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ABSTRACT

This literature review examines the relationship between phonemic awareness and the ability to read. It addresses four main issues: (1) if phonemic awareness is a prerequisite for or a consequence of learning to read; (2) what is needed to teach phonemic awareness; (3) tasks or activities and assessment tools to develop phonemic awareness; and (4) other areas of literacy linked to phonemic awareness. After an introduction, sections of the review are: statement of the problem; definitions; history of the topic; major issues; controversies; programs; contributors; synthesis and analysis; conclusion; and recommendations (including making phonemic awareness part of the everyday curriculum in preschool, kindergarten, and first grade; providing for phonemic awareness training and inservicing needs ahead of time; finding a program that will complement any existing curriculum; and evaluating successes and failures with pride. (RS)

Phonemic Awareness:
A Review of Literature

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Introduction

Children learn to speak before ever learning to read or write. "It is sometimes said that no one has to "teach" children to talk; yet they master the huge and complex body of knowledge needed to use language by about age five" (Fountas & Pinnell, 1996, p.11). Language encountered and used in the environment provides the rules needed to generate an infinite number of words and sentences (Fountas & Pinnell, 1996). Children begin to realize words and sentences are a way of communicating their needs and wants. Through continuous practice with language, children refine its use. "Language is a self-extending system; that is, it allows the learner to keep on learning by using it" (Fountas & Pinnell, 1996, p.11).

Reading can be viewed as a self-extending system as well. In Essays into Literacy, Frank Smith (1983) said, "learning to read is a complex and delicate task in which almost all the rules, all the cues, and all the feedback can be obtained only through the act of reading itself" (p.23). Yet, this form of literacy does not seem to develop as naturally as spoken language. Wallach and Wallach (1976) state:

> "...reading is a complex skill which is best learned by systematically cumulating the mastery of its component subskills. This implies a sequence which starts with establishing competence in the recognition and manipulation of sounds and mastery of the alphabetic code and then proceeds to the utilization of that code in reading printed material with comprehension" (p.69).

"Children bring to the reading situation a control of oral language but the oral language dialect differs in important ways from the written language dialect" (Clay, 1991, p.7). The complex skill of reading or written language needs to be taught. In 1995, the California Department of Education focused on a better approach to reading through the Superintendent's Reading Task Force called Every Child a Reader. "The Reading Task Force report called for a balanced and comprehensive approach to early reading instruction and the activities and strategies most often associated with literature-based, integrated language arts instruction" (California Department of Education, 1996, p.3).

One of the most current instructional components of a balanced and comprehensive early reading program, outlined in the report, is phonemic awareness. "Phonemic awareness is the understanding that speech is composed of a series of individual sounds or phonemes" (Yopp, 1992, p.696). "The objective of any phonemic

awareness activity should be to facilitate children's ability to perceive that their speech is made up of a series of sounds" (Yopp, 1992, p.699). By focusing on speech, the aspect of literacy children have the best command of, phonemic awareness is being taught to facilitate reading acquisition. "Children's awareness of the phonemic structure of spoken words is an extremely strong predictor of their success in learning to read" (Adams, 1990, p.412). Stanovich (1994) states, "most importantly, phonemic awareness tasks are the best predictors of the ease of early reading acquisition - better than anything else that we know of, including IQ" (p.284).

The task force report goes on to include other instructional components used in an early reading program such as: "letter names and shapes; systematic, explicit phonics; spelling; vocabulary development; comprehension and higher-order thinking; and appropriate instructional materials" (California Department of Education, 1996, p.3). These components should certainly not be overlooked. However, phonemic awareness is related to children's natural ability to speak which is the first form of literacy a child masters. Therefore, phonemic awareness can be viewed as the first building block or component to reading literacy.

"Phonemic awareness skill enables children to use letter-sound correspondences. "And indeed, phonemic awareness would be irrelevant were it not for the fact that phonemes are the units encoded by the letters of the alphabetic languages used in most of the modern world, the raw material of reading and writing" (Griffith & Olson, 1992, p.516). The discovery of the nature and enabling importance of phonemic awareness is said to be the single greatest breakthrough in reading pedagogy in this century (Adams, 1990).

Statement of the Problem

> "With little or no direct instruction, almost all young children develop the ability to understand spoken language. While most kindergarten children have mastered the complexities of speech, they do not know that spoken language is made up of discrete words, which are made up of syllables, which themselves are make up of the smallest units of sound, called "phonemes." This awareness that spoken language is made up of discrete sounds appears to be a crucial factor in children learning to read" (Sensenbaugh, 1996, p.2).

Phonemic awareness seems to be the "missing element which will help a child move as naturally into the reading phase of the overall language acquisition picture as he did into the speaking phase" (Sumpter & Szitar, 1993, p.210).

This paper will examine the relationship between phonemic awareness and the ability to read. In so doing, this paper will address these questions:
Is phonemic awareness a prerequisite for or a consequence of learning to read?
What is needed to develop phonemic awareness? More specifically, what tasks or activities as well as assessment tools should be used to develop phonemic awareness?
To what other areas of literacy is phonemic awareness linked?

Definitions

This section of the paper will define the terminology associated with phonemic awareness as it is used throughout the literature. The first definitions used for the following terms came from the ELIC (Early Literacy Inservice Course) document entitled, Phonemic Awareness and Phonics Instruction (1997). The definitions presented in the document were straight forward and easy to understand. Any additional definitions used may be helpful in further understanding the terminology.

Phonology: "The system of sounds in oral language" (Rigby, 1997, p.6).
Throughout the literature, phonology seems to be used interchangeably with the terms phoneme or phonemic. In addition the term, phonological awareness, is prevalent. Roger Sensenbaugh (1996) defines it as "an awareness that words consist of syllables,

"onsets and rimes," and phonemes, and so can be a broader notion than phonemic awareness" (p.2).

Phonemes: "The 44 individual sounds that make up all English words" (Rigby, 1997, p.6). Durgunoglu, Nagy, & Hancin (1991) define phonemes as, the speech sounds smaller than syllables that correspond to letters or letter clusters . Yopp (1992) defines phonemes as the smallest units of speech.

Phonemic Awareness: "The ability to hear the individual sounds that make up words; an understanding that speech is composed of individual sounds" (Rigby, 1997, p.6).

During the late 1970's and early 1980's, some of the literature refers to phonemic awareness as linguistic awareness, linguistic insight, phonemic analysis, or phonemic knowledge. More recently, the literature uses the term phonemic awareness or phonological awareness. This paper will use the term phonemic awareness unless a direct quote uses another term.

Graphophonics: "Letters, or combinations of letters, and the sounds each has; the sound system (phonology), the graphic system (orthography), and the system that relates the two (phonics)" (Rigby, 1997, p.6 taken from Ken Goodman, 1993).

Graphemes: "The 26 symbolic letters of the alphabet" (Rigby, 1997, p.6).

Phonics: "The various ways of teaching children the relationship between spelling patterns and sound patterns. The complex relationship between the sounds of language and the system of spelling" (Rigby, 1997, p.6).

This definition seems to be the most current. However, previous literature refers "to phonics as sounding out words or word attack skills" along with mastering lists of skills and passing a test (Rigby, 1997, p.7). Also, the phrase, drill and kill, may come to mind when thinking about phonics.

Orthography: "The system of spelling and punctuation" (Rigby, 1997, p.6).

Alphabetic Principle: "The twenty-six letters of the alphabet representing forty-four sounds of oral language. All English words are composed of various combinations of the two" (Rigby, 1997, p.7).

Onsets: "The initial consonant or consonant cluster, as in the sound /buh/ in the word bat" (Rigby, 1997, p.6).

The onset can be referred to as anything before or up to the first vowel in a word.

Rimes: "Vowel or vowel-plus-consonant element, as <h> + /e/ in the word he, or <c> + /at/ in the word cat" (Rigby, 1997, p.6 taken from Thomas Gunning, 1995).
The rime can be referred to as anything after the onset, beginning with the first vowel.

History of the Topic

The ability to read is a complex process. Children come to school with a variety of experiences and skills to enable them to read. Teachers use a variety of strategies and experiences to facilitate reading acquisition. However, when trying to find the correct approach to use in the teaching of reading, it is necessary to analyze children's problems in beginning reading. This can enable teachers to create programs, tasks, and assessment tools based on the areas of need.

Most recently, phonemic awareness has gathered momentum as a valuable tool to enhance children's abilities to read. In order to understand the value of phonemic awareness, we must take a step back. Researchers have studied children's problems in beginning reading for years and many have made early attempts to solve these problems through the use of phonemic awareness.

"During the 1950's and 1960's, it was the difficulty inherent in the visual differentiation and identification of letters that was emphasized in analyses of children's problems in beginning reading" (Williams, 1984, p.240). Jean Turner Goins (1958) investigated the visual perceptual aspects of reading at the beginning level, explored how the aspects could be a cause of reading disability, and provided training of the perceptual process in learning to read. It was found that the visual form training used did not increase reading ability in first grade.

In the 1970's, "faced with disillusionment about the benefits of visual training, the field turned its interest to the auditory modality" (Williams, 1984, p.240). Haddock (1976) explored instruction in auditory blending as it relates to word attack skills. "Haddock (1976) found that teaching preschoolers to blend separated phonemes and to associate a limited number of letter-sound correspondences resulted in transfer to word reading" (Davidson & Jenkins, 1994, p.149). However, the subject's segmentation ability was not measured, therefore, it was not determined "if blending alone was responsible for the transfer to reading" (Davidson & Jenkins, 1994, p.149). Other

research studies found that auditory skills were important to reading, but did not focus specifically on phoneme analysis (Williams, 1984).

In the 1980's, the opinion held was that a poor reader has language perception problems (Williams, 1984). In a study done by Brady, Shankweiler, and Mann (1983), it was found "that a failure to use phonetic coding efficiently leads to the poor reader's deficiency in short-term memory for labelable stimuli" (p. 363). The outcome of this study "suggests that poor readers require more complete stimulus information than good readers in order to apprehend the phonetic shape of spoken words" (Brady et al., 1983, p.364). However, previous research was reviewed and showed poor readers not making full use of auditory and visual presentations of the stimulus items which they require.

In the 1990's, early detection of at-risk readers seems to be the focus. The problems in beginning reading have been spelled out and programs, training, and interventions are in place to help children in the acquisition of reading. Class sizes have been reduced and the goal is to have every child reading by the end of third grade. Phonemic awareness is seen as a valuable tool in reading acquisition in the early grades. "The research further shows that children who lack phonemic awareness skills are at risk for developing reading problems" (Treiman & Weatherston, 1992, p.174).

Major Issues

In looking at the major issues surrounding phonemic awareness, an old saying comes to mind, which came first, the chicken or the egg? One question that is frequently discussed in the literature asks: which comes first, phonemic awareness or the ability to read? More specifically, the contradictory hypotheses question whether phonemic awareness is a consequence or a prerequisite of learning to read (Yopp, 1992). According to Stahl and Murray (1994), "it may be that certain levels of phonological awareness, either as measured by different tasks or by different levels of linguistic complexity, precede learning to read, whereas more advanced levels may result from learning to read" (p.223). Treiman and Zukowski (1996) build on the same idea and consider phonemic awareness to be a heterogeneous skill with different forms

and properties developing at different times and linking in different ways to reading acquisition.

Tunmer and Nesdale (1985) studied phonemic awareness as a prerequisite for reading. "They hypothesized that if the knowledge is necessary, then it would be impossible to make progress in learning to read without it and subsequently, that all accomplished readers would have it" (Winsor & Pearson, 1992, p.6). In concluding, Tunmer and Nesdale (1985) found phonemic awareness necessary, but not adequate for the acquisition of recoding skills.

Similarly, Lundberg, Frost, and Peterson (1988) studied phonological awareness in preschool children outside the context of the acquisition of an alphabetic writing system. The evidence obtained in their study suggests, "first, that phonological awareness can be developed before reading ability and independently of it, and, second, that this phonological awareness facilitates subsequent reading acquisition, thus providing unconfounded evidence of a causal link" (p.282). The explicit instruction seems to be the crucial factor.

Two studies involving adults hypothesized that phonemic awareness is a consequence of learning to read. In the study done by Morais, Cary, Alegria, and Bertelson (1979), they found that "illiterate adults were unable to delete or add a phone at the beginning of a non-word, while adults from the same environment who learned to read in youth or as adults had little difficulty" (p.329). In a study done by Read, Yun-Fei, Hong-Yin, and Bao-Qing (1986), much of the previous study done by Morais et al. was confirmed. Read et al. found their alphabetic group, those Chinese adults familiar with a pinyin writing system, were similar to the literates. The nonalphabetic group, Chinese adults familiar with the logographic characters, performed very much like the illiterates. Neither study discounts the prerequisite hypotheses, particularly since children were not taken into account. Hallie Yopp (1992) clearly summarizes the issue, "in order to benefit from formal reading instruction, youngsters must have a certain level of phonemic awareness. Reading instruction, in turn, heightens their awareness of language. Thus, phonemic awareness is both a prerequisite for and a consequence of learning to read" (p.697).

Another question that arises asks, what are the effects of phonemic awareness instruction on bilingual and reading disabled children? Treiman and Weatherson (1992) reviewed the research and stated "that phonemic awareness plays an important role in learning to read and write an alphabetic system" (p.174). "Heightening phoneme awareness my help prevent some children from experiencing early reading and spelling failure" (Ball & Blachman, 1991, p.52).

A study was conducted by Durgunoglu, Nagy, and Hancin (1991) to investigate cross-language transfer in bilingual students during the early stages of learning to read. The study "examined the relationship of Spanish phonemic awareness to English word recognition tasks to determine if there is cross-language transfer in the word recognition component of reading. A related issue is the role of oral language proficiency in second-language word recognition" (p.6). The results indicated that cross-language transfer can happen. "Both phonemic awareness and word recognition skills in Spanish are predictive of word recognition in English. In contrast, oral language proficiency in Spanish is not related to word recognition processes in English" (p.15).

Research conducted by Hurford and Sanders (1990) focused on disabled readers poor ability to discriminate and identify phonemic information. "The assessment performance and reading level matches between the fourth-grade disabled and second-grade nondisabled readers suggests that a developmental lag exists in disabled readers' phoneme discrimination ability" (p.412). After training, the disabled readers did demonstrate that the lag or deficit was subject to remediation. Phonemic awareness training is normally suggested for preschool, kindergarten, and first grade children. In light of the research, reading disabled children may benefit regardless of their grade level.

However, the outlook for dyslexic children does not look as promising. Maggie Bruck (1992) examined the phonological awareness skills of dyslexics as associated to their reading level and age. "Dyslexic children between the ages of 8 and 16 years not only show deficits in phoneme awareness when compared with good readers of the same age and reading level, but they also show little if any development of phoneme awareness as their reading skills increase. Similar patterns of results are found for adult dyslexics" (p.884).

Controversies

The "Great Debate" lives on. In its original form, the debate posed whole language instruction against phonics instruction. With both sides being adamantly opposed to the other, somewhere in education the debate continues. However, a more recent debate exists between phonemic awareness and phonics instruction. In contrast, this debate is not over which instructional program is superior in teaching reading, rather there is controversy over the similarities in terms of phonemics and phonics along with questions about their relationships to reading.

To review the ELIC document entitled, Phonemic Awareness and Phonics Instruction (1997), it is important to read the terminology once again.

Phonemic Awareness: "The ability to hear the individual sounds that make up words; an understanding that speech is composed of individual sounds."

Phonics: "The various ways of teaching children the relationship between spelling patterns and sound patterns. The complex relationship between the sounds of language and the system of spelling" (p.6).

Phonemic awareness focuses on an awareness of oral language. Phonics are the methods or the program focusing on written language in combination with oral language.

Phonemic awareness has been directly linked to success in reading. Yet, it is only one component of an early reading program. The document entitled, Teaching Reading (1996), promotes instruction of systematic, explicit phonics as well. However, the very nature of explicit phonics requires phonemic awareness "because the sounds associated with letters are directly provided" (Beck & Juel, 1995, p.25). Steven Stahl (1992) described an effective phonics program as one that builds on a child's concept of print and on a foundation of phonemic awareness. The Teaching Reading document (1996) states that "it is essential that both phonemic awareness and phonics be mutually reinforced in the context of integrated, shared reading and writing activities" (p.8). Therefore, the great debate may have become how to fit it all in.

Another controversy that has plagued the research on phonemic awareness is the validity and reliability of phonemic awareness tasks and tests. With such a variety

available and in use, making comparisons in research is difficult. Nesdale, Herriman, and Tunmer (1984) address this problem:

> "While performance on any one of these tasks might well be considered to say something about a child's phonological awareness, it is also certainly plausible that such tasks might demand different levels of segmentation ability in the child...The clear implication is that considerable caution must be exercised in comparing the results of specific studies since the child's assessed level of phonological awareness will depend greatly on the task" (p.60).

Hallie Yopp (1988) successfully paved the road to understanding the validity and reliability of phonemic awareness tests as well as selected test(s) that "best predict initial steps in reading acquisition" (p.163). The study goes into great detail about the purpose and administration of each test. The results of Yopp's study indicate that "most tests of phonemic awareness are significantly and positively correlated" (p.171). "Only three of the phonemic awareness tests in this study had reliability coefficients of .90 or greater for this sample of kindergarten children" (p.172). That reliability score should be considered in decision making for individual children. "The tests of phonemic awareness were highly interrelated, indicating that they were tapping a similar construct, and thus lending construct validity to the concept of phonemic awareness" (p.172). Five of the tests show predictive validity causing a link between reading acquisition and phonemic awareness. Finally, "the Yopp-Singer phoneme segmentation test, with a reliability of .95, may be the preferred test for measuring Simple Phonemic Awareness..." (p.175).

In addition, Janet Spector (1992) questioned the unfamiliarity and complexity of many phonemic awareness tasks. "A limitation of conventional tests of phonemic awareness is that they yield too many false negatives, that is, students who are unable to perform the experimental task but who actually possess (or could easily acquire) the ability that the task is designed to measure" (p.354). Spector (1992) explored dynamic assessment which is a term "used to describe a variety of evaluation approaches that emphasize the processes, in addition to the products, of assessment" (p.354). This approach requires interaction between the tester and the child being tested. It was found that "dynamic phoneme segmentation was a better predictor of kindergarten

reading progress than any of the three static measures of phonemic awareness: phoneme segmentation, phoneme deletion, and invented spelling. The dynamic measure was also a better predictor of word recognition than the Peabody Picture Vocabulary Test-Revised" (p.359). This approach may be a more realistic way to assess phonemic awareness.

Programs

Joanna Williams (1984) briefly reviewed five instructional programs introduced in the 1970's, the first two focus on specific phonemic skills, while the final three focus on phonemic training as it was incorporated in comprehensive programs. Williams (1984) cautions against the effectiveness of the programs, "for it is impossible to evaluate the effects of the phonemic training components apart from the effects of all of the other components of the program" (p.242). However, a good groundwork has been laid for future research.

In 1969, Lindamood and Lindamood, emphasized labeling of articulatory movements of the mouth. Years later, the Lindamood Auditory Conceptionalization Test (1979) "measured the ability to discriminate one sound from another as well as the ability to perceive the number and order of sounds within a spoken pattern" (Cunningham, 1990, p.433).

In 1971, Rosner and Simon "focused on the skills of adding, omitting, substituting, and rearranging phonemes" (Williams, 1984, p.242) on a new auditory analysis test. Research results showed an increased progression of mean scores from kindergarten to grade six with the largest increase between kindergarten and first grade. An initial conclusion suggested that an interwoven effect occurred between the auditory analysis test and children's reading skills.

In 1976, Venezky designed a Pre-Reading Skills program for low-ability kindergarten children. Five skills were emphasized: attending to letter order, attending to letter orientation, attending to word detail, sound matching, and sound blending. "Kindergarteners were successful at both learning and retaining the picture-sound associations and at blending phonemes after going through the program" (Williams, 1984, p.242).

In 1976, Wallach and Wallach designed a reading program with three parts to be administered in a tutorial setting. The first part included children recognizing letter sounds and letter shapes, then connecting the two. The second part included children manipulating and blending sounds in regularly spelled words. The third part included children utilizing what they know about sounds to read. Williams (1984) summarizes the results, "low-readiness first graders who received this program performed significantly better than control subjects on several reading measures, including standardized tests and report card grades" (p.242).

In 1979, Williams developed a program for learning disabled children designed to teach decoding. The program called, The ABD's of Reading, focused on phoneme analysis and phoneme blending. The posttest scores of the instructed group were significantly higher than those of the comparison groups. "On the test of decoding, which included both real and nonsense material...the posttest score of the instructed group was double that of the comparison group" (Williams, 1979, p.190).

During the late 1980's and early 1990's, considerations from previous programs were made and two additional instructional programs were introduced. In 1988, Lundberg, Frost, & Peterson developed "a training program consisting of metalinguistic games and exercises...with the aim of stimulating preschool children to discover and attend to the phonological structure of language" (p.263). Lundberg et al., concluded that metaphonological training does affect skills such as those requiring the manipulation of phonemes. This may lead to "a clear advantage in learning to read and spell in school" (Lundberg et al., 1988, p.283).

In 1991, Byrne and Fielding-Barnsley evaluated "a new program designed to teach young children about phonological structure" (p.451). The focus was on phoneme identity and was administered to preschool children. "There was a substantial overall performance increase from pretest to posttest" (p.454). Research also found improvement on sounds which were not a part of training. In 1993, a 1-year follow-up was done on the same children now in kindergarten. The passers had superior knowledge of phoneme identity as well as word identification, pseudoword identification, and spelling. "The present results confirm that phonemic awareness and alphabet knowledge work in combination to support the earliest stages of reading and spelling

acquisition" (p.110). In 1995, Byrne and Fielding-Barnsley conducted a 2 and 3 year follow-up including the same children now in first and second grade and a new preschool trial. "The most prominent finding in this follow-up investigation is the continuing superiority of the children from the experimental condition in decoding, as measured by accuracy in reading pseudowords, and signs of superiority in reading comprehension" (p.496).

Contributors

While reading the research and literature available on phonemic awareness, it became obvious that the earliest work on the topic was done in 1963 by two Russian psychologists, Zhurova and Elkonin. Zhurova (1963) points out that by the age of two, an infant can distinguish sound complexes. However, a preschool age child has difficulty distinguishing individual sounds in words. Thus, the reproduction of speech differs fundamentally from individual sound isolation. Zhurova (1963) conducted three series of experiments on four to six year olds focusing on phoneme isolation with varying degrees of experimenter help. "In the first series all the children in the four to six age group dealt successfully with the task of selecting the first sound in the word, in the third series, only 12% of those in the four to five age group carried out the task, and 39% of those in the five to six age group" (p.26). Therefore, phoneme isolation is not a single-stage act, it must be taught.

Elkonin (1963) developed a method to train children to isolate and identify individual phonemes within words. To make the task more concrete, a visual model was included. The model consisted of connected squares to represent the sounds or phonemes in a word. Markers were used to count the phonemes and eventually the markers were replaced with the letters. By 1973, Elkonin was reporting "that prereaders who were taught with this method mastered phonemic analysis quickly, and that they also showed improvement in various aspects of learning literacy" (p.219).

Liberman, Shankweiler, Fischer, and Carter (1974) studied syllable and phoneme segmentation abilities in young children.

> "At the nursery school level, none of the children could segment by phonemes, while nearly half (46%) could segment by syllables. Ability to perform phoneme segmentation was demonstrated by only 17% of the children at the kindergarten level; by contrast, almost

> half (48%) of the children at that level could segment syllabically. Even at the end of first grade, only 70% succeeded in phoneme segmentation, while 90% were successful in the syllable task" (p.208).

It was found that phoneme analysis is significantly more difficult than syllable analysis, therefore it would be important to train children in developing this ability.

Nancy Lewkowicz (1980) categorized "the various phonemic awareness training tasks according to their probable usefulness in the early stages of reading readiness training" (p.687). Two categories were proposed: (1) Tasks likely to be useful in the early stages, (2) Tasks likely to be useful only in the later stages of training. Lewkowicz (1980) lists and describes ten phonemic awareness tasks. "Blending and segmentation are the basic phonemic awareness tasks, then clearly they belong in a phonemic awareness training program" (p.691). Lewkowicz (1980) examines some basic principles of teaching these tasks. The remaining tasks can be helpful in mastering blending and segmentation, however, a few are impractical until later stages of training.

Joanna Williams (1980) describes her program, The ABD's of Reading, as it was used on learning disabled children to successfully teach general decoding skills. Training was provided in phoneme analysis and blending, letter-sound correspondences, and decoding. Instructed children "performed significantly better on a test of decoding than did control children" (p.14). William's program shows promise as a component of a well-planned comprehensive reading program for use with rather severely learning-disabled children.

Bradley and Bryant (1983) hypothesized that childrens' experiences with rhyme before entering school might have an effect on later success in reading and writing. The study found "high correlations between the initial sound categorization scores and the children's reading and spelling over 3 years later" (p.419). The intellectual level at the time of both tests and differences in memory were removed. A training study was included to check that any such relationship was a causal one. At the end, "group 1 (trained on sound categorization only) was ahead of group 3 (trained on conceptual categorization only) by 3-4 months in standardized tests of reading and spelling. This suggests a causal relationship between sound categorization and reading and spelling" (p.420).

As discussed earlier in the controversy section of this paper, Hallie Yopp (1988) determined the validity and reliability of phonemic awareness tests. It was concluded that "most tests of phonemic awareness are significantly and positively correlated" (p.171). Yopp (1992) later focused on the training of phonemic awareness. Suggestions for teachers in developing phonemic awareness activities are provided and examples are given. "They have been field tested in many classrooms, and both anecdotal accounts and experimental research indicate that children respond to the activities with enthusiasm and increased facility" (p.699).

Marilyn Adams (1990) wrote a book about beginning reading which focused on thinking and learning about print. Adams believes that "if children cannot hear and manipulate the sounds in spoken words, they have an extremely difficult time learning how to map those sounds to letters and letter patterns-the essence of decoding" (California Department of Education, 1996, p. 4 as taken from Adams). The emphasis of the alphabetic principle is of utmost importance. "Faced with an alphabetic script, the child's level of phonemic awareness on entering school may be the single most powerful determinant of the success he or she will experience in learning to read" (p.304).

As discussed earlier in the programs section, Byrne and Fielding-Barnsley (1995) developed a program to teach phoneme identity to preschool children and followed up 2 and 3 years later. "The most prominent finding in this follow-up investigation is the continuing superiority of the children from the experimental condition in decoding, as measured by accuracy in reading pseudowords, and signs of superiority in reading comprehension" (p.496).

Synthesis and Analysis

There is a general consensus that phonemic awareness contributes to reading acquisition. McCutchen and Crain-Thoreson (1994) point out that "a causal link has been demonstrated in studies showing that children who received phonemic awareness training prior to first grade became better readers than children who received no such training" (p.69-70). Several researchers previously described contributed to the consensus that phonemic awareness contributes to reading acquisition.

Bradley and Bryant (1983) looked at the causal connection of categorizing sounds and learning to read. "The consistent 3-4 month superiority of group 1 over group 3 does strongly suggest that training in sound categorization affects progress in reading and spelling" (p.420). In 1988, Lundberg, Frost, and Petersen studied the effects of explicit instruction in phonological awareness on preschool children and its long term effects on reading and spelling acquisition. In preschool, "small but significant effects were observed on rhyming tasks and on tasks involving word and syllable manipulation. And on tasks requiring phoneme segmentation, the effect was dramatic" (p.263). On measures given in grade one, performance showed transfer to new tasks and new formats in reading and spelling.

In the early 1990's, Cunningham "examined the role phonemic awareness plays in reading development and different methods of instruction in phonemic awareness" (p.429). The results were consistent with previous studies. Cunningham (1990) found that trained kindergartners performed better on all three tasks of phonemic awareness than the first grade control group. In 1991, Ball and Blachman examined phoneme awareness training in kindergarten as it relates to early word recognition and spelling. The Woodcock Word Identification Test was administered and 34% of the phoneme awareness group were able to read 4 or more words, whereas only 13% of the language activities group and only 7% of the control group could read 4 or more words. "The results from the spelling data parallel the reading findings" (p.63).

In 1993 and 1994, three studies were done on the effects of phonemic awareness training and reading ability. Sumpter and Szitar (1993) looked at a phonemic awareness plan for first grade involving activities and assessment. Castle, Riach, and Nicholson (1994) looked at phonemic awareness instruction within a whole language program. Weiner (1994) looked at phonemic awareness training on low and middle achieving first graders. Two of the studies, those done by Sumpter et al. and Castle et al., indicate that phonemic training programs did have an effect on reading skills. However, the study done by Weiner (1994) showed "there was no significant differences on measures of deletion, deletion and substitution, decoding, and reading ability" (p.291) between the experimental and control groups.

Janet Spector (1992) summarizes the following positions very well. "The results of both correlational and experimental studies generally have indicated that students who enter reading instruction unable to perform phonemic awareness tasks experience less success in reading than students who score high in phonemic awareness when instruction commences" (Spector, 1992, p.353).

The benefits of phonemic awareness are clear. The next question seems to be, what is needed to develop phonemic awareness? Several researchers suggest beginning by identifying the levels of phonemic awareness in children. The levels are not intended as a sequential program.

Yopp (1992), Snider (1995), Griffith and Olson (1992) suggest the following levels:

1. Word awareness - identifies how many words a given sentence contains
2. Word rhyming - identifies and/or supplies a word that rhymes with another
3. Sound matching - identifies which of several words begins with a certain sound
4. Sound isolation - identifies which sound is heard at the beginning, middle, or end of a given word
5. Phoneme blending - given isolated sounds of a word, blends the sounds into a word
6. Sound addition or substitution - adds or substitutes one sound or another in words, songs, and rhymes
7. Sound segmentation - isolates sounds in a spoken word (the opposite of blending)
8. Phoneme manipulation - changes the order of phonemes or other manipulation of sounds within or between words (Rigby, 1997).

Once the levels have been identified, decisions can be made on how to proceed in developing phonemic awareness in children. Spector (1995) recommends six forms of instruction in phonemic awareness that are directly related to a few of the aforementioned levels.

1. At the preschool level, engage children in activities that direct their attention to the sounds in words, such as rhyming and alliteration games.
2. Teach students to segment and blend.
3. Combine training in segmentation and blending with instruction in letter-sound relationships.
4. Teach segmentation and blending as complementary processes.

5. Systematically sequence examples when teaching segmentation and blending.
6. Teach for transfer to novel tasks and contexts. (Sensenbaugh, 1996, p.3).

Spector's recommendations are very limited to segmentation and blending of phonemes. The other levels of phonemic awareness need to be explored as well.

The next question to be addressed asks: what specific tasks or activities as well as assessment tools should be used to develop phonemic awareness? Phonemic awareness tasks are often used in two ways. The tasks may be used to teach or develop phonemic awareness and/or the tasks may be used to assess development of phonemic awareness in children. Usually, a phonemic awareness program or phonemic awareness training utilizes various tasks. There are numerous phonemic awareness tasks and they should be chosen to fit the concept to be taught or assessed.

Nancy Lewkowicz (1980) compiled a list of tasks that focused on sounds only, rather than printed letters or words. Researchers have used these tasks to teach or test phonemic awareness.

1. Sound-to-word matching, that is, recognition within a word, of a previously specified phoneme.
2. Word-to-word matching, that is, recognition of the fact that a word has the same beginning sound, or same final sound, or same medial vowel, as another word.
3. Recognition of rhyme, that is, recognition (at some level) of the fact that a word is identical with another word except for the portion preceding the stressed vowel.
4. Isolation of a beginning, medial, or final sound, that is, pronunciation, in isolation, of the phoneme occupying a designated location in a given word.
5. Phonemic segmentation, that is, separately articulating (isolating) all the sounds of a word, in correct order.
6. Counting the phonemes in a word.
7. Blending, that is, responding to a sequence of isolated speech sounds by recognizing and pronouncing the word that they constitute.
8. Deletion of a phoneme, that is, responding to a spoken word by pronouncing the new word or syllable that can be formed by omitting a designated phoneme.

9. Specifying which phoneme has been deleted, that is, responding to a pair of words, in which the second is identical to the first except that it lacks one phoneme, by pronouncing in isolation the phoneme that was left out of the second word.
10. Phoneme substitution, that is, responding to a spoken word, paired with an isolated phoneme, by pronouncing the new word formed by substituting the isolated phoneme for one of the sounds of the word (p.687-688).

Hallie Yopp (1988) compiled a list of phonemic awareness tests to examine the validity and reliability (discussed in more detail in controversy section) of their use. There are some similarities between Yopp's tests and Lewkowicz's tasks. Some of the tests were created years ago by researchers and remained the same, while other tests may have been modified by Yopp to fit the perimeters of the study. In some cases, two different versions of a test were administered. The list will include only the name of the test due to the fact that the test has most likely been previously described.

1. Auditory discrimination test
2. Phoneme blending test
3. Phoneme counting test
4. Phoneme deletion tests
5. Rhyming test
6. Phoneme segmentation tests
7. Sound isolation test
8. Word-to-word matching test
9. Phoneme reversal test
10. Learning test

One of the segmentation tests called, the Yopp-Singer Test of Phoneme Segmentation, "had a reliability score of .95, indicating that it can be appropriately used in the assessment of individuals" (Yopp, 1995, p.23). This test makes "a unique contribution to predicting students' reading and spelling achievement" (Yopp, 1995, p.26).

Research done by Yopp (1988) states that rhyme tasks are the easiest phonemic awareness tasks to perform. Adams (1990) agrees, the most primitive level of phonemic awareness consists of having an ear for the sounds of words or rhymes. Adams (1990) continues with the second level of difficulty being the recognition of

alliteration in words, focused attention to sound components. Phoneme blending tasks are seen at the next level by Yopp (1988) and Adams (1990). Segmentation of component phonemes are at the fourth increased level of difficulty. According to Lewkowicz (1980), blending and segmentation are classified as having the most direct relationship to decoding which leads to reading acquisition. Finally, researchers agree that phoneme deletion or manipulation tasks are the most difficult.

As can be seen in the literature, various tasks and tests are used to teach and assess phonemic awareness. "The hypothesis that reading acquisition and phonemic awareness are related has been repeatedly supported by research" (Yopp, 1992, p.697). The next question to be answered is: to what other areas of literacy is phonemic awareness linked?

McCutchen and Crain-Thoreson (1994) studied phonemic processes in children's reading comprehension. They employed the tongue-twister paradigm to answer their questions. In a previous study, McCutchen et al. (1991) explained:

> "this "tongue-twister effect" by suggesting that words with similar phonemic features (specifically, similar initial phonemes) are confused with one another in working memory, much as letters with similar visual features are confused during visual scanning (Neisser, 1963). When tongue-twister are read, even silently, sentence comprehension is slowed because the confusions induced by phonemic similarity must be resolved before comprehension can take place" (p.71).

McCutchen and Crain-Thoreson concluded "that it was the phonemic repetition in the tongue-twisters that caused children difficulty during comprehension" (p.82). So phonemic awareness is not only related to reading, it is related to comprehension as well.

In addition, research has been conducted on the effects phonemic awareness has on spelling. "It suggests three possible ways phonemic awareness affects spelling development. First, it enables beginners to segment a word into its constituent phonemes as they invent spellings. Additionally, it facilitates the acquisition of letter-sound representations that can later be used to generate spellings. Finally, during reading it aids in the storage of spellings for equivocal phonemes in specific words" (Griffith, 1991, p.218).

Griffith (1991) investigated the direct effects phonemic awareness and word-specific information had on spelling for first and third graders. In addition, the relationship between phonemic awareness and the acquisition of memorized spellings was explored. "In first grade phonemic awareness has a more powerful effect, indicating that at this level spelling relies heavily on phonological processing. By grade 3 word-specific information exerts the stronger influence on spelling, suggesting that at this level the use of memorized orthographic units is an important factor in spelling ability" (p.225).

Tangel and Blachman (1992) investigated whether children who received phonemic awareness instruction would differ in invented spelling from children not receiving the instruction. "Our findings indicate that the children who participated in the phoneme awareness intervention outperformed the control children on measures of phoneme segmentation, letter name and letter sound knowledge, and two measures of beginning word recognition" (p.250-251). What Tangel and Blachman found most interesting was that "treatment children were also able to produce invented spellings that were rated developmentally superior to those of the control children" (p.251).

Conclusion

"We know, for example, that poor readers who enter first grade phonemically unaware are very likely to remain poor readers at the end of fourth grade, since their lack of phonemic awareness contributes to their slow acquisition of word recognition skill" (Griffith & Olson, 1992, p.518 taken from Juel, 1988). Therefore, phonemic awareness has proven to be a strong predictor in reading acquisition. It "is a more potent predictor of success in reading than IQ or measures of vocabulary and listening comprehension, and that if it is lacking, emergent readers are unlikely to gain mastery over print" (Yopp, 1995, p.28).

This paper examined the relationship between phonemic awareness and the ability to read. In so doing, this paper attempted to answer four main questions. They were as follows:

1. Is phonemic awareness a prerequisite for or a consequence of learning to read?
2. What is needed to teach phonemic awareness?
3. More specifically, what tasks or activities as well as assessment tools should be used to develop phonemic awareness?
4. To what other areas of literacy is phonemic awareness linked?

The research is very clear in its support of phonemic awareness and the benefits it has in education.

So, which comes first, phonemic awareness or the ability to read? Tunmer and Nesdale (1985) hypothesized that phonemic awareness was a prerequisite for reading and found it was necessary, but not adequate for reading acquisition. Lundberg, Frost, and Petersen (1988) provided unconfounded evidence of a causal link. Morias et al. (1979) and Read et al. (1986) hypothesized that phonemic awareness was a consequence of learning to read and found illiterate adults had no phonemic skills while literate adults could add or delete phonemes. Yopp (1992) summed it up by saying a certain level of phonemic awareness is needed for reading and in turn reading heightens phonemic awareness. Therefore, phonemic awareness and the ability to read both came first.

To develop phonemic awareness, numerous tasks and tests can be used. Researchers suggest identifying pre-existing or non-existing levels of phonemic awareness in children in order to make decisions based on their needs. Yopp (1992), Snider (1995), and Griffith and Olson (1992) suggest the following: word awareness, word rhyming, sound matching, sound isolation, phoneme blending, sound addition or substitution, sound segmentation, and phoneme manipulation. The task of rhyming has been proven to be the easiest, therefore, it would be a good way to begin phonemic awareness in children. Whereas, phoneme deletion or manipulation tasks are the most difficult and should be considered later in their development.

Finally, phonemic awareness has been linked to other areas of literacy such as comprehension and spelling. McCutchen and Crain-Thoreson (1994) concluded that children had difficulty comprehending the phonemic repetition in tongue-twisters. Griffith (1991) investigated the effects of phonemic awareness and spelling. He concluded that first graders relied heavily on phonological processing in spelling and third graders relied

heavily on memorized orthographic units in spelling. Tangel and Blachman (1992) found that children participating in phoneme awareness intervention outperformed the control children.

Recommendations

One of the biggest concerns among educators today is how to create a nation of readers. The California Department of Education (1996) organized a reading task force to create a balanced and comprehensive approach to early reading instruction. This approach included phonemic awareness and realized the benefits such an awareness has on children's ability to read. Phonemic awareness should be a part of the everyday curriculum in preschool, kindergarten and first grade. The benefits may carry over to other grades with children that have limited English or are reading disabled in some way.

Phonemic awareness training and inservicing needs to take place ahead of time. In a study done by Troyer and Yopp (1990), it was found that some "kindergarten teacher participants had never heard the term phonemic awareness and were unfamiliar with its role in beginning reading" (p35). Yet, they were being asked to predict the level of phonemic awareness of their students. A school or district needs to provide their teachers with knowledge about phonemic awareness.

Once the teachers are knowledgeable, a program including assessment needs to be found that will compliment any existing curriculum and fit the needs of the students. There are so many tasks and tests available to choose from that can be both fun for the teacher and the children. Yopp (1992) offers a few recommendations for phonemic awareness activities:

1. Keep a sense of playfulness and fun, avoid drill and rote memorization.
2. Use group settings that encourage interaction among children.
3. Encourage children's curiosity about language and their experimentation with it.
4. Allow for and be prepared for individual differences.
5. Make sure the tone of the activity is not evaluative but rather fun and informal.

Finally, the phonemic awareness teacher should evaluate the successes and failures with pride. Roger Sensenbaugh (1996) sums it up best by saying, "spending a few

minutes daily engaging preschool, kindergarten, and first-grade children in oral activities that emphasize the sounds of language may go a long way in helping them become successful readers and learners" (p.3).

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