

Author



Sheela Shah became involved with research early in her career at UCI. She was also president of the Psi Chi National Honor Society and the Psychology Students Association. Shah's study, which is based upon a pilot completed during the previous year, was also presented at the UROP Undergraduate Research Symposium in the spring of 2000. Shah recommends that other undergraduates "start early" with research, as the benefits may include grants, research opportunities, and will "ease the transition to graduate school." Shah hopes to continue her work in a Ph.D. program in psychology.

Key Terms

- Digit Span
- Phonological Awareness
- Positive Home Reading Environment
- Socioeconomic Status

Home Literacy and Phonological Awareness as Predictors of Reading Ability

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Abstract

Phonological awareness is the ability to compare and manipulate small units of sound within words and letters. Because the English alphabet is a phonological system it may be essential to have a basic phonological awareness in order to read. This study investigated the relationships between phonological awareness, language-processing skills, and home environment in order to determine what factors predict young children's later reading ability. It compared 45 kindergartners' home literacy environments (measured through parental questionnaires) with their performance on phoneme awareness, letter/sound knowledge, and reading tests. Through data analysis, results from the different tasks and the parental home literacy questionnaires were compared in order to determine which factors influence young children's reading ability. It was found that letter-sound knowledge is a critical skill in attaining a better phonological awareness. Phonological awareness, in turn, is a critical skill in later reading ability. Also, positive home environment (e.g. book exposure and parental teaching) was found to be significantly related to later reading ability.

Faculty Mentor



Sheela Shah's research on the role of home literacy environment in reading acquisition is truly cutting edge and has required mastery of a large literature as well as development of innovative questionnaires and test materials to assess the behaviors of kindergarten children and their parents. Phoneme awareness, which is the ability to break spoken words into letter-sized sounds (e.g. to realize that "cat" without the first sound is "at" or to realize that "cat" and "cup" start with the same sound), is one of the most critical precursors of early reading ability. It is the skill that makes phonics possible, but it is also a skill that some children acquire much more easily than others do. The questions posed in this paper are directed at individual differences in phoneme awareness and Sheela's work is very timely indeed. Her discovery is two-fold: 1) that letter-sound knowledge paves the way to phoneme awareness which in turns paves the way towards successful reading and 2) that parental efforts to create a "positive home reading environment" account for between 10 and 15 percent of the variance in reading and pre-reading skills.

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Introduction

English is a phonological writing system with an alphabet that more or less represents the basic units of sounds that are called phonemes. Phonemes are the smallest units of sound within syllables and words. Phonological awareness is the awareness of these basic units of sound and is measured in terms of the ability to compare and manipulate the units of speech within words and syllables. This measured ability to break down words into sounds is the first step in utilizing the alphabet; it assists children as they attempt to understand what the letters of the alphabet represent. In conjunction with phoneme awareness, factors of letter knowledge, short-term memory, and home literacy may also be among the predictors of children's early reading ability. Discovering whether this is indeed the case was the goal of this study.

Previous studies have found that tasks involving analyses of phonemes were some of the most accurate predictors of later reading development (Elbro, Borstrom and Petersen, 1998; Mann, 1998; Wagner and Torgesen, 1987). Children who performed better on these tasks also read at a higher level, emphasizing the importance of phonological awareness. Several important tasks that have been found to specifically measure phonological awareness include tests of rhyme detection, phoneme counting, and phoneme deletion. These tasks require children to distinguish among different sounds and to manipulate those sounds.

Although some phonological awareness tasks employ written language materials and letter sounds such as "buh" or "guh," many tasks assessing phonological awareness may also be used for younger pre-reading children. One study suggests that young preschool children can be tested for lower levels of phonological sensitivity using oral/auditory tasks because the performance on lower level tasks will be a predictor of higher levels of phonological awareness in later reading (Lonigan et al., 1998). Such tasks of phonological sensitivity require the child to distinguish among sounds and demonstrate an overall sensitivity to speech sounds at varying levels, such as syllables, onset-rhymes and phonemes (phoneme judgment tasks). Lonigan *et al.* used auditory language tests of rhyme and alliteration to indicate that phonological sensitivity can indeed be accurately measured in children as young as three-years old (1998). Their results indicated that there was a substantial increase in the performance on these phonological tasks between the ages of three and four, and that scores on earlier tasks were predictive of scores on later tasks.

Past studies have linked phonological awareness with letter knowledge (Scarborough, 1989; Treiman et al., 1998). Hollis Scarborough found that deficient letter knowledge and poor performance on productive vocabulary tasks were indicators of reading disability in dyslexic children (1989). Children who were later diagnosed with dyslexia didn't perform as well as other children on tests assessing letter knowledge, productive vocabulary, and phonological awareness. This research with dyslexics suggests that the skills related to phonological awareness are critical in learning to read. Treiman *et al.* studied the relationship between letter knowledge and performance on letter-sound tasks (1998). Their results showed that children seem to use their knowledge of letter names when learning sounds, rather than simply memorizing letters and letter-sounds as random pairings. This further emphasizes the importance of having sufficient knowledge of letter names for learning letter-sounds, and thus for normal reading acquisition.

Past studies also determined a strong relationship between short-term memory and later reading ability (Brady, 1986; Mann, 1998). Susan Brady discussed a developmental study in which a significant relationship is found between phonetic processes and verbal short-term memory, but no relationship is found between phonetic processes and nonverbal short-term memory (1986). Elbro *et al.* showed that phonological short-term memory span in preschool children was also predictive of later reading ability and that it actually contributed significantly to the prediction of dyslexia (1998). Another study used the Digit Span measure for short-term memory, and found that dyslexic and learning-disabled subjects had poorer phonological sensitivity and shorter digit spans (Ackerman, Dykman and Gardner, 1990).

Short-term memory may play a significant role in phonological awareness, and thus in later reading ability, because it is necessary to have a store in memory where speech sounds can be held while other adjacent sounds are collected. Once several sounds are held in memory, they can be separated or compared to successfully solve phoneme awareness tasks. Those children who can hold more items in their short-term memory store will also have a greater ability to manipulate the units of sound needed for phonological awareness, and thus will later perform better in reading tasks. Additionally, an adequate memory store would enable proper retention of words so that sentences can be semantically and syntactically processed (Mann, 1998).

In the past, studies have successfully used many tasks to measure phonological awareness, letter knowledge, working

memory, and other language processing skills. When investigating the role of phonological awareness in reading, Lonigan *et al.* found a significant difference in phonological awareness among children from different socioeconomic status classes (SES) with an overall lower performance in pre-reading tasks for children in lower SES classes (1998). This difference in performance for phonological awareness tasks for children from different SES classes was found for children as young as three years old. It was further suggested that such a difference might be attributed to differences in the type and frequency of exposure to home literacy-related activities. Consistent with this speculation, parents from a higher class are reported to spend more time reading to their children and may also have more rhyme books, books of poems, and alphabet-related teaching materials (Stuart *et al.*, 1998). Stuart *et al.* found that there was a specific social class difference in the amount of time parents reported reading to their children. Lower SES adults may be infrequent or poor readers themselves, and thus may read less to their children (1998). The greater number of resources in higher socioeconomic homes may help children develop a greater phonological knowledge because they will be exposed to books and other materials (e.g. computer games, videos, etc.) which emphasize learning letters and letter sounds (e.g. alphabet books).

If different home literacy environments are an explanation for a difference in phonological awareness among children from various SES classes, it may be important to investigate the role of home literacy in early reading. One important contribution of home environment is the amount of book exposure that the child is given outside the classroom. Book exposure may be something that could differ with socioeconomic class status because low SES parents may not have the time or money to provide their children with as many literacy materials as high SES parents. However, with simple self-reported parental questionnaires, it may be hard to determine how much the child is truly exposed to literature due to inaccurate parental reporting. For this reason, the current study will directly test the child's book exposure through a title recognition task (adapted from Schoenburg, 1998) in order to determine the specific contribution of book exposure to children's language processing skills, phonological awareness, and reading ability.

More generally, Fernandez-Fein and Baker looked at different home literacy activities and related them to children's reading ability (1997). When assessing the influence of home environment, word games such as nursery rhymes were significantly correlated with performance on rhyme tasks, showing that word games at home may help children gain early pho-

nological awareness and thus aid them in an early start to reading. A strong correlation between letter knowledge and performance on rhyme tests in their study further showed the underlying phonemic connection between both these skills (Fernandez-Fein and Baker, 1997).

Although home literacy may play a large role in early reading ability, simple exposure to print is not enough to make a significant difference in later reading ability for children. Parents who offer corrective feedback and actively discuss letters and words with their children tend to improve their children's understanding of letters and sounds (Baker *et al.*, 1998; Evans, Barraball and Eberle, 1998). Moreover, active conversations regarding words during joint book reading might prove beneficial later. If parents teach their young children letter names and play language games dealing with phonological awareness, children may be more likely to later exhibit a greater reading ability due to the early establishment of a phonological foundation. Evans *et al.* asked specific questions regarding parental views on what is important when learning to read (1998). Parents were asked to indicate how much they emphasize interest, vocabulary, sounding words, recognizing pictures, and other language skills. Some of the questions dealing with parental teaching were adapted and expanded in the present study's home literacy questionnaire.

The present study further investigated the role of home literacy in early reading ability and extended previous experiments by looking at different parental teaching types during home reading activities. Parental teaching has been shown to play a role in children's reading performance, but there is a need for more research on what type of parental teaching is most effective in promoting reading skills. This longitudinal study tested four and five-year-old pre-reading children with auditory tasks that measure low-level phonological sensitivity, so that performance was within the capabilities of the children. Children were also assessed for pre-reading skills using established letter knowledge, rhyme recognition, and working memory, as well as a measure of book exposure. Phonological awareness and the other language-processing tasks were given twice during the year, so improvement could be monitored and relationships among factors could be determined. The scores on these tests (as predictors of later reading ability) were then compared to other factors (home literacy questionnaires and other language-processing tasks).

Parents of kindergarten children were asked specific questions about home reading resources and literacy activities in order to assess home literacy environment. The current study adapted many of the questions pertaining to home literacy

activities from a study that investigated the influences of the home literacy environment on the development of oral and written language (Senechal et al., 1998). Specifically, questions targeted how often parents read to their children, and how often they facilitated other literacy activities such as library visits, number of library books, etc. Questions were expanded and the scales were changed for a broader range of answer choices. This study built upon past studies by adding measures of frequency of home reading and overall exposure to reading at home. This longitudinal study attempted to show the relationships between letter knowledge, short-term memory, and phonological awareness and investigate any causality between these different factors. It was also hypothesized that pre-reading children who have home literacy environments that emphasize learning letters and sounds will have a greater phonological awareness, and perform at an overall greater level in the given language skill tasks than those children who do not.

Methods

Participants

Forty-five kindergartners and their parents from two elementary schools in Orange County were asked to participate in the current study, and parents were asked to sign consent forms. Four and five-year old children who were native speakers of English were tested. Most of the children could not read at the time, or were just beginning to learn.

Materials

Home Literacy Questionnaire

The questionnaire consisted of a total of 17 questions. Nine questions pertained to home reading activities, two pertained to parental teaching, two were related to other educational resources available in the home, and four questions asked parents about their child's interest in reading and reading-related activities. Questions consisted of six or seven point Likert scale questions and components, which asked the parents to rate their different teaching emphases from 1 to 10.

Phonological Awareness Tasks

The two phonological awareness tests consisted of Phonological Judgement and Phoneme Deletion (Singson, 1999). The Phonological Judgement task required children to recognize and distinguish between words that shared initial or final phonemes with a specific target word. An initial word was presented orally to the child and they were told to pay attention to the first sound. Then a pair of words was presented and the child was asked to repeat the word that started with the same first sound as the initial word. Two practice

sets were given to introduce the 20 initial phoneme judgment pairs, and two practice sets were also given to introduce the ten final phoneme judgment pairs. The Phoneme Deletion task required children to say the remainder of a given word after taking the initial or final phoneme out. Two practice items were given before the set of ten initial phoneme deletions and two practice items were given before the set of ten final phoneme deletions.

Digit Span

This test measures the maximum number of digits a child can remember and recite (Wechsler, 1967). It serves as a measure of short-term memory. The Backwards Digit Span was also administered as another measure of memory.

Rhyme Recognition Task

Borrowed from Carolyn Chaney, this measure of phonological sensitivity was administered to measure children's understanding of rhyme (1998). Eight sets of three pictures were presented one at a time. After the pictures were identified, the child was told to point to the picture of the word that did not rhyme with the other two words.

Phonological Representation

As another measure of phonological sensitivity, this test (Elbro, 1998) was administered to test how quickly the child could pull information from lexical store. Pictures of three items were presented on each of 15 note cards (e.g. one card might have pictures of a cow, pig and lamb).

Letter Knowledge

The Woodcock Letter Identification task (Woodcock, 1987) and the Letter-Sound task (Schoenburg, 1998) were used to measure letter knowledge. In the Letter Identification task, children simply stated the name of each letter presented in the booklet. Letters were uppercase, lowercase, and in cursive. A total of 45 letters were presented and the total number correctly named was recorded. The Letter-Sound task consisted of several cards with single letters or pairs of letters where the child reported what sound each letter made (Schoenburg, 1998). A total of 20 cards were presented.

The Woodcock Word Tests

The Word Identification task (Woodcock, 1987) consisted of 150 real words in order of increasing difficulty. Children were asked to read the first 25 words (grade 1.6 equivalent), until they missed five words in a row, then their score of the number correct was noted. The Woodcock Word Attack task consisted of 50 nonsense words. Children were asked to read the first five words (grade 1.6 equivalent). This task

was scored in the same manner as the Word Identification. Both tasks measured the child's ability to decode words from sounds, thus directly measuring reading ability.

Title Recognition Task

As developed by Schoenburg, this test measures children's storybook exposure (1998). Children were shown 32 pictures taken directly from popular children's books and were asked to name the title of the book from which the picture came.

Procedure

Consent forms were handed out to teachers several weeks prior to testing. Home questionnaires were then distributed to those parents who signed the consent forms. In this longitudinal study, children were tested at two different times in the year, once in early fall at the beginning of the school year, and once at the end of winter. Children were tested individually in their school for two sessions for approximately 20 minutes each for the Fall testing (all measures) and 20 minutes total for the Winter testing (phonological awareness tasks, letter tasks, and reading tasks were administered again). In order to minimize fatigue effects, the Fall pre-reading tasks were not administered all at once, but instead were split into two sessions and given on two different days. In the course of the testing, children were told that they could return to their classrooms at any time if they became tired or if they no longer wanted to participate. After each completed task, children were rewarded with stickers in order to encourage their best performance and further motivate them.

Results

The present study investigated language-processing skills as well as factors in the home environment that may be related to and predict later reading skills. The mean values and their standard deviations are listed in Table 1. As would be expected there are significant improvements in children's performances with time for letter sound knowledge ($t = -8.93$, $p < 0.001$), phonological awareness ($t = -7.45$, $p < 0.001$), and reading ability ($t = -5.07$, $p < 0.001$).

All the items in the Home Literacy Questionnaire were entered into a Principal Components factor analysis, which revealed five factors. The first and most important factor was extracted with an eigenvalue of 5.06 which accounted for 25.3% of the variance. This factor had high factor loadings (ranging from 0.601 and 0.770) from questions such as how often parents taught their children to read words to the frequency of joint reading in the home. The factor variable is

referred to as "Positive Home Reading Environment" in all subsequent analysis.

Cross lag correlations between some of the longitudinal data show the predictability of various language-processing skills and reading ability. The Fall Letter-Sound task correlates with the Winter Phonological Awareness task more than the Fall Phonological awareness task correlates with the Winter Letter-Sound task, indicating that letter-sound knowledge precedes phonological awareness in early development. Another such cross lag correlation suggests that phonological awareness is predictive of reading ability, with the Fall Phonological Awareness and Winter Reading task correlation being greater than the Fall Reading task and the Winter Phonological Awareness task correlation. These correlations suggest that letter-sound knowledge is more predictive of phonological awareness while phonological awareness is more predictive of reading ability.

Short-term memory as measured through the Digit Span task correlated with several measures including the Winter Phonological Awareness task ($r = 0.499$, $p < 0.01$) and the Winter Reading task ($r = 0.388$, $p < 0.01$), thus showing the important role of short-term memory in reading acquisition.

The factor scores of the Positive Home Reading Environment factor were compared to the various language processing and reading tasks to determine the relationships between home literacy and written language skills. Home environment positively correlated with several measures including the digit span test ($r = 0.418$, $p < 0.01$), the title recognition task ($r = 0.473$, $p < 0.473$), the letter sound task (fall: $r = 0.333$, $p < 0.05$), the letter identification tasks (fall: $r = 0.311$, $p < 0.05$ and winter: $r = 0.379$, $p < 0.05$), the phoneme awareness tests (fall: $r = 0.366$, $p < 0.05$ and winter: $r = 0.423$, $p < 0.01$) and the winter reading task ($r = 0.395$, $p < 0.05$). Thus it is likely that parental involvement had a role in the children's performance on the language-processing and reading tasks.

Another way of understanding the relationships between all these variables is through the Stepwise Linear Regression. Further analyses with a Stepwise Linear Regression showed the important links between letter-sound knowledge, phonological awareness, and reading ability. Notably, 55% of the variance in the Winter Reading Ability could be attributed to Fall Phonological Awareness while 11% of the variance could be attributed to Book Exposure (the Title Recognition Task). Since these results show the importance of phonological awareness in reading, a stepwise regression of Winter Phonological Awareness was also run. Results show that 52% of

Table 1

Descriptive Statistics for all measures (test and questionnaire data)

Task (n = 45)	M	SD	Home Literacy Questionnaire	M	SD
Age (months)	64.60	3.96	Age began reading to child	2.30	1.47
Digit Span	4.67	1.73	How often read ABC books	2.04	1.13
Picture Naming Time (sec)	1.27	0.18	How often teach child to read words	3.44	1.01
Title Recognition Test (max = 32)	2.82	1.81	Parental emphasis on developing broad interests	7.71	2.21
Affect/Orientation (max = 16)	14.27	2.51	Parental emphasis on learning letters	8.53	2.43
Fall Testing			Parental emphasis on recognizing words by sounding out	7.07	3.00
Letter Identification (max = 45)	20.31	9.87	Parental emphasis on matching pictures with words	7.31	2.36
Letter Sound (max = 20)	10.02	6.36	Parental emphasis on recognizing words after repeated practice	6.68	2.97
Rhyme Recognition (max = 8)	5.78	1.88	Frequency of reading with child at home	2.84	1.21
Phoneme Judgment (max = 20)	18.80	4.62	How many books child has at home	4.53	1.42
Phoneme Deletion (max = 10)	2.93	4.85	Visits to the library	2.11	0.98
Reading Assessment (max = 30)	3.00	7.57	Frequency of child's solitary reading	2.91	0.96
Winter Testing			Frequency that child asks to be read to	3.00	0.91
Letter Identification (max = 45)	29.44	3.47	Child reads other things: road signs, etc.	3.44	1.16
Letter Sound (max = 20)	16.58	3.02	How interested is child in reading	3.67	1.09
Rhyme Recognition (max = 8)	7.02	1.27	How much time watching reading television programs	2.96	0.98
Phoneme Judgment (max = 20)	22.49	4.83	Time playing computer reading games	3.51	1.27
Phoneme Deletion (max = 10)	7.53	6.95	Number of children's magazine subscriptions	1.64	0.8
Reading Assessment (max = 30)	13.47	19.93	Frequency of parental reading	2.69	0.95
			Parental interest in reading	3.84	1.07

the variance in Winter Phonological Awareness could be attributed to Fall Letter-Sound Knowledge, while 15% of the variance could be attributed to "frequency of parental teaching."

Discussion

The present study compared several language-processing skills, reading skills, and home literacy factors in order to determine the factors related to and predictive of successful reading in children. As many others have shown, a variety of factors influence the difficult task of learning to read (Elbro et al., 1998; Lonigan et al., 1998; Mann, 1998; Wagner and Torgesen, 1987). All agree that phonological awareness plays a large role in predicting children's later reading ability. The results of the present study support this notion. The relationship between the Fall Phoneme test and the Winter Reading test is greater than the relationship between the Fall Read-

ing test and the Winter Phoneme test. This is consistent with the idea that phonological awareness leads to increased reading ability. Also, because Fall phonological awareness contributed to over half of the variance in Winter Reading ability in the Stepwise Regression, it is likely that phonological awareness is a critical skill that children must acquire in order to read successfully.

Because phonological awareness is an accurate predictor of reading ability, it is important to investigate the factors that play a role in developing phonological awareness. The results of this study are consistent with past studies in showing the importance of letter-sound knowledge as related to phonological awareness. Scarborough found that children who were later diagnosed with dyslexia performed worse on specific tasks of letter knowledge than normal readers, thus showing the importance of letter knowledge in successful reading (1989). As expected, the present study shows that letter-sound

knowledge has a strong positive relationship with children's performance on phonological awareness tasks, so that children who tend to know and understand more letter-sound relationships also tend to perform better on tasks measuring phonological awareness. The cross lag correlations of the present study further support the importance of letter-sound knowledge. The relationship between the Fall letter-sound task and the Winter phoneme awareness task is greater than the relationship between the Fall phoneme awareness task and the Winter letter-sound task, suggesting that phonological awareness is linked to letter-sound knowledge. The results from the Stepwise Linear Regressions further support this argument. Results show that letter-sound knowledge contributes to 52% of the variance in phonological awareness, which in turn contributes to 55% of the variance in later reading ability, thus indicating the importance of letter-sound knowledge in gaining phonological awareness and of having a good phonological awareness in learning to read.

The present study also found the scores on the digit span memory task to have a strong positive correlation with the children's phonological awareness and reading ability. This is consistent with Elbro *et al.* who found phonological short-term memory span to be predictive of later reading ability, such that children with a greater short-term memory span performed better on later reading tasks (1998). As expected, the current study found that even the short-term memory capacity for a string of digits, as measured by the digit span task, significantly correlated with children's performance in phonological awareness and reading tasks. This suggests that, in order to solve phoneme awareness tests and decode words when attempting to read, children must have the capacity to store words in their memory so that the sounds within the words can be separated from each other.

Relationships between letter-sound knowledge, rhyme recognition, short-term memory, and phonological awareness seem to support the notion that all these elements are essential for written language development. It is necessary to have the basic knowledge of letters and the sounds they make in order to recover the spoken words groups of letters represent. Along with this phonological awareness, it seems crucial to have a large enough short-term memory capacity that these letter sounds can be held so they are ready to be blended during the actual reading process. It is also important to recognize the nature of sounds and be able to recognize similar and dissimilar sounds (as was measured through the rhyme recognition task) and apply them to reading words. These factors interact with and contribute to a child's phonological awareness, which enables the child to manipulate and control

letters and words when learning to read later.

Along with relationships between language-processing and reading skills, the present study also found strong relationships between these skills and the positive home environment factor extracted from the home literacy questionnaire. This factor consisted of several questions regarding frequency of parental teaching in the home, children's interest in reading, and the frequency of joint reading in the home. Lonigan *et al.* found a difference in phonological awareness between children from different SES classes (1998). Children from lower SES classes seemed to perform at a lower level in the phonological awareness tasks. As an explanation for this possible discrepancy between children of different SES class, it was posited that home environment may have a strong influence in children's reading acquisition.

The present study found that home environment is related to children's performance on letter knowledge, letter-sound knowledge, title recognition (book exposure), phonological awareness, and reading tests. The Title Recognition task was used to objectively test book exposure and the results from the study showed that the amount of book exposure a child possessed strongly related to letter knowledge, letter-sound knowledge, phonological awareness, and reading ability. Parental teaching had a high-loading on the positive home environment factor which, in turn, related to reading, phonological awareness, and other cognitive skills. Among other things, this supports the conclusion that children who were most aware of phonemes had parents who reported actively teaching their children to read words and know the alphabet. This further supports Baker *et al.* who argued for regular home discussions of letters and words so children could better understand letters and sounds (1998). Parental involvement does seem to play a role in children's reading acquisition because it can supplement and reinforce school education and allow pre-reading children to have the needed tools for an early start to reading.

Although the present study has shown several relationships between various language-processing tasks, positive home environment, phonological awareness, and reading ability, it may be important for future studies to choose a more diverse sample of children from different SES classes. The children in the present study came from different areas in Orange County but they were drawn from only two schools. Also, the present study did not record how many years of prior schooling the children had before their first year of kindergarten (e.g. preschool), but rather assumed that the children should be at about an equal level of instruction. This

could have had some role in the children's performance and should be accounted for in future studies.

In conclusion, the relationships seen in the present study further support the phonetic approach to teaching children to read at school and home. It may be important to use letter-sounds and rhyming games to teach pre-readers the basic phonological skills necessary for reading. At an early age, children should be taught about letters and basic sounds so they will have the skills needed for greater phonological awareness and thus a foundation for later reading. Such instruction can take many forms, including letter-sound games and activities involving manipulations of sounds in words. For young children, even a basic teaching of the alphabet can be beneficial.

The results of the present study also show that it is important for parents to play an active role in teaching their children at home and promoting an overall positive reading environment. It is crucial for parents to teach their children basic skills such as letter knowledge (through the alphabet) and to play language-based games at home. Parents should also read regularly to their children to both cultivate an interest in reading and provide experience with letter-sounds. With this added supplement to school instruction, children will have an advantage when they start to read. It is also reasonable to speculate that the continuing development of alphabet sound books and reading-related computer games will expose more children to reading and promote further interest. Such materials should be available in schools and libraries for those families who may not be able to afford these resources for their homes. Ideally, more parents and teachers will use phonetic techniques and materials to develop a greater phonological awareness in pre-reading children, thus ultimately leading to a greater advantage in reading acquisition for all children.

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