have worked closely with policymakers and curriculum developers to ensure that classroom literacy instruction focuses on building the foundational skills of phonemic and phonological awareness. In contrast, preparing educational personnel to build morphological knowledge (MK) skills has been considered to a lesser extent. However, in the last decade, MK has received more attention as a core knowledge area for speech-language pathologists (SLPs; Brimo & Henbest, 2020), as it has become increasingly accepted that, along with phonemic and phonological awareness, MK is an important subskill associated with learning to read (Carlisle, 2000; Colenbrander et al., 2021; Levesque et al., 2018).

Growing recognition of the importance of MK is also evident in many universal standards for English language arts (ELA), which outline what a student should know and be able to do at the end of each grade level. In third grade, for example, the Common Core Standards state that students are expected to use a known root word as a clue to the meaning of an unknown word with the same root (e.g., company, companion) (CCSS.ELA-Literacy.L3.C). In fact, students are expected to understand the meaning of prefixes and suffixes to increase grammatical accuracy and aid in the understanding of unknown words when reading; however, concerns have been raised as to adequacy or frequency of MK instruction that occurs in typical instructional practices (Gabig & Zaretsky, 2013; Henbest et al., 2019).

Among barriers to MK instruction, the existing literature reports a lack of training and preparation in MK instruction for educational personnel (e.g., Good, 2019; Washburn & Mulcahy, 2019) and difficulties implementing MK interventions without extensive training (Colenbrander et al., 2021). Based on a survey study of 105 school-based SLPs, recruited from American Speech-language and Hearing Association (ASHA)'s School-Based Issues Special Interest Group 16, 30% of the SLPs reported that they did not receive training in MK instruction in their preservice training and 17% were uncertain (Good, 2019). Only 56% had received continuing education related to MK. In addition, 67.7% of the SLPs in Good's study rated themselves as having moderate to low levels of confidence in providing MK instruction. The need for MK training for educational personnel is further substantiated by the findings of Colenbrander and colleagues' (2021) study, which reported how teaching assistants (TAs) found structured word inquiry (SWI), a type of MK instruction, challenging to deliver. The TAs reported that many of the concepts were new to them, which may have reduced their ability to tailor instruction and feedback to their students.

Given concerns for preparation and training, further examination of professionals' knowledge of morphology

[1]Florida State University, Tallahassee, USA

Corresponding Author:
Keisey Fumero, School of Communication Science and Disorders, Florida State University, 201 West Bloxham, Tallahassee, FL 32306-1200, USA.
Email: fumero.keisey@gmail.com

and skills in implementing morphological instruction may be useful in informing professional development and preservice training. In response, the current study aims to examine SLPs and educator's MK and self-efficacy ratings. Toward this end, we review the role of MK in literacy and the importance of professional knowledge, skill, and self-efficacy when implementing morphology-focused instruction.

Role of Morphological Knowledge in Language and Literacy

First, it is important to note that the terms *morphological awareness* and *morphological knowledge* are both used in the literature; however, based on the arguments recently posed by Kirby and Bowers (2018) regarding the fact that unlike morphological awareness, morphological knowledge may vary on the level of explicitness depending on the type of task and/or the skills of the individual being tasked, therefore the term *morphological knowledge* (MK) will be used throughout this article. Morphological knowledge refers to the understanding of the morphemic structure of words and the ability to combine morphemes or decompose words into different morphemes (Apel, 2014; Carlisle, 1995, 2000; Levesque et al., 2018; Nagy & Townsend, 2012). Morphemes are the smallest units of meaning and include free bases (e.g., mother, book, day, act, run), bound bases, and roots, which often do not stand alone (e.g., "aud" in audiology, audition, audience), and affixes (i.e., prefixes and suffixes). Affixes can be categorized into two types of morphemes: inflectional and derivational. *Inflectional morphemes* are those that provide additional information about the base word (e.g., quantity, tense, comparisons) but do not change the meaning of the word. *Derivational morphemes* modify the base they are added to by changing their meaning and/or grammatical word class. For example, when the inflectional plural -s morpheme is added to "book," the morpheme *-s* changes the quantity. Contrastingly, when the derivational morpheme *-or* is added to a base such as *act*, the grammatical word class is changed from a verb (act) to a noun (actor).

In prior systematic reviews and meta-analyses, researchers have reported that MK instruction and intervention is a useful component in improving language and literacy skills (e.g., Bowers et al., 2010; Goodwin & Ahn, 2010, 2013). Specifically, researchers have noted that MK is beneficial for several subskills of reading, including decoding (Deacon & Kirby, 2004; Nagy et al., 2006; Roman et al., 2009), spelling (Chomsky & Halle, 1968; Deacon & Bryant, 2006), vocabulary (Baumann et al., 2003; Carlisle & Fleming, 2003), and reading comprehension (Kotzer et al., 2021; Vadasy et al., 2006). The impact of MK has been noted not only for typically developing English proficient students but also for students with language-based learning disabilities (Casalis et al., 2004; Elbro & Arnbak, 1996) and English learners (ELs) (Crosson et al., 2019; Crosson & Moore, 2017; Keiffer & Lesaux, 2008).

SLP and Educator Morphological Knowledge and Self-Efficacy

To successfully foster MK and implement effective instruction or intervention, educators (i.e., ELA teachers, special education teachers, and reading specialists) and SLPs must have an explicit understanding of morphology as it pertains to language, the specific morphological structure of the English language, and the overall self-efficacy to implement such instruction (Colenbrander et al., 2021; Washburn et al., 2016). Research indicates that educators and SLPs use their explicit knowledge of language to assess and treat children with language-based learning disorders (Moats, 2004; Piasta et al., 2009). Without in-depth knowledge of morphology, it may be difficult for them to implement evidence-based recommendations. Moreover, effective communication and collaboration between educational personnel is bolstered by common understanding and knowledge.

Most of the prior research on MK of educational personnel has predominantly focused on teachers' knowledge and skills (e.g., Moats, 1994; Moats & Foorman, 2003; Piasta et al., 2009; Purvis et al., 2016; Washburn & Mulcahy, 2019). In a survey study by Moats (1994), participants were asked to define terms, provide examples, and analyze phonemes and morphemes. Results of this survey indicated that teachers demonstrated little knowledge as it pertained to morphology terminology. For example, they were unable to differentiate between *inflectional* and *derivational morphemes*, and just over 25% of the 89 participants were able to count the number of morphemes in simple one- to two-syllable words. In a similar study, Washburn and Mulcahy (2019) examined the MK of general education teachers and special education teachers. They reported that, on average, teachers were able to correctly count syllables and sounds, but had difficulties identifying individual word parts and counting morphemes in words. Furthermore, Washburn and Mulcahy reported that general education teachers were more accurate on MK tasks than special education teachers.

In addition, while explicit MK is important, the self-efficacy of service providers is another aspect that warrants further study. *Self-efficacy* is defined as one's ability to organize and execute a task based on one's perceived ability to complete said task (Bandura, 1977). Self-efficacy influences choices, effort, and attention when selecting and implementing tasks (Sharp et al., 2016). A few studies have examined self-efficacy as it pertains to literacy-related concepts (e.g., Cunningham et al., 2004; Messier & Jackson, 2014; Spear-Swerling et al., 2005),

and in one study, Spear-Swerling and colleagues assessed educator self-efficacy as it related to MK. The investigators found that educators performed poorly on MK tasks and self-efficacy ratings were lower for MK concepts than they were for phonological concepts. Moreover, their self-efficacy ratings appeared to be an overestimation when compared with their actual performance accuracy on MK exercises. This finding is particularly concerning considering that Cunningham and colleagues suggest that over-inflated perceptions of skill level may reduce the chances of individuals seeking continuing education opportunities

Finally, there is a need to inform professional development efforts designed for special education teams serving students with language-based learning disorders. Such teams often include the general classroom teacher, special education teachers, SLPs, and reading specialists. Educational personnel receive various preservice and in-service opportunities to support their instruction. Some studies have shown that having more reading-related professional development is related to students' language and literacy outcomes (McCutchen et al., 2002; Researchers have argued that there is inadequate preparation in concepts related to language and literacy assessment, instruction, and intervention (Porter et al., 2022; Putman & Walsh, 2021; Reid-Lyon & Weiser, 2009). Thus, more research is needed on the knowledge of such concepts, which includes MK, to inform the development of in-service professional development opportunities to support educational professionals' integration of MK into reading instruction, which ultimately affect language and literacy outcomes of students with and without disorders (Bowers et al., 2010; Goodwin & Ahn, 2013; Kirby & Bowers, 2018).

Research Aims

In response to the current gaps in the literature, the present study aimed to describe the perceptions, knowledge, and skills on MK tasks of educators and SLPs regarding the role of MK instruction. The current study is driven by the following questions:

RQ1. Is there a significant difference in MK (measured as morpheme counting and nonword derivation task accuracy) between groups of educational personnel who differ in disciplinary background (ELA teachers, SLPs, special education teachers, and reading specialists)?
RQ2. Are there group differences in self-efficacy ratings between groups who differ in disciplinary background?
RQ3. Is there a relation between participants' self-efficacy ratings and MK measured as morpheme counting and nonword derivation task accuracy)?

Method

Instrument Development

During the drafting phases of the survey, it was piloted with a group of individuals including a doctoral advisor (n =1), doctoral students (n = 6), and SLPs (n = 5). Their feedback was used to finalize the survey. The pilot responses were not included in the final database. The survey consisted of four components: (a) participant demographics, (b) professional experience, (c) self-reflection on knowledge and skills, and (d) a MK measure.

Demographics and professional experience. The demographics component of the survey consisted of eight questions. This set of questions sought information such as type of profession (i.e., ELA teacher, special education teacher, SLP, or reading specialist), years of experience, state where they practice, and grade they teach or treat. This information was used to describe the sample and to also examine relations between responses and participants' profession.

Self-efficacy. This section sought information on the participants' MK self-efficacy. The five self-efficacy questions were adapted from a previous study which assessed professional self-efficacy related to vocabulary instruction (Brown, 2019). The original questions were adapted to shift focus from vocabulary to MK. Participants were asked to reflect on their understanding of morphology and MK while answering questions related to assessment, intervention, and role of MK in language and literacy development. The questions were presented as a matrix table and included five self-efficacy rating questions. Participants used a 5-point Likert-type scale to respond: 1 = *strongly agree*, 2 = *somewhat agree*, 3 = *neutral*, 4 = *somewhat disagree*, and 5 = *strongly disagree*. An example question was, "I feel confident in my ability to determine appropriate morphological knowledge goals for children with limited language and literacy skills." Cronbach's alpha for the five-item self-efficacy scale was .89, suggesting very good internal consistency reliability for the scale (Pallant, 2020).

MK measure. The first author developed a MK measure which consisted of 21 open-ended questions and nine multiple-choice exercises. This section asked participants to answer questions related to different morphological concepts. Prior to beginning the MK measure, the participants were provided with definitions for *MK* and *morpheme*. The first 10 questions asked the participants to count the number of inflectional and derivational morphemes in words and phrases. The decision to include morpheme counting tasks was based on the wide use of such tasks when assessing education professionals' morphological skills (e.g., Moats, 1994; Washburn & Mulcahy, 2019). The words and phrases

in the section were developed by the first author and they sought to include a balanced number of single and multimorphemic words. The number of morphemes in the words section ($n = 6$) ranged from 1 to 4 morphemes. The number of morphemes in the phrases ($n = 4$) ranged from 3 to 7 morphemes. An example was, "How many morphemes (including free, bound, derivational, or inflectional) are in the phrase "SHE LIKES TO EAT WATERMELON?" This subset of the 10-item morpheme counting questions had a Cronbach's alpha of .84, suggesting good internal consistency reliability for the scale (Pallant, 2020).

The final nine questions of the survey involved *nonword derivation*, a task commonly used as a measure of MK (Mahony, 1994). The rationale for inclusion of a non-word derivation tasks in this particular survey was based on the use of such tasks in the relevant literature (e.g., Kieffer & Lesaux, 2012; Tighe & Schatschneider, 2015). The nonword derivation items included in the survey were from a measure used in previous research (Foorman et al., 2021). Participants were asked to read a sentence (e.g., "The meeting was very _____") and complete the sentence by choosing one of four pseudowords that has an appropriate derivational affix (e.g., "(a) lorialize (b) lorialism (c) lorial (d) lorify"). Cronbach's alpha in previous research was reported to be .76 (Foorman et al., 2021). In the current study, Cronbach's alpha coefficient was .37.

An additional 11 MK questions were given to participants but were not included in the analyses due to weak internal consistency reliability. To encourage responses and reduce nonresponse error, the final question of the survey prompted participants with the option to submit their email for the chance to be entered in a raffle to win a free iPad mini. Emails were only used to randomly select a winner and were not used to identify participant responses.

Procedures

The university Institutional Review Board (IRB) approved the distribution of the survey link using Qualtrics. A *Tailored Design Method* was implemented in the design of this study (Dillman et al., 2014). The survey was developed with a population in mind, educators and SLPs who address the language and literacy needs of their students. The recruitment process was split into two phases.

In the first phase, recruitment was conducted through two social media platforms, Instagram and Facebook. The study announcement was posted to Instagram using a page specifically created by the primary investigator to reach SLPs and educators. The distribution of the survey relied mostly on public shares of the post using an anonymous link to the survey through Qualtrics. The survey link remained active on Instagram and Facebook for 3 months. Instagram post insights revealed that the post was shared 83 times and reached a total of 3,294 people. The survey link was shared on Facebook using the first author's main page and specific Facebook groups. The survey was posted to five different groups created for ELA teachers ($n = 2$), SLPs ($n = 1$), reading specialists ($n = 1$), and special education teachers ($n = 1$). Members in each group ranged from 11,000 to 64,400. Because the response to the survey link depended on members that were currently active on Facebook during the time of the post, a calculated response rate would likely result in an underestimation.

The second phase of recruitment relied on communication via email. In this phase, the first author aggregated a list of emails provided from a previous study (Brown, 2019) which included 13,686 teachers located in Florida, Georgia, and Alabama. A second list of emails ($n = 124$) was also created using ASHA's Advocacy page where contact information for each state's speech-language hearing association and special education department could be accessed. The email announcement asked recipients to forward the survey link to professionals that met the survey inclusion criteria (i.e., ELA teachers, special education teachers, SLPs, and reading specialists). Qualtrics reported that a total of 282 responses were due to email contact. Low response rates were expected as contact by email often achieves low responses (Dillman et al., 2014). Because distribution relied in large part on the responsiveness of the contacted administrator, a calculated response rate would likely be an underestimation.

Inclusion criteria. Participants who indicated they were within the profession (e.g., ELA teachers, special education teachers, reading specialists, and SLPs) were included in the study. Respondents outside the United States were excluded from the study ($n = 44$). Finally, participants who indicated that less than 10% of their caseload had language and literacy goals were excluded ($n = 7$).

Missing data. A total of 1,128 respondents opened the link and initiated the survey. Of those who began the survey, 850 participants (75%) submitted their responses. According to the Qualtrics Response Data Set, 850 submissions were made, but only 650 participants (76%) finished the survey. Qualtrics defines "Finished" submissions ($n = 650$) as surveys in which the respondent has reached an end point of the survey, where unfinished surveys ($n = 200$) indicate a submission where the respondent left their survey before reaching an end point and the response was instead closed manually or closed due to an expired session. It is important to note that although 650 finished the survey, as denoted by Qualtrics, there were instances where participants skipped questions or left questions unanswered. Due to the use of sum scores for the analyses, participants who left questions unanswered were dropped from the analyses. Therefore,

Table 1. Demographics of Participants in the Morphological Study.

Characteristic	All participants $N = 850$	ELA teachers $n = 178$	Speech-language pathologists $n = 406$	Special education teachers $n = 201$	Reading specialists $n = 65$
Gender					
Female	827	167	401	195	64
Male	23	11	6	5	1
Age (in years)					
M (*SD*)	39.96 (11.23)	42.28 (11.13)	37.78 (10.77)	39.27 (10.43)	49.03 (11.17)
Range	22–73	22–70	22–66	22–73	27–72
Race (%)					
African American/Black	5.2	8.0	3.5	6.5	4.5
Asian/Pacific Islander	3.4	2.9	3.7	4.0	1.5
Caucasian	88.7	86.8	90.8	84.5	93.9
Native American	1.4	1.7	0.7	3.0	0
Multiracial	1.2	.6	1.2	2.0	0
Ethnicity					
Hispanic	10	15.2	8.5	11.5	89.4
Non-Hispanic	90	84.8	91.5	88.5	10.6
Education (%)					
Bachelor's	20.3	47.8	4.2	30	16.7
Master's	74.7	47.2	91.9	65	71.2
Doctorate	3.5	3.9	2.7	3.5	7.6
Years in profession					
M (*SD*)	12.87 (11.23)	14.89 (9.84)	11.82 (10.02)	10.73 (8.45)	20.40 (10.02)
Range	1–48	1–48	1–42	1–48	1–43
Region (%)					
Northeast	17.9	6.6	22.7	17.1	21.3
Southeast	38.6	75.3	26.8	29.4	41.0
Midwest	15.8	6.6	17.2	21.9	13.1
Southwest	3.8	3.0	3.1	5.9	3.3
West	23.9	8.4	30.2	25.7	21.3

Note. ELA = English language arts.

group sizes vary in the self-efficacy ($n = 791$), morpheme counting scores ($n = 546$) and nonword derivation ($n = 633$) total scores. Descriptive data were included for all participants who submitted the survey ($n = 850$).

Sample Characteristics

The final sample consisted of 850 participants with varying professional backgrounds (e.g., ELA teachers, special education teachers, reading specialists, and SLPs). On average, the respondents had about 13 years of experience ($SD = 9.97$) and a large majority (75%) had a master's degree, while (20%) had at least a bachelor's degree. This high percentage of participants with master's degrees was to be expected considering that several states require SLPs, special education teachers, and reading specialists to have a master's degree. The majority of the survey respondents identified as Caucasian (87%). The survey was distributed broadly; however, approximately a third of the participants reported working in the southeast region (38.6%). Participant characteristics are summarized in Table 1.

Results

The present study aimed to (a) describe and compare participants' MK by profession, (b) describe and compare self-efficacy by profession, and (c) determine whether a relationship exists between participant self-reported self-efficacy and MK.

MK by Profession

To answer the first question which examined potential group differences in MK, we first report descriptive statistics of participant performance on each MK task. Descriptive statistics revealed that, as a group, participants completed the 10 Morpheme Counting tasks with 80% accuracy ($M = 7.94$, $SD = 2.47$) and the eight Nonword Derivation tasks with 87% accuracy ($M = 6.96$, $SD = 1.15$). As a group, participants demonstrated a high percentage of accuracy on both MK tasks. Table 2 provides composite scores by profession.

A one-way between-group analysis of covariance was conducted to compare MK, as measured by performance on

Table 2. MK Composite Scores by Profession.

Profession	Morpheme counting range 0–10 *M* (*SD*)	Nonword derivation range 0–8 *M* (*SD*)
ELA	*n* = 100 7.45 (2.81)	*n* = 123 6.89 (1.22)
SLPs	*n* = 313 8.59 (1.67)	*n* = 328 7.04 (1.09)
SPED	*n* = 91 6.52 (3.44)	*n* = 134 6.75 (1.18)
RS	*n* = 42 7.40 (2.39)	*n* = 50 7.20 (1.19)

Note. MK = morphological knowledge; ELA = English language arts; SLPs = speech-language pathologists ; SPED = special education teacher; RS = reading specialist.

Table 3. Nonword Derivation Task Accuracy Estimated Marginal Means by Profession.

					95% Confidence interval	
Profession	Unadjusted mean	*SD*	Adjusted mean	*SE*	Lower bound	Upper bound
ELA teacher	6.98	1.09	6.995	0.097	6.80	7.19
SLP	7.15	1.02	7.147	0.06	7.03	7.26
Special education teacher	6.92	1.18	6.909	0.094	6.72	7.09
Reading specialist	7.33	0.96	7.359	0.157	7.05	7.67

Note. ELA = English language arts; SLP = speech-language pathologist.

non-word derivation tasks, between the different professions, while controlling for years of experience. The independent variable was the professional field (general education, special education, speech-language pathology, and reading specialist) and the dependent variable consisted of the non-word derivation tasks composite scores. Participants' number of years of experience in their field was used as the covariate in this analysis. Preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, or reliable measurement of the covariate. After adjusting for the number of years of experience, there was a significant difference between the groups of participants from different disciplines on non-word derivation tasks, $F(3, 626) = 2.875$, $p = .036$, partial eta squared = .014. There was not a significant relationship between the years of experience and performance on non-word derivation tasks ($p = .334$ and partial eta squared value of .001). See Table 3 for the estimated marginal means.

An analysis of covariance (ANCOVA) was attempted to control for years of experience; however, due to violations of the assumption of equal variance, years of experience could not be parsed out across groups using ANCOVA. As a result, an analysis of variance (ANOVA) with Welch corrections was conducted to explore potential differences in morpheme counting between groups that differed in discipline and years of experience. There was a statistically significant difference in morpheme counting for the three discipline groups, $F(3, 124.14) = 16.108$, $p < .001$. The effect size, calculated using eta squared, was .03. Post hoc comparisons using Dunnett's test revealed that the mean accuracy for SLPs ($M = 8.59$, $SD = 1.67$) was significantly greater than morpheme counting accuracy for ELA teachers, special education teachers, and reading specialists (see Table 4).

Self-Efficacy by Profession

To address the next research aim which examined potential group differences in self-efficacy, descriptive statistics were first reported to describe participants' self-efficacy ratings by profession (see Table 5). To further answer the third research question, an ANCOVA was attempted to control for years of experience; however, due to violations of the assumption of equal variance, years of experience could not be parsed out across groups using ANCOVA. As a result, an ANOVA with Welch corrections was conducted.

The ANOVA revealed significant differences by profession in the self-efficacy summed score, $F(3, 230.103) = 8.005$, $p < .001$. The effect size, calculated using eta squared, was .11. Because of the significant difference in the participants' self-efficacy ratings, post hoc comparisons were made using Dunnett's test to analyze the differences

Table 4. Post Hoc Dunnett's Correction Multiple Comparison: Morpheme Counting.

Profession	Mean difference	*SE*	*p*	95% Confidence interval	
				Lower bound	Upper bound
ELA teacher	−1.14	0.30	.001	−1.93	−0.35
Special education teacher	−2.07	0.37	<.001	−3.08	−1.07
Reading specialist	−1.19	0.38	.018	−2.23	−0.14

Note. Comparisons with SLPs. ELA = English language arts; SLP = speech-language pathologist.

Table 5. Self-Efficacy Composite Scores by Profession.

Profession	Self-efficacy composite score *M* (*SD*)	Average self-efficacy scores
ELA (*n* = 161)	13.81 (5.11)	2.76
SLPs (*n* = 380)	13.82 (4.37)	2.76
SPED (*n* = 185)	14.58 (5.28)	2.91
RS (*n* = 65)	11.03 (4.97)	2.20

Note. Participants used a 5-point Likert-type scale to respond: 1 = *strongly agree*, 2 = *slightly agree*, 3 = *neutral*, 4 = *slightly disagree*, and 5 = *strongly disagree*. Average self-efficacy scores = mean composite score divided by five self-efficacy items. Range: 5–25. ELA = English language arts; SLP = speech-language pathologist; SPED = special education teacher; RS = reading specialist.

by profession. Post hoc comparisons revealed significant differences between reading specialists and all other professions, with reading specialists rating their efficacy higher than other professions (refer to Table 6).

Participant Self-Efficacy and MK

Finally, correlations were examined to consider potential relations between participants' MK knowledge and Self-Efficacy composite scores. No significant associations were found between Morpheme Counting composite scores and Self-Efficacy. A small significant positive correlation was found between participants' Nonword Derivation composite scores and Self-Efficacy ($r = .09$, $p = .03$).

Discussion

In this survey study, professionals reflected on their self-efficacy related to application topics of morphology and completed MK tasks. The results yielded two key findings: (1) MK differs by profession and (2) MK self-efficacy differs by profession. Before discussing the key findings of this study, we will first address the relation between self-efficacy and MK.

The MK findings of the present study are consistent with those of previous studies related to the knowledge gaps demonstrated by educators (i.e., ELA teachers and special education teachers) and language and literacy specialists (i.e., SLPs and reading specialists) with regard to language concepts (Purvis et al., 2016; Washburn et al., 2016). Other studies have assessed educator's (Moats, 2009; Spear-Swearling et al., 2005) and SLPs' (Good, 2019) competence in counting morphemes in words and phrases and found that professionals had difficulties completing this task with accuracy. This could reflect a lack of knowledge in terminology (*syllables* vs. *morphemes*) or skill in the counting of syllables rather than morphemes. Among unique findings was the significant differences between professionals in the nonword derivation task after controlling for years of experience; however, it was beyond the scope of this survey to identify the variables contributing to higher performance.

Professionals' Self-Efficacy

Although previous research has found that educators and related service personnel rate themselves as having proficient to expert knowledge in topics related to language and literacy (e.g., Cunningham et al., 2004; Spear-Swerling et al., 2005), the professionals in the present study were more likely to rate themselves as moderately confident ("somewhat agree" and "neutral") rather than expert ("strongly agree"). When considering

Table 6. Post Hoc Dunnett's Correction Multiple Comparison: Self-Efficacy Summed Scores.

			95% Confidence interval	
Profession	Mean difference	*SE*	Lower bound	Upper bound
ELA teacher	−2.78*	0.74	−4.83	−0.72
SLP	−2.79*	0.66	−4.59	−0.91
SPED teacher	−3.55*	0.73	−5.58	−1.51

Note. Comparisons for reading specialist. ELA = English language arts; SLP = speech-language pathologist; SPED = special education teacher; RS = reading specialist.
*The mean difference is significant at .05.

that the present survey asked professionals to rate themselves with regard to their ability to *apply* their knowledge of morphology rather than their knowledge of morphological terminology or ability to morphologically analyze words and phrases, then the findings of the present study may align with those of previous studies. For example, Washburn and Mulcahy asked teachers both ability (e.g., related to teacher's ability to morphologically analyze words) and application (e.g., related to teacher's pedagogical content knowledge about teaching morphology) questions and found teachers to be more likely to accurately answer application questions than ability questions.

Finally, although the causal relations cannot be derived to explain the self-efficacy scores, it is possible that the different levels of training related to the topic may have affected the participants' responses. For example, the finding that reading specialists had significantly higher self-efficacy ratings may be partially explained by their training which includes extensive training in the areas of reading development, acquisition, assessment, and instruction, which may include in-depth discussions of morphology (International Reading Association [IRA], 2004).

Contributions of MK to Professional Self-Efficacy

The current finding of a small positive relation between participant self-efficacy and skill substantiates the knowledge base on the relationship between skill and self-efficacy. The small positive correlation may suggest that ability to perform highly on the Nonword Derivation Task may influence the ability to adequately describe the role of morphology in literacy. Although the correlation found in this study was smaller than expected, previous studies have found significant correlations between education professionals' self-efficacy and their actual knowledge when it relates to language concepts (e.g., Mather et al., 2001; Spear-Swearling, 2005). However, it is important to note that this survey did not explicitly ask professionals to reflect on their own *ability* to perform on MK tasks, instead it assessed professionals' self-efficacy ratings of the *application* of their understanding of morphology and MK. As such, there may have been a disconnect between MK tasks and self-efficacy ratings, which may be a plausible explanation for the lack of significant relations by profession and the small size of the correlation.

Limitations

Although the present study provided insight into the MK of educators and SLPs, caution must be taken when interpreting the results. Although the survey reached several states across the nation, the sample may not adequately reflect educators and SLPs from all regions of the country. Many respondents (approximately 39%) reported being from the southeast region of the United States. As such, it cannot be assumed that trends in the current findings would generalize to other educators and SLPs working in other regions. Another weakness to be considered is the unequal sample sizes by profession. Specifically, reading specialists were under-represented in the current respondent pool. This weakness may also be attributable to the current study's recruitment methods. Almost half of the survey participants were SLPs (48%), same professional background as the authors, while only 8% of the participants were reading specialists. Similarly, the professions included in this study are not exhaustive and there may be other related professions that may provide further insight.

In addition, the length of the survey could also be considered a weakness of the study given that of the 850 participants who began the survey, only 650 (76%) of them completed the survey in its entirety. Survey length has been previously noted to significantly affect response rates, where longer surveys are not typically completed (Kalantar & Talley, 1999). The survey included a large number of demographics and experience questions that may have exhausted participants' time allocation prior to reaching the MK tasks.

Future Directions

The findings and limitations of the current study warrant the need for empirical study of the MK and professional

self-efficacy related to MK. First, future studies should consider implementing purposeful sampling methods in an effort to have a sample that includes a more diverse pool of educators and language and literacy specialists. In future studies, it may also be beneficial to intentionally oversample reading specialists and/or commit resources for recruiting across the fields of language and literacy instructors. The significant group differences found in the current study point to the need for further research on the potential impact of training and exploration of novel types of in-service and preservice training that may be associated with high MK and foster self-efficacy in the application of MK. The findings compel the need for empirical study to add to the knowledge base on impacts of professional development on MK and the association between MK, quality of MK instruction, and student achievement outcomes.

Implications and Conclusion

Despite the limitations of the current study, we still find value in understanding the knowledge of language concepts, which includes MK, among interdisciplinary education teams to inform the development of in-service professional development opportunities tailored to support educational professionals' integration of MK into reading instruction, by profession, which ultimately affect language and literacy outcomes of students with and without disorders. Although not all professionals in the current study demonstrated expert levels of MK and self-efficacy, it is important to consider that MK, and the role it plays in language and literacy, is a relatively new area of focus. As such, it is possible that some participants had not received training related to MK due to the previous lack of emphasis on MK historically.

In addition, the differences in professional knowledge and confidence levels as it relates to morphology may call for the implementation of collaborative models between interdisciplinary professional. Collaborative MK instruction is aligned with Darling-Hammond and colleagues (2009) who underscore the need and benefits of implementing collaborative models between educators and related service personnel due to the vast range of expertise among professions. For SLPs seeking guidance, Meaux and colleagues (2020) provide a tutorial and Fumero and Tibi (2020) provide a guide for assessment and implementation of morphological instruction.

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ORCID iDs

Keisey Fumero https://orcid.org/0000-0002-6274-545X
Carla Wood https://orcid.org/0000-0002-0551-0638

References

Apel, K. (2014). A comprehensive definition of morphological knowledge: Implications for assessment. *Topics in Language Disorders*, *34*(3), 197–209. http://doi.org/10.1097/TLD.0000000000000019

Bandura, A. (1977). Self efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–216. https://doi.org/10.1037/0033-295X.84.2.191

Baumann, J. F., Edwards, E. C., Boland, E. M., Olejnik, S., & Kame'enui, E. J. (2003). Vocabulary tricks: Effects of instruction in morphology and context on fifth-grade students' ability to derive and infer word meanings. *American Educational Research Journal*, *40*(2), 447–494. https://doi.org/10.3102/00028312040002447

Bowers, P. N., Kirby, J. R., & Deacon, S. H. (2010). The effects of morphological instruction on literacy skills. *Review of Educational Research*, *80*(2), 144–179. https://doi.org/10.3102/0034654309359353

Brimo, D., & Henbest, V. S. (2020). The importance of speech-language pathologists' explicit knowledge of morphology. *Language, Speech, and Hearing Services in Schools*, *51*(3), 561–571. https://doi.org/10.1044/2020_LSHSS-19-00057

Brown, D. M. (2019). Teachers' and Speech-Language Pathologists' Perceptions of and Responses to Students' African American English Use within Academic Settings.

Carlisle, J. F. (1995). Morphological knowledge and early reading achievement. *Morphological Aspects of Language Processing*, *17*(8), 189–209. https://doi.org/10.2307/495689

Carlisle, J. F. (2000). Awareness of the structure and meaning of morphologically complex words: Impact on reading. *Reading and Writing*, *12*, 169–190. https://doi.org/10.1023/A:1008131926604

Carlisle, J. F., & Fleming, J. (2003). Lexical processing of morphologically complex words in the elementary years. *Scientific Studies of Reading*, *7*(3), 239–253. https://doi.org/10.1207/S1532799XSSR0703_3

Casalis, S., Colé, P., & Sopo, D. (2004). Morphological knowledge in developmental dyslexia. *Annals of Dyslexia*, *54*, 114–138. https://doi.org/10.1007/s11881-004-0006-z

Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. Harper & Row.

Colenbrander, D., Parsons, L., Bowers, J. S., & Davis, C. J. (2021). Assessing the effectiveness of structured word inquiry for students in grades 3 and 5 with reading and spelling difficulties: A randomized controlled trial. *Reading Research Quarterly*, *57*(1), 307–352. https://doi.org/10.1002/rrq.399

Crosson, A. C., McKeown, M. G., Moore, D. W., & Ye, F. (2019). Extending the bounds of morphology instruction: Teaching Latin roots facilitates academic word learning for English Learner adolescents. *Reading and Writing*, *32*, 689–727. https://doi.org/10.1007/s11145018-9885-y

Crosson, A. C., & Moore, D. (2017). When to take up roots: The effects of morphology instruction for middle school and high school English learners. *Reading Psychology*, *38*, 262–288. https://doi.org/10.1080/02702711.2016.1263699

Cunningham, A. E., Perry, K. E., Stanovich, K. E., & Stanovich, P. J. (2004). Disciplinary knowledge of K-3 teachers and their knowledge calibration in the domain of early literacy. *Annals of Dyslexia*, *54*(1), 139–167. https://doi.org/10.1007/s11881-004-0007-y

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession* (p. 12). National Staff Development Council.

Deacon, S. H., & Bryant, P. (2006). This turnip's not for turning: Children's morphological knowledge and their use of root morphemes in spelling. *British Journal of Developmental Psychology*, *24*(3), 567–575. https://doi.org/10.1348/026151005X50834

Deacon, S. H., & Kirby, J. R. (2004). Morphological knowledge: Just "more phonological"? The roles of morphological and phonological awareness in reading development. *Applied Psycholinguistics*, *25*(2), 223–238. https://doi.org/10.1017/S0142716404001110

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. Wiley.

Elbro, C., & Arnbak, E. (1996). The role of morpheme recognition and morphological knowledge in dyslexia. *Annals of Dyslexia*, *46*, 209–240. https://doi.org/10.1007/BF02648177

Foorman, B. F., Herrera, S., Dombek, J. L., & Wood, C. (2021). *The impact of Word Knowledge Instruction on literacy outcomes in grade 5*. U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory. https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=4565

Fumero, K., & Tibi, S. (2020). The importance of morphological awareness in bilingual language and literacy skills: Clinical implications for speech-language pathologists. *Language, Speech, and Hearing Services in Schools*, *51*(3), 572–588. https://doi.org/10.1044/2020_LSHSS-20-00027

Gabig, C. S., & Zaretsky, E. (2013). Promoting morphological knowledge in children with language needs: Do the common core state standards pave the way? *Topics in Language Disorders*, *33*(1), 7–26. https://doi.org/10.1097/TLD.0b013e318280f592

Good, J. (2019). School-based speech-language pathologists' knowledge/use of morphological knowledge instruction: Results of a survey. *Perspectives of the ASHA Special Interest Groups*, *4*(4), 696–703. http://doi.org/10.1044/2019_PERS-SIG16-2018-0023

Goodwin, A. P., & Ahn, S. (2010). A meta-analysis of morphological interventions: Effects on literacy achievement of children with literacy difficulties. *Annals of Dyslexia*, *60*, 183–208. https://doi.org/10.1007/s11881-010-0041-x

Goodwin, A. P., & Ahn, S. (2013). A meta-analysis of morphological interventions in English: Effects on literacy outcomes for school-age children. *Scientific Studies of Reading*, *17*(4), 257–285. https://doi.org/10.1080/10888438.2012.689791

Henbest, V. S., Apel, K., & Mitchell, A. (2019). Speech-language pathologist–guided morphological knowledge instruction in the general education classroom. *Perspectives of the ASHA Special Interest Groups*, *4*(5), 771–780. https://doi.org/10.1044/2019_PERS-SIG1-2019-0003

International Reading Association. (2004). *The role and qualifications of the reading coach in the United States: A position statement of the International Reading Association*.

Kalantar, J. S., & Talley, N. J. (1999). The effects of lottery incentive and length of questionnaire on health survey response rates: A randomized study. *Journal of Clinical Epidemiology*, *52*(11), 1117–1122.

Kieffer, M. J., & Lesaux, N. K. (2008). The role of derivational morphology in the reading comprehension of Spanish-speaking English language learners. *Reading and Writing*, *21*(8), 783–804.

Kieffer, M. J., & Lesaux, N. K. (2012). Direct and indirect roles of morphological knowledge in the English reading comprehension of native English, Spanish, Filipino, and Vietnamese speakers. *Language Learning*, *62*(4), 1170–1204. https://doi.org/10.1111/j.1467-9922.2012.00722.x

Kirby, J. R., & Bowers, P. N. (2018). The effects of morphological instruction on vocabulary learning, reading, and spelling. In R. Berthiaume, D. Daigle, & A. Desrochers (Eds.), *Morphological processing and literacy development: Current issues and research* (pp. 217–243). Routledge.

Kotzer, M., Kirby, J. R., & Heggie, L. (2021). Morphological awareness predicts reading comprehension in adults. *Reading Psychology*, *42*(3), 302–322.

Levesque, K. C., Kieffer, M. J., & Deacon, S. H. (2018). Inferring meaning from meaningful parts: The contributions of morphological skills to the development of children's reading comprehension. *Reading Research Quarterly*, *54*(1), 63–80. https://doi.org/10.1002/rrq.219

Mahony, D. L. (1994). Using sensitivity to word structure to explain variance in high school and college level reading ability. *Reading and Writing*, *6*(1), 19–44.

Mather, N., Bos, C., & Babur, N. (2001). Perceptions and knowledge of preservice and inservice teachers about early literacy instruction. *Journal of Learning Disabilities*, *34*(5), 472–482.

McCutchen, D., Abbott, R. D., Green, L. B., Beretvas, S. N., Cox, S., Potter, N. S., & Gray, A. L. (2002). Beginning literacy: Links among teacher knowledge, teacher practice, and student learning. *Journal of Learning Disabilities*, *35*(1), 69–86.

Meaux, A. B., Diehm, E., & Collins, G. (2020). Morphological knowledge: Opportunities for collaboration through multitiered system of supports. *Language, Speech, and Hearing Services in Schools*, *51*(3), 515–530. https://doi.org/10.1044/2020_LSHSS-19-00051

Messier, J., & Jackson, C. W. (2014). A comparison of phonemic and phonological awareness in educators working with children who are d/Deaf or hard of hearing. *American Annals of the Deaf*, *158*(5), 522–538. https://doi.org/10.1353/aad.2014.0004

Moats, L. C. (1994). The missing foundation in teacher education: Knowledge of the structure of spoken and written language. *Annals of Dyslexia*, *44*, 84–102. https://doi.org/10.1007/BF02648156

Moats, L. C. (2004). Science, language, and imagination in the professional development of reading teachers. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 269–287). Brookes Publishing Co.

Moats, L. C. (2009). Knowledge foundations for teaching reading and spelling. *Reading and Writing*, *22*(4), 379–399. https://doi.org/10.1007/s11145-009-9162-1

Moats, L. C., & Foorman, B. R. (2003). Measuring teachers' content knowledge of language and reading. *Annals of Dyslexia*, *53*(1), 23–45. https://doi.org/10.1007/s11881-003-0003-7

Nagy, W. E., Berninger, V. W., & Abbott, R. D. (2006). Contributions of morphology beyond phonology to literacy outcomes of upper elementary and middle-school students. *Journal of Educational Psychology*, *98*(1), 134–147. https://doi.org/10.1037/0022-0663.98.1.134

Nagy, W. E., & Townsend, D. (2012). Words as tools: Learning academic vocabulary as language acquisition. *Reading Research Quarterly*, *47*(1), 91–108. https://doi.org/10.1002/RRQ.011

Pallant, J. (2020). *A step-by-step guide to data analysis using IBM SPSS* (7th ed.). McGraw-Hill Education.

Piasta, S. B., Connor, C. M., Fishman, B. J., & Morrison, F. J. (2009). Teachers' knowledge of literacy concepts, classroom practices, and student reading growth. *Scientific Studies of Reading*, *13*(3), 224–248. http://doi.org/10.1080/10888430902851364

Porter, S. B., Odegard, T. N., McMahan, M., & Farris, E. A. (2022). Characterizing the knowledge of educators across the tiers of instructional support. *Annals of Dyslexia*, *72*(1), 79–96.

Purvis, C. J., McNeill, B. C., & Everatt, J. (2016). Enhancing the metalinguistic abilities of pre-service teachers via coursework targeting language structure knowledge. *Annals of Dyslexia*, *66*, 55–70. https://doi.org/10.1007/s11881-015-0108-9

Putman, H., & Walsh, K. (2021). *State of the States 2021: Teacher Preparation Policy*. National Council on Teacher Quality.

Reid Lyon, G., & Weiser, B. (2009). Teacher knowledge, instructional expertise, and the development of reading proficiency. *Journal of Learning Disabilities*, *42*(5), 475–480.

Roman, A. A., Kirby, J. R., Parrila, R. K., Wade-Wooley, L., & Deacon, H. (2009). Toward a comprehensive view of the skills involved in word reading in Grades 4, 6, and 8. *Journal of Experimental Child Psychology*, *102*(1), 96–113. https://doi.org/10.1016/j.jecp.2008.01.004

Sharp, A. C., Brandt, L., Tuft, E. A., & Jay, S. (2016). Relationship of self-efficacy and teacher knowledge for prospective elementary education teachers. *Universal Journal of Educational Research*, *4*(10), 2432–2439.

Spear-Swerling, L., Brucker, P. O., & Alfano, M. P. (2005). Teachers' literacy-related knowledge and self-perceptions in relation to preparation and experience. *Annals of Dyslexia*, *55*(2), 266–296. https://doi.org/10.1007/s11881-005-0014-7

Tighe, E. L., & Schatschneider, C. (2015). Modeling the relations among morphological knowledge dimensions, vocabulary knowledge, and reading comprehension in adult basic education students. *Frontiers in Psychology*, *7*, Article 86. https://doi.org/10.3389/fpsyg.2016.00086

Vadasy, P. F., Sanders, E. A., & Peyton, J. A. (2006). Code-oriented instruction for kindergarten students at risk for reading difficulties: A randomized field trial with paraeducator implementers. *Journal of Educational Psychology*, *98*(3), 508–528. https://doi.org/10.1037/0022-0663.98.3.508

Washburn, E. K., Binks-Cantrell, E. S., Joshi, R., Martin-Chang, S., & Arrow, A. (2016). Preservice teacher knowledge of basic language constructs in Canada, England, New Zealand, and the USA. *Annals of Dyslexia*, *66*(1), 7–26.

Washburn, E. K., & Mulcahy, C. A. (2019). Morphology matters, but what do teacher candidates know about it? *Teacher Education and Special Education*, *42*(3), 246–262. https://doi.org/10.1177/0888406418806649