



The Reading Matrix
Vol. 8, No. 1, April 2008

PRIMARY TEACHERS' KNOWLEDGE AND KNOWLEDGE CALIBRATION OF EARLY LITERACY PRACTICES

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Abstract

This research design was based on the knowledge calibration work by Cunningham, Perry, Stanovich, and Stanovich (2004). One hundred and forty-one full time teachers participated in a four day professional development workshop on research-based reading instruction. Participants were administered a three-part survey comprised of 1) demographic information 2) knowledge calibration items measuring perceived understanding of phonics, phonological awareness, and syllabication and 3) phonics pretest published in *Self-Paced Phonics: A Text for Educators* (2005). There were statistically significant differences between participants who rated their knowledge as high and those who rated their knowledge as low on the phonological and phonics items. However, teachers in this study overestimated their knowledge of phonological awareness and phonics. There were no significant differences between those who rated their knowledge as high as compared to those who rated their knowledge as low on the subtest knowledge of syllabication. In addition, no significant differences were found between new teachers and experienced teachers in their knowledge in the three domains. The results and discussion address the importance of knowledge calibration to develop professional educational experiences for new and experienced teachers.

Introduction

Considering all that goes into the reading process it seems almost magical when a young learner reads that first story. Reading is a complex process that can challenge students on several levels as they move through the grades. Prior knowledge, decoding skills, and specific strategies

are critical elements influencing comprehension and interpretation of texts encountered throughout life. Several well documented studies (Adams & Bruck, 1995; Blachman, 2000; Bos, C., Mather, N., Dickson, S., Podhajski, B., & Chard, D., 2001; Juel, 1988) have indicated that the challenges students face are even greater when beginning basic reading skills are not successfully acquired in the early grades. When students struggle as poor readers in the first three grades they are likely to remain poor readers throughout their school experience (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996; Snow, Burns, & Griffin, 1998). Guiding and teaching children to become effective readers requires a strong knowledge base of the skills and complexities involved, as well as the understanding, ability, and flexibility to diagnose and meet the instructional needs of each student.

The National Reading Panel (2000) identified five factors critical to reading instruction for young learners; phonics, phonemic awareness, fluency, vocabulary, and comprehension. Research has indicated that students who acquire a good understanding of the alphabetic principle in the early stages of literacy development (Adams, 1990; Share & Stanovich, 1995) and have well developed phonological awareness (Snow, Burns, & Griffin, 1998) possess a greater chance for reading success. Having a good command of phonological awareness and the alphabetic principle helps make fluency and vocabulary development possible and enables the learner to focus on gaining meaning from the text.

Heilman, Blair, & Rupley (1998) found that teachers in the 1980s and 1990s often considered phonics instruction to be the “enemy”, however, Shaffer, Campbell, and Rakes (2000) discovered a shift in attitudes in teacher perceptions and beliefs. Their survey of 208 elementary teachers provided evidence that phonics was perceived by most to be a necessary aspect of reading instruction for students in primary grades in order for them to achieve independence as readers. Although teachers may recognize the importance of including phonological awareness and language structure in their instruction, several studies have revealed that many teachers charged with this responsibility do not possess a deep understanding of the concepts and elements involved (Abbott, Walton, & Greenwood, 2002; Mather, Bos, & Babur, 2001; Troyer & Yopp, 1990).

The study described in this paper investigated teacher knowledge and beliefs related to three areas of early literacy development and instruction. Three questions were posed.

1. Do k-3 teachers demonstrate a good understanding of phonics, phonemic awareness, and syllabication for the purpose of early reading instruction?
2. Are k-3 teachers aware of their knowledge base in phonics, phonological awareness, and syllabication for the purpose of early reading instruction?
3. Is there a difference between experienced teachers’ and new teachers’ confidence in their knowledge and knowledge levels concerning phonics, phonological awareness and syllabications?

Considering the first question, it cannot be assumed that because teachers are literate and have some knowledge of phonics and phonological principles that they are well prepared to address the needs and difficulties faced by struggling readers. Perhaps because teachers are typically very proficient readers it may be difficult for them to recognize and break down phonemic and morphemic aspects that have become automatic for them (Spear-Swerling, Brucker, & Alfano, 2005). Explicit instruction may be necessary for assisting teachers in identifying specific elements, skills, and strategies needed for success among early struggling readers. As McCutchen and her colleagues (2002) found in their study, assisting teachers in

developing deeper phonological and orthographic knowledge can lead to changes in instructional practices influencing positive student achievement.

Students who are struggling with phonology and the alphabetic principle require teachers with more than surface-level understanding to provide effective instruction (Ehri & Williams, 1995; McCutchen, Abbott, Green, Beretvas, Cox, Potter, Quiroga, & Gray, 2002). “Because English orthography is not perfectly alphabetic, teachers need additional knowledge of linguistic structures beyond simple letter-sound correspondences” (McCutchen, et al, p. 70). McCutchen and her colleagues found that explicit instruction in phonological and orthographic awareness provided through a two-week summer institute and supported at various times throughout the school year, could successfully equip teachers with deeper knowledge and effective instructional practices for classroom implementation. As a result, student learning was also found to improve. Moats and Foorman (2003) found that as teachers develop a deeper understanding of phonology and patterns of spelling, instruction and effects of that instruction improve.

The second question posed for this study concerns accuracy of teachers’ self-assessment of their own knowledge level of phonics, phonological awareness, and syllabication. Cunningham, Perry, Stanovich, and Stanovich (2004) chose to investigate not only teacher knowledge but also teachers’ perceived beliefs concerning their level of knowledge in the areas of phonics and phonological awareness. This additional dimension of study, termed knowledge calibration, includes metacognitive along with cognitive aspects of teaching practices. Bol (2005) and her colleagues cite Lin & Zabrucky (1998) defining calibration as “the degree to which judgments of performance accurately reflect actual performance” (p. 270). The premise is that teachers’ beliefs concerning their level of knowledge may influence instruction and willingness to engage in professional development. If teachers have false perceptions concerning their own knowledge of the basic components of reading, they may naively misrepresent both phonemes and morphemes as they instruct causing confusion among students. For example, if the word *gone* is confidently introduced as a long vowel, silent e word rather than an irregular word, or if the teacher does not recognize that *s* is a morpheme giving plural meaning to words like carrots, it is problematic.

The third question for this study was a result of consideration of teachers new to the profession. Turley, Powers, and Nakai (2006) found that elementary teachers new to the profession were only somewhat confident about teaching upon entering the first year of teaching even though they had the advantage of a current knowledge base and freshly learned skills and strategies. Cunningham, Perry, Stanovich, and Stanovich (2004) found in their disciplinary knowledge study of early literacy that K-3 teachers with less than three years experience perceived their knowledge levels more positively in all areas examined than did more experienced teachers. “With regard to actual knowledge, least experienced teachers did know more in their areas of phoneme awareness and explicit phonics, while no differences were observed in the areas of implicit phonics . . .” (p.158). In a more recent study by Spear-Swerling (2005) and her colleagues, teachers’ perceptions of their knowledge of early literacy disciplinary knowledge as it related to background (course preparation and experience) and actual performance correlated significantly in some areas but not in others. As they suggested, the difference in findings of teachers’ accuracy of perceptions concerning their early literacy knowledge may be partially attributed to sample differences, one study with teachers in professional development institutes and the other with teachers in degree programs. However, even in the Spear-Swerling study, scores of teachers categorized as high-background did not approach the ceiling level, or highest possible score, on any of the assessed tasks.

Consequently, an inflated sense of knowledge and a false sense of depth of understanding of concepts or skills to be taught may contribute to teachers' inattention and support for professional development. Teachers who are aware of knowledge deficits are more likely to engage in and be receptive to instruction and professional development opportunities. Therefore, the focus of this study was to examine the knowledge and knowledge calibration levels of inservice K-3 teachers in the areas of phonological awareness, phonics, and syllabication.

Methodology

Participants

One hundred and forty-one K-3 teachers from urban and rural schools in the mid-Atlantic region of the United States participated in this study. The teachers were attending a four-day professional development workshop on research-based reading instruction. The majority of teachers indicated that their participation in this training was voluntary and that they were attending the training for recertification points.

All teachers who participated in this workshop held bachelor's degrees with sixty-eight percent (95 participants) receiving undergraduate degrees in education and forty-eight percent (67 participants) holding graduate degrees. Approximately nine percent (12 participants) were reading specialists. The range of teacher experience varied from new teachers who were just entering the profession and had not taught in a classroom to seasoned teachers with more than twenty-five years of experience.

Tasks and Procedures

On the opening day of the workshop instructors asked for volunteers to complete a survey prior to beginning instruction. Of the one hundred and forty one participants, 100% agreed to complete the survey, however; not all teachers completed the entire survey. The instructors monitored the administration of the survey to ensure that surveys were completed individually and to answer any procedural questions. The teachers indicated that the survey was difficult and several felt they did not answer many of the questions correctly.

The three-part survey began with questions designed to gather demographic information. The second part was comprised of knowledge calibration questions intended to measure teachers' perceived knowledge of phonics, phonemic awareness, and syllabication. The final part selected for the purpose of measuring actual knowledge was a phonics pretest published in *Self-Paced Phonics: A Text for Educators* (Dow & Baer, 2005). The pretest included questions from three categories of early literacy development; questions related to phonological awareness, to phonics, and to syllabication. The entire survey took approximately forty-five minutes to one hour to complete.

Phonological Awareness Knowledge. The portion of the survey used to assess teachers' phonological awareness consisted of eight questions. Four of the questions were in a fill-in-the-blank format with a word bank provided; two were application questions which required breaking the words, *night* and *boat* into phonemes, and two questions on phonological awareness asked teachers to respond by matching vowel phonemes and identifying letters that do not represent phonemes identified by their own name. Scores were based on eight questions with two points given for correct answers and a score of zero given for incorrect answers making a possible total score of 16 points on this portion of the survey. A Cronbach's alpha was performed to determine the degree to which the questions used in this portion of the survey were

all measuring phonological awareness knowledge. According to Nunnally (1978) a level of .7 or above is considered a strong relationship between items. The results indicated a strong reliability, Cronbach's alpha = .704.

Phonics Knowledge. Twenty-two questions were utilized on this portion of the survey to ascertain teachers' knowledge of phonics. These questions consisted of phonics terminology knowledge and applied knowledge of phonics. Questions related to phonics terminology included matching the terms; phoneme, diagraph, syllable, phonogram, phonics, grapheme, macron, closed syllable, consonant blend, and diphthong with their definition. Questions that required participants to apply their knowledge of phonetic principles asked participants to identify an ending consonant grapheme, a diphthong, a digraph, and words containing r controlled vowels. The questions also included define the term grapheme, identify letters that represent a soft c sound, and other explicit questions asking teachers to identify consonant blends, and particular sounds in words. Each correct answer was given two points and incorrect answers were given zero points making a possible total of 44 points. Again, a Chronbach's alpha was performed to ensure internal consistency between the questions related to phonics knowledge. The result was a Chronbach's alpha level = .770.

Syllabication Knowledge. This section of the survey was composed of sixteen questions related to syllabication knowledge. Questions that were answered correctly received two points and incorrect questions received zero points making a total of 32 points possible on this section. Participants identified words with open syllables and closed syllables, and the rules for decoding multisyllabic words. Seven questions required participants to break vowel-consonant letter patterns (represented as CVCCVC, etc.) into syllables, and five questions entailed dividing nonsense words into syllables. A Chronbach's alpha result of .74 indicated a strong internal consistency.

Knowledge Calibration Questions: The knowledge calibration portion of the survey consisted of three questions. Participants were requested to respond by indicating whether they felt they were: expert, proficient, minimal ability, no ability or no experience in the areas of phonological awareness, phonics, and syllabication. The categories of expert and proficient were collapsed into *high perceived knowledge*. The categories of minimal, no ability and no experience were collapsed into *low perceived knowledge*. The categories were collapsed into two groups to make the number of responses in each group larger and was based on the previous work of Cunningham, Perry, Stanovich, and Stanovich (2004). The first knowledge calibration question addressed the issue of phonological awareness and was phrased, "How would you rate your ability to instruct K-3 students on phonological awareness?" The second question concerning knowledge calibration was directed toward phonics and was stated, "How would you rate your ability to instruct K-3 students on all aspects of phonics including consonant clusters, digraphs, diphthongs, etc.?" The last question on knowledge calibration concerned syllabication knowledge and was worded, "How would you rate your knowledge of syllabication generalizations?"

Results

Analyses were conducted to examine 1) teachers' level of knowledge in the domains of phonological awareness, phonics, and syllabication; 2) teachers' perceived knowledge in the three domains; 3) relations between perceived knowledge and actual knowledge in the three domains, and 4) relations between new teachers' knowledge and experienced teachers' knowledge.

Knowledge of Phonological Awareness and the Relation to Perceived Knowledge

We examined teachers' overall knowledge of phonological awareness and explored the differences in knowledge by teachers' years of experience. Also we examined differences in teachers who identified themselves as having *high perceived knowledge* and *low perceived knowledge*.

Overall teacher responses indicated a score of 53% correct (range of scores = 2 – 16). Using an independent samples t-test we examined the difference between teachers classified as new teachers (0-5 years of experience) and teachers who were experienced (6 + years of experience). New teachers' means and experience teachers' means revealed no significant difference (See Table I).

Insert Table I

In the domain of knowledge calibration, seventy two percent (102 participants) of teachers rated their knowledge of phonological awareness as high perceived knowledge indicating they were expert or proficient in this area. Twenty eight percent (39 participants) rated their knowledge as low perceived knowledge indicating that they had no experience teaching this subject, no ability, or minimal ability.

An independent samples t-test was conducted to compare the high perceived knowledge scores for teachers and the low perceived knowledge scores on phonological awareness. A significant difference ($p < .002$) was found between the high perceived group and the low perceived group (See Table I for means and standard deviations). Results indicate that the group who had rated their knowledge as expert or proficient did indeed score higher than the group who had rated their skills as minimal.

Knowledge of Phonics and the Relation to Perceived Knowledge

We examined teachers' actual knowledge of phonics, the relationship between their perceived knowledge and actual knowledge and the relation between years of experience and phonics knowledge. There were 22 questions in this part of the survey with each correct question receiving 2 points for a maximum total of 44 points. Overall teachers' average percentage correct on the phonics portion on the survey was 61% (range of scores= 0 to 44). The results indicated no significant difference between new teachers means and experienced teachers means (See Table I).

Knowledge calibration results revealed that sixty-seven percent (95 participants) rated their knowledge as high perceived knowledge while thirty-three percent (46 participants) rated their knowledge in this area as low perceived knowledge. An independent t-test was employed to determine if there were significant differences between teachers' who rated their knowledge of phonics as high and low perceived knowledge. A significant difference ($p < .006$,) was found indicating that the teachers who had rated their knowledge as high had in fact, scored higher on the knowledge portion of the survey than teachers who had rated their knowledge as low (See Table I).

Knowledge of Syllabication and the Relation to Perceived Knowledge

An important aspect of primary grade reading instruction is knowledge of syllabication. Teachers begin teaching children various rules for dividing words and sounding them out to spell and read in the early grades. It was therefore important to ascertain primary teachers' knowledge about syllabication. Sixteen questions on the survey that pertained to syllabication knowledge with each correct response receiving two points for a possible total of 32 points. Participants' score on the syllabication portion averaged 62% correct with the range of scores from 0 to 16. (Refer to Table I)

We also wanted to determine if years of experience had an affect on knowledge of syllabication. An independent t-test indicated that there were no significant differences, between new teachers' means and experienced teachers' means (See Table I).

In the realm of knowledge calibration approximately forty-four percent (62 participants) rated their knowledge of syllabication as high perceived knowledge with fifty-six percent (79 participants) ranking their knowledge as low. When an independent t-test was used to determine if the *high perceived knowledge* group had scored significantly different than the *low perceived knowledge* group no significance was found (See Table I).

Discussion

There are many areas considered essential components in learning to read such as comprehension, fluency, vocabulary development, phonics, phonological awareness, and knowledge of early literacy skills. This study focused on three of the areas of primary teachers' literacy knowledge considered important in helping children learn to read: phonological awareness, phonics, and syllabication. Researchers have suggested that teacher knowledge of phonics and phonological awareness is an integral part of teaching primary students the sounds in our language system and lays the foundation for teaching students to read (Spear-Swerling, Brucker, & Alfano, 2005).

Although there is general agreement that phonics and phonological awareness are important skills for children to acquire while learning to read (Ball, 1993; Lundberg, Frost & Peterson 1988; Mann, 1993), only recently have studies investigated teachers' knowledge in these areas (Bos, Mather, Dickson, Podhajski, & Chard, 2001; Cunningham, Perry, Stanovich & Stanovich, 2004). This study attempts to add to the knowledge base of this existing research.

In examining the scores in this study of K-3 teachers on phonological awareness, phonics, and syllabication, it appears that the majority of the participants were not familiar with early literacy terminology such as: phonemes, digraphs, consonant blends, and graphemes. The knowledge calibration portion of this survey indicated that overall, teachers were positive in their knowledge calibration responses indicating confidence in their understanding and skills in phonics and phonological awareness.

The scores indicated teachers' knowledge of phonological awareness was very weak, averaging 53% correct, when asked to identify how many phonemes are in a word; a task that is commonly taught in kindergarten and first grade. This brings into question how teachers' can help children learn this skill when they are unable to complete the task themselves. The teachers' scored the lowest on this portion of the survey compared with the other two sections. It could be that teachers have not been directly exposed to the rules of phonological awareness in their teacher preparation courses nor in the in-service training offered by the school districts. Teachers may be able to perform simple exercises such as adding phonemes, segmenting, and deleting phonemes but may not possess a deeper understanding of the knowledge base that underlies these principles. Survey results indicated that primary teachers who rated themselves as expert or proficient in phonological awareness had weak overall scores with a mean of 9.37 or approximately 58% correct. Scores this low would not be considered as proficient in phonological awareness by most educators or researchers. A significant relation was found between teachers' perceived knowledge in phonological awareness and actual knowledge. This finding indicates that while the group that rated their knowledge as high did have an overall higher mean score (mean=9.37) than the lower perceived knowledge (mean= 6.41) the group that

rated their knowledge as expert or proficient had scores that averaged 59% correct which would not be considered by most educators as expert or proficient in this area.

The phonics portion of this survey measured teachers' knowledge of terminology and actual ability to apply phonetic principles. The results averaged 61% on phonics knowledge, which brings into question teachers' ability to teach primary age children phonics material. Because the English language is structurally complex and not orthographically transparent or phonetically regular, it is essential that primary teachers master the basic rules and concepts of phonics and phonological awareness. Without this mastery, teachers may use inappropriate examples in class or misguide students on the complexities of the English sound system. One possible explanation is that teachers may not have received phonics instruction during their elementary education nor in their teacher preparation courses and are relying heavily on the teacher's manual to teach phonics instruction. They may be adept and prepared to teach the content of their basal series but have not internalized the rules of phonics to apply to spontaneous situations. Sixty-seven percent (95 participants) of teachers rated their perceived knowledge as expert or proficient in phonics. An independent t-test indicated a significant difference between high perceived knowledge and the low perceived knowledge. Again, the high perceived knowledge group had a higher mean, however; their total scores on the tests indicate a weak knowledge base, scoring approximately 52% correct on phonics; which would not be considered sufficient much less expert or proficient by most educators. However, it is interesting to note that 48% of the participants felt that phonics was the most important skill required for effective reading.

Results on the syllabication knowledge portion of the survey averaged 62% correct, making this section the highest score of the three sections. Teachers appear to be somewhat familiar with the rules of syllabication when presented with nonsense words to break into syllables and CVC exercises. Teachers' rated their perceived knowledge of syllabication lower than phonics and phonological awareness, however; the overall average correct on the syllabication portion of the survey was 62% indicating that teachers' possessed more knowledge of syllabication than they realized. One possible explanation could be that teachers learned the syllabication rules during their college course work or that the syllabication rules are taught routinely enough that teachers have internalized the rules without being aware of this process. An independent t-test revealed no significant difference between the two groups.

The overall findings from this study lead us to believe that teacher education programs should offer pre-service teachers explicit instruction in early literacy skills such as phonemic awareness, phonics, and syllabication. While the researchers realize that comprehension is the overall goal of reading, without appropriate and accurate instruction in all areas of early literacy, students' comprehension will be hindered.

Limitations

It should be noted that each category of the survey, phonological awareness, phonics, and syllabication had small numbers of questions which may not have fully tested the participants' abilities in early literacy knowledge. One possible reason for the low scores on the phonological awareness portion of this test could be because many of the questions on the knowledge pretest were related to terminology rather than application questions. It is possible that the same teachers may know the sound of particular letters but may not have a complex understanding of the terminology used to describe the elements and activities that they are using on a daily basis.

Another limitation is that the sample is a selected group of primary teachers who signed up to attend a professional development work on research-based techniques. It could be that this

population of teachers felt weak overall in areas of reading and purposely sought training to improve their early literacy knowledge. This same survey administered to a random sample of teachers in the school systems might yield different results.

Conclusion

Our results add to the existing literature that supports the 2004 finding of Cunningham, Perry, Stanovich and Stanovich. Teachers in this study did overestimate their knowledge of phonemic awareness, phonetic principles and specific terminology. Teachers overall knowledge in the areas investigated revealed a weak knowledge base. Through the use of calibration methodology, teachers' perception of their knowledge has given us a window to redesign the professional development experiences for experienced teachers as well as for preservice training. If teachers have false perceptions concerning their knowledge of basic components of reading, they may naively misrepresent both phonemes and morphemes as they instruct causing confusion among students. An interesting finding was that 48% of the participants felt that phonics was the most important skill required for effective reading; however they had not mastered the terminology or the phonetic principles to adequately instruct children in these skills. Additional research should be conducted to distinguish differences between calibration of knowledge in the other domains such as vocabulary, comprehension, and fluency.

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