

PreK

Teacher's Manual



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Phonological Awareness Literacy Screening

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University of Virginia Printing and Copying Services
Printed in the United States of America



CHAPTER FIVE

The Development of PALS-PreK

Children's literacy experiences before formal schooling can play an important role in their future success and achievement. Children who begin school with prior knowledge and skills in a variety of language and literacy areas are more likely to become successful readers in the primary grades (Byrne, Fielding-Barnesly, Ashley, & Larson, 1997; Raz & Bryant, 1990; Roskos et al., 2001; Scarborough, 1998; Snow et al., 1998; Storch et al., 2002). This underscores the need for early childhood educators to (a) identify children's literacy strengths, (b) recognize children who might experience future reading difficulties, and (c) promote classroom experiences that build early literacy skills. Using PALS-PreK, teachers can plan literacy experiences and instruction that best fit the needs of each individual child. The preschool setting is an optimal place for young children to build a strong foundation in all areas of development including language and literacy.

PALS-PreK assesses many of the emergent literacy factors shown by research to predict later reading achievement. Most notable among these are phonological awareness and alphabet knowledge (Badian, 2000; Johnston, Anderson, & Holligan, 1996; Snow et al., 1998; Storch et al., 2002). The two best predictors of early reading achievement are the awareness of sound units within spoken words (Scarborough, 1998; Wagner et al., 1987; Watson, 2001), and accurate recognition of the letters of the alphabet (Adams, 1990; Badian, 2000; Byrne et al., 1989). PALS-PreK is a measure of young children's knowledge of fundamental aspects of phonological awareness and print knowledge, including: (a) name writing, (b) alphabet recognition and letter sounds, (c) beginning sound awareness, (d) print and word awareness, (e) rhyme awareness, and (f) knowledge of nursery rhymes.

The Phonological Awareness Literacy Screening for Preschool (PALS-PreK) was created due to the popularity of the original PALS assessment for kindergarten children and the need for early prevention of reading problems (Bowman et al., 2001; Burns, Griffin, & Snow, 1999; Foorman, Francis, Shaywitz, Shaywitz, & Fletcher, 1997). Virginia's Preschool Initiative, which provides funds for Virginia's state-supported preschool programs serving at-risk children also contributed to the development of PALS-PreK (for more information about this initiative see the Virginia Department of Education's Web site at http://www.pen.k12.va.us/VDOE/Instruction/Elem_M/early.html).

The tasks presented in PALS-PreK are a representative sample of tasks found in other measures of emergent literacy. Items were selected because of their previous history in emergent literacy research (Clay, 1985; Dickinson & McCabe, 2001; Dickinson & et al., 2001; Johnston et al., 1996; Liberman et al., 1985; Masonheimer, 1981). Administration procedures were developed based on psychoeducational research and research on developmentally appropriate practice for early literacy assessment (Culbertson & Willis, 1993; NAEYC & IRA, 1998; Sattler, 1988). Several well-documented assessments were reviewed and critiqued during the development of task presentation and format (i.e., *Essential Skills Screener-*

Rationale

Development

Preschool Version, 1995; *Metropolitan Readiness Test*, 6th Ed., 1995; *Peabody Picture Vocabulary Test-3rd Ed.*, 1997; *PreLas 2000*, 1998; *Test of Reading Ability-3rd edition*, 2001). Item selection and field-testing procedures for the tasks on PALS-PreK are outlined in the sections that follow.

Item Development and Field Testing

The first step to providing teachers with a developmentally appropriate and robust instrument was to select task items based upon scientific research in the area of early literacy. The next steps were to test the PALS-PreK items in a pilot study, collect suggestions for improvements, make necessary revisions, and re-pilot the revised tasks. Pilots were conducted in 14 different Virginia preschools during the Spring of 2000 and across the 2000–2001 academic year. Additionally, during the 2002–2003 academic year, 287 preschool children from five different locations in Virginia participated in a field test of a revised beginning sound task. Finally, a new PALS-PreK assessment was piloted that included two revised tasks (Beginning Sound and Rhyme Awareness) and two entirely new tasks (Nursery Rhyme Awareness and Print and Word Awareness). Over the course of the 2003–2004 academic year, 138 preschool children from four different schools participated in this pilot, which included assessment on all PALS-PreK tasks. Reliabilities of the new tasks were examined and compared to reliability estimates for the previous version of PALS-PreK. A description of the item-development process, pilots, and results is provided in the following sections.

It is important to note that while a summed score, consisting of the total of scores from each PALS-PreK task, was included in the previous version of PALS-PreK, a summed score is not calculated in the current version. This is due primarily to the limited usefulness of summing these scores. The nature and purpose of PALS-PreK is to guide teachers' efforts at planning literacy instruction. Therefore, comparing children's scores to developmental ranges within individual tasks is believed to be much more useful to teachers. In the following sections, any reference to a summed score refers to scores obtained using the previous version of PALS-PreK.

Name Writing

A child's first attempt to convey meaning through written language often occurs when that child learns to write the letters in his or her name (Bloodgood, 1999; Welsch, Sullivan, & Justice, 2003). In order to measure familiarity with writing, a name-writing task was included on PALS-PreK. Children's writing behaviors can be examined from a developmental perspective as they advance through various stages, from a scribbled representation to a correct and recognizable signature (Ferrerio & Teberosky, 1982). The scoring of the name-writing task reflects these varied stages of development.

Developing over time, name production represents a child's cognitive process as s/he begins to understand the connection between written and spoken language (Lieberman, 1985). A direct connection between literacy acquisition and name-writing ability has also been observed. In a study of preschool and kindergarten children, Bloodgood (1999) found that while all children made literacy gains over the course of a school year, there was a clear relationship between name writing and other literacy tasks such as concept of word, beginning sound identification, word recognition, and spelling. She also found significant correlations between children's letter-naming and name writing ability, which increased

with age. Welsch et al. (2003) replicated these findings with a much larger sample involving 3,546 four year olds. Thus, it appears that name writing is closely related to other literacy skills as each is derived from experiences with oral and written language.

Alphabet Knowledge

Upper-case alphabet recognition was chosen as a core component of PALS-PreK based on early literacy research suggesting that the single best predictor of early reading achievement, on its own, is accurate, rapid naming of the letters of the alphabet (Adams, 1990; Badian, 2000; Snow et al., 1998). The results of the first pilot study of PALS-PreK indicate that the participating preschool children consistently knew more upper than lower-case letters. In addition, data collected from the original PALS assessment in 1997–1998 denoted a ceiling effect for kindergarten and first-grade children on the Upper-Case Alphabet Recognition task but not on the Lower-Case Alphabet Recognition task (Invernizzi, Robey, & Moon, 1999). Taken together, these data suggest that naming of upper-case letters is the more developmentally appropriate task for preschool children (Masonheimer, 1981). Once a child demonstrates the ability to identify 16 or more upper-case letters on PALS-PreK, then s/he moves to the Lower-Case Alphabet Recognition task. Crosstab analyses revealed that children who are able to name 9 or more lower-case letters were likely to also know some letter sounds, so PALS-PreK offers a Letter Sounds task for children who name 9 or more lower-case letters correctly.

The 2000–2001 pilot study further demonstrates the predictive nature of the Upper-Case Alphabet Recognition task for reading success. Children's Fall 2000 scores on the Upper-Case Alphabet Recognition task were significantly correlated with their Spring 2001 PALS-PreK Summed Score ($r = .69, p < .001$) and accounted for 48% of the variance in spring scores.

Beginning Sound Awareness and Rhyme Awareness

Phonological awareness refers to the ability to pay attention to, identify, and manipulate sound units within spoken words. In particular, the research literature on phonological awareness identifies individual phoneme awareness as significantly related to reading outcomes (Blachman, 2000; Morris et al., 2003; Swank & Catts, 1994). Research on emergent literacy continues to support the importance of children's skill with beginning phoneme identity, or beginning sound awareness, as they enter into the world of beginning reading (Byrne et al., 1997; Johnston et al., 1996).

Items on the Beginning Sound Awareness task of PALS-PreK were selected to meet three attributes of measurement. First, the items selected needed to be at an appropriate difficulty level for preschool children (i.e., neither too difficult nor too easy). Second, the selected items needed to have a strong predictive relationship with reading achievement. Measures of phoneme identity are well documented as predictive of reading outcomes (Bradley & Bryant, 1985; Bryant et al., 1989; Bryant, MacLean, Bradley, & Crossland, 1990; Nicholson, 1997; Swank, 1997; Swank et al., 1994). Unlike the PALS-K (Invernizzi et al. 2003), which utilizes a pencil-and-paper, group format, the phonological awareness tasks on PALS-PreK assess children in an individual format using oral assessment procedures.

Developmentally appropriate pictures with a prior history in phonological awareness research were selected for the Beginning Sound Awareness tasks on

Children's Fall 2000 scores on the Upper-Case Alphabet Recognition task were significantly correlated with their Spring 2001 PALS-PreK Summed Score ($r = .69, p < .001$) and accounted for 48% of the variance in spring scores.

During the 2002–2003 academic year, a total of 289 preschool children from 12 preschools in five different geographic areas of the Commonwealth of Virginia participated in a pilot of the revised Beginning Sound Awareness task.

PALS-PreK. The items selected met the following two criteria: first, stimuli had been used previously with preschool and primary age children to assess phonological awareness and predictive outcomes were established, and second, pictures were easily recognizable and represented age-appropriate vocabulary. The first criterion was met by selecting stimuli from past prediction studies (Bradley et al., 1983, 1985; Bryant et al., 1990; Scarborough, 1998; Swank, 1997; Swank et al., 1994; Wagner et al., 1987). The second criterion was met by selecting picture templates and having an artist draw similar renderings of pictures used successfully with preschool children. The pictures represent one-syllable, high frequency words that are appropriate for preschool children (Bear, et al. 2004). Only single-syllable, concrete words that could be represented pictorially were selected.

The 2002–2003 pilot study of PALS-PreK provided opportunities to (a) evaluate the other tasks on PALS-PreK, (b) determine the areas of the PALS-PreK that require further pilot studies, and (c) establish a more comprehensive test of beginning sound knowledge. Revisions to the PALS-PreK Beginning Sound Awareness task for this study included (a) the addition of a third sound, (b) requiring children to produce the beginning sound rather than match a picture, (c) a change in the directions to suggest a teaching opportunity, and (d) revised pictures. These changes were based upon feedback from teachers, comments from the advisory review panel committee members, and literacy-expert advice.

During the 2002–2003 academic year, a total of 289 preschool children from 12 preschools in five different geographic areas of the Commonwealth of Virginia participated in a pilot of the revised Beginning Sound Awareness task. The age range for the sample was between three years, ten months and six years, one month. The pilot resulted in positive feedback from teachers and acceptable reliability estimates on the revised task (Cronbach's $\alpha = .83$). Thus, the revised Beginning Sound Awareness task was subsequently incorporated into PALS-PreK.

Print and Word Awareness

The revised Print and Word Awareness task is a more efficient measure that takes the place of three tasks originally included in PALS-PreK Print Knowledge section: (a) Print Identification, (b) Concepts of Print, and (c) Concept of Word. In the following section, the development of the initial three tasks is outlined, followed by data informing the new Print and Word Awareness task.

According to Burns et al. (1999), one of the essential steps toward becoming a successful reader is gaining the understanding that writing represents the sounds of spoken words. Snow et al. (1998) and Burns et al. (1999) include print related skills among the many four-year-old developmental accomplishments associated with successful literacy acquisition. Specific accomplishments include children's ability to (a) recognize print in the local environment, (b) know that it is the print that is read in stories, and (c) understand that different text forms are used for different functions. The original PALS-PreK assessed these developing skills through the Print Knowledge and Concept of Word tasks.

The ability to automatically recognize significant concepts about printed material is necessary for reading acquisition (Chaney, 1992; Clay, 1977; Lomax & McGee; Saracho, 1985). Such concepts refer to knowledge about book organization (i.e., cover and orientation) and printed language (i.e., words tell the story, not the pictures; distinction between letters and words, etc.). In the original Print Knowledge task on PALS-PreK, a child was asked to demonstrate that s/he could

appropriately differentiate between print conventions such as letters, numbers, words, and pictures. Items for this task were developed based upon the *Assessment of literacy acquisition* (Invernizzi & Bloodgood, 1992) and *The observation survey of early literacy achievement* (Clay, 1993).

The original Concepts of Print task on PALS-PreK was also adapted from Clay's (1977) seminal research on assessment tools that measure children's concepts of print. In this task, a child was asked to identify basic elements of the reading process such as orientation and directionality. Items were selected based upon research recommendations for the performance expectations of preschool children, established by the National Academy of Sciences (Burns et al., 1999).

Concept of word attainment is a milestone in learning to read. Concept of word refers to the emergent reader's ability to match spoken words to written words as he or she reads a memorized rhyme or simple text (Clay, 1977; Henderson & Beers, 1980; Lomax et al., 1987; Morris, 1981; Roberts, 1992). Research has shown that a stable concept of word in text can facilitate a child's awareness of the individual sounds within words (Morris et al., 2003). Until a child can point to individual words accurately within a line of text, he or she will be unable to learn new words while reading or to attend effectively to letter-sound cues at the beginning of words in running text (Morris, 1983). The ability to fully segment all the phonemes within words appears to follow concept of word attainment. Concept of Word was also included in PALS-PreK because of its relationship to the kindergarten SOLs (K.5) for Virginia. The administration and format of the original Concept of Word task was adapted from PALS-K (Invernizzi et al., 2003).

One reason that these three tasks were modified derived from analyses of PALS-PreK data collected between 2001 and 2003 from over 9,000 children (5,510 in 2001–2002; 9,774 in 2002–2003; and 9,423 in Fall 2003) throughout the Commonwealth of Virginia: The problem identified was a lack of variance in two of the three tasks. In the original PALS-PreK, the Print Knowledge task was too easy, resulting in a ceiling effect for four year olds; that is, the distribution of scores was heavily skewed toward the highest possible score, resulting in very little variance. Conversely, the Concept of Word task was too hard, resulting in a floor effect. In other words, children scored quite low on this task, with the distribution of scores heavily skewed toward the lower end of the scale, also resulting in very little variance. As a result, a new Print and Word Awareness task was adapted from Justice & Ezell (2001) and piloted during the 2003–2004 academic year with 125 preschool children from five preschools in three different geographic areas of the Commonwealth of Virginia. The pilot included preschools randomly selected from a statewide sample. The sites that were chosen for participation represent the larger population of preschool classrooms on variables such as ethnic composition and socioeconomic status. The age range for the sample was between three years, ten months and six years, one month. The pilot resulted in positive feedback from teachers and acceptable reliability estimates (Cronbach's alpha = .73). The revised Print and Word Awareness task was subsequently incorporated into PALS-PreK.

The format of the new Print and Word Awareness task was chosen to provide an ecologically valid means of assessing print and word concepts. The task is administered in a book reading context suggestive of instruction that might occur during a Read Aloud. Like other PALS-PreK tasks, the Print and Word Awareness task is meant to be instructionally transparent.

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*Bryant, Bradley,
Maclean & Crossland
(1989) found a
significant relationship
between early
knowledge of nursery
rhymes and success in
learning to read and
spell over the next
three years.*

Rhyme Awareness

Items on this section of PALS-PreK were selected to provide an appropriate level of difficulty for preschool children (i.e., neither too difficult nor too easy) and have a strong predictive relationship with reading achievement. Developmentally appropriate pictures with a prior history in phonological awareness research were selected for the Rhyme Awareness task on PALS-PreK. The items selected met the following two criteria: first, stimuli had been used previously with preschool and primary age children to assess phonological awareness and predictive outcomes were established, and second, pictures were easily recognizable and represented age-appropriate vocabulary.

The first criterion was met by selecting stimuli from past prediction studies (Bradley et al., 1983, 1985; Swank, 1997; Wagner et al., 1987). Selecting picture templates and having an artist draw similar renderings of pictures used successfully with preschool children fulfilled the second criterion. The pictures represent high frequency, one-syllable words that are appropriate for preschool children (Bear et al., 2003). Only single-syllable, concrete words that could be represented pictorially were selected.

Nursery Rhyme Awareness

Nursery rhymes have been a staple in many young children's lives and research by Trevarthen (1986, 1987) has demonstrated that mothers recite nursery rhymes to babies as young as three months old. Qualitative research has revealed many similarities between the rhythm of nursery rhymes and the way mothers speak and sing lullabies to their infants (Glenn, Cunningham, & Joyce, 1981). Maclean, Bryant, and Bradley (1987) demonstrated that the extent of children's nursery rhyme knowledge was a powerful predictor of their growing skill in phonological awareness between the ages of three years, four months and four years, seven months. Because considerable evidence suggests that children's sensitivity to rhyme and alliteration (beginning sound) is related to their reading success several years later, Maclean et al. sought to establish a relationship between children's knowledge of nursery rhymes and their progress in learning to read several years later. Bryant et al. (1989) empirically established such a connection when they reported longitudinal data from a group of 64 children, whom they followed from age three years, four months to age six years, three months. They found a significant relationship between early knowledge of nursery rhymes and success in learning to read and spell over the next three years, "even after differences in social background, IQ, and the children's phonological skills at the start of the project" were taken into account (1989, p. 407). These researchers offered empirical support for a causal connect between knowledge of nursery rhymes and reading.

The cloze format of the Nursery Rhyme Awareness task was chosen after multiple field trials of other formats in the pilot. Children did best when provided the context of the entire stanza and when the task was administered in a socially supportive, turn-taking paradigm. The particular nursery rhymes selected are a subset of a larger set of nursery rhymes that were piloted. A nursery rhyme was removed if the item-to-total correlation was .30 or less. The remaining nursery rhymes yielded reliability estimates that were acceptable, including Cronbach's alpha (.77) and Guttman split-half reliability (.75).

Advisory Review Panel

The Code of Fair Testing Practices in Education (McLoughlin & Lewis, 2001) outlines the obligations of professionals who undertake the process of creating an assessment instrument. Included among these obligations are procedures that minimize the potential for bias or stereotyping.

The potential for bias can be minimized if assessment tools are carefully evaluated (McLoughlin et al. 2001). One procedure that protects against inappropriate instrument content is the use of an advisory review panel. Therefore, we sought the opinions of an outside review committee. This committee consisted of preschool teachers, early childhood program coordinators, university faculty members, and other educators from the Commonwealth of Virginia. The advisory review panel reviewed all the materials that were part of PALS-PreK in the winter of 2001. They were asked to provide feedback on (a) the content of the assessment, (b) the content of the teacher's manual, (c) the directions for administration and scoring, (d) the content of the screening instrument, and (e) the graphic qualities of the materials. Members of this initial advisory panel are listed in Figure 5.1.

Figure 5.1 2001 VDOE Advisory Review Panel

<p>Denise Pilgrim <i>Intervention Coordinator</i> Albemarle County</p>	<p>Kathy Grant <i>Preschool Educator</i> Charlottesville City</p>	<p>Linda Poorbaugh Virginia Department of Education</p>
<p>Sherri Smalley <i>Preschool Educator,</i> Charlottesville City</p>	<p>Dr. Bob Pianta Curry School of Education, UVA</p>	<p>Kathleen Smith Virginia Department of Education</p>
<p>Nancy Gercke <i>Preschool Program Director</i> Charlottesville City</p>	<p>Dr. Jane Hansen Curry School of Education, UVA</p>	
	<p>Dr. Laura Justice Curry School of Education, UVA</p>	

A second advisory panel was convened in the summer of 2003 to review PALS-PreK materials item by item, with an eye toward examining items for difficulty, bias, clarity, and consistency. Members of this panel evaluated items individually, discussed their evaluations with the entire panel in a group format, and provided feedback to the PALS staff in a single day-long session in Charlottesville. Members of the 2003 advisory review panel are listed in Figure 5.2.

Figure 5.2 2003 PALS-PreK Advisory Review Panel

Denise Pilgrim Instructional Coordinator Albemarle County	Dr. Jane Hansen Curry School of Education, UVA	Vicky Alley Assistant Head of Lower School St. Christopher's School Richmond
Patricia Marhelski Preschool Educator Pittsylvania County	Dr. Laura Justice Curry School of Education, UVA	Linda Drake Director/Educator Southampton County
Nancy Mast Supervisor, Remedial Education Rockingham County	Gail Barnes Virginia Department of Education	Heidi Lohr Preschool Educator Madison County
Kathy Grant Preschool Educator Charlottesville City	Susan Elliott Head Preschool Educator Shenandoah Head Start	Cindy Hutchinson Director Presbyterian Preschool Richmond
Janet Mauck Preschool Educator Presbyterian Preschool Richmond	Robyn Davis Preschool Educator Charlottesville City	

Pilot Studies

In addition to examining annual data each year, four distinct pilots have been conducted. The demographics of participants in each pilot are presented in Table 5.1. Descriptive statistics from Pilots 1, 2, and 3 are presented in Table 5.2, and descriptives for Pilot 4 are presented in Table 5.3. Following is a brief description of each pilot.

Pilot 1 (2000)

An initial pilot study of the PALS-PreK tasks was conducted in the Spring of 2000. This pilot included 56 children from five Virginia preschools (see Table 5.1). Ages of the participating children ranged from four years, one month to five years, eight months. The major goals of this pilot study were to gain information about preschool children's performance on the PALS-PreK tasks and to evaluate the administration procedures. The original tasks included Rhyme Awareness, Beginning Sound Awareness, Upper-Case Alphabet Recognition, Lower-Case Alphabet Recognition, Print Knowledge, and Name Writing. Table 5.2 shows the descriptive data from this pilot. Based on these results, revisions to PALS-PreK were made and a second pilot was conducted.

Pilot 2 (2000–2001)

During the 2000–2001 academic year, 251 preschool children from the Commonwealth of Virginia participated in the second PALS-PreK pilot study. The preschools were randomly selected from a state and local sample. The age ranges for this sample were between four years, two months and five years, nine months. The sites that were chosen for participation represented the larger population of preschool classrooms on variables such as ethnic composition and socioeconomic status.

Revisions to PALS-PreK for this pilot included: (a) adding the Verbal Memory task, (b) updating the Print Knowledge task to include the print identification

Table 5.1 Demographics of Participants in Pilot Studies

Pilot	Gender		Ethnicity				Free/Reduced Lunch	
	Male	Female	African American	Caucasian	Hispanic	Other	Free/Reduced	Regular Price
Pilot 1: 2000 (<i>n</i> = 56)	28 (50%)	28 (50%)	21 (38%)	30 (54%)	2 (4%)	3 (5%)	—	—
Pilot 2: 2000–2001 (<i>n</i> = 251)	124 (49%)	127 (51%)	113 (45%)	125 (50%)	5 (3%)	8 (3%)	147 (60%)	99 (40%)
Pilot 3:* 2002–2003 (<i>n</i> = 289)	107 (49%)	111 (51%)	54 (25%)	147 (68%)	8 (4%)	7 (3%)	200 (69%)	89 (31%)
Pilot 4: 2003–2004 (<i>n</i> = 138)	70 (51%)	68 (49%)	23 (17%)	107 (78%)	4 (3%)	4 (3%)	73 (53%)	65 (47%)
TOTAL of all Pilot Samples	329 (50%)	334 (50%)	211 (32%)	409 (62%)	19 (3%)	22 (3%)	420 (62%)	253 (38%)

*Note: In the 2002–2003 pilot, demographic information was not reported on 71 children.

Table 5.2 Task Means and Standard Deviations for Pilots 1, 2, and 3

PALS-PreK 2000–2003 Screening Tasks (maximum)							
Pilot	Rhyme (10)	Beginning Sound (10)	Upper-Case Alphabet (26)	Print Knowledge (10)	Verbal Memory (18)	Concept of Word (24)	Name Writing (7)
1	5.95 (2.6)	6.96 (2.7)	18.5 (8.6)	4.13 (1.8)	n/a	n/a	3.95 (1.21)
2	6.93 (2.8)	7.87 (2.4)	18.87 (8.2)	15.57 (2.4)	8.23 (2.1)	16.09 (7.11)	6.01 (1.45)
3	6.93 (2.8)	7.42 (2.8)*	17.46 (8.8)	8.02 (2.3)	16.02 (2.9)	15.32 (7.8)	6.14 (1.6)

*Note: The Beginning Sound statistics in Pilot 3 are based on the revised Beginning Sound Awareness task that is now included in PALS-PreK.

component, (c) adding the Concept of Word task, and (d) modifying the Name Writing task by increasing the score range and adding the self-portrait component. Other modifications included revising pictures in the Rhyme Awareness and Beginning Sound Awareness tasks, and changing the instrument to include the Administration Booklet for better organization of assessment materials. These were based upon feedback from teachers, comments from the review committee, and literacy-expert advice. Descriptive information from this pilot is reported in Table 5.2.

Pilot 3 (2002–2003)

One pilot was conducted across the 2002–2003 school year for the purposes of revising tasks and establishing the necessary psychometric properties for PALS-PreK. In particular, three different formats of the Beginning Sound Awareness task were examined. The entire PALS-PreK assessment, along with one of three new Beginning Sound Awareness tasks, was given to 287 preschool children. The preschools were randomly selected from a statewide sample; children were from

Corrected alpha levels for the four revised tasks ranged from 0.75 to 0.93, which supports the reliability and appropriateness of the revised instrument.

one of 14 preschools across five geographic regions of the Commonwealth. The sites that were chosen for participation represent the larger population of preschool classrooms on variables such as ethnic composition and socioeconomic status. The age of participants ranged from three years, ten months to six years, one month. As mentioned previously under Item Development and Field Testing, one result of this pilot was the selection of a revised Beginning Sound Awareness task, based on positive qualitative feedback from teachers and acceptable reliability estimates (Cronbach's alpha = .83).

In summary, the 2002–2003 pilot of the PALS-PreK Beginning Sound Awareness task provided opportunities to (a) evaluate the other tasks on PALS-PreK, (b) determine the areas of PALS-PreK that required further pilot studies, and (c) establish a more comprehensive test of beginning sound knowledge.

Pilot 4 (2003–2004)

The 2003–2004 pilots of PALS-PreK provided the opportunity to test and confirm changes made on four of the original tasks included in PALS-PreK. In particular, we examined item-level statistics for the revised Rhyme Awareness task, the revised Beginning Sound Awareness task, the adjusted Print and Word Awareness task, and the new Nursery Rhyme Awareness task. Items with extreme difficulty levels or low reliability estimates (Cronbach's alpha) were excluded, leaving only appropriately challenging items for preschool children. Corrected alpha levels for the four revised tasks ranged from 0.75 to 0.93, which supports the reliability and appropriateness of the revised instrument.

The 2003–2004 pilot of the PALS-PreK instrument also provided opportunities to determine inter-rater reliability and concurrent validity. Statistical analyses show that pilot results were fairly consistent for males and females across a diverse sample of school programs (i.e. public, private, and Head Start) and different ethnicities. In addition, the pilot provided opportunities to demonstrate that all seven tasks included in the revised PALS-PreK can be scored accurately and reliably.

Across the 2003–2004 academic year, several changes were made to PALS-PreK. First, the Rhyme Awareness task was revised with the inclusion of several more appropriate pictures. Second, the sorting format used in the Beginning Sound Awareness task was changed to a simpler production format. Third, the Concept of Word and Print Knowledge tasks were combined into one task referred to now as Print and Word Awareness. Lastly, the Letter Sounds task was added as an option for children who receive exceptional scores on the Alphabet Recognition tasks. Verbal Memory was removed and replaced with the Nursery Rhyme Awareness task.

In order to document the technical adequacy of these changes, a pilot was completed to test the reliability and validity of the entire revised PALS-PreK

Table 5.3 Task Means and Standard Deviations for Pilot 4

Revised PALS-PreK Tasks (maximum)						
Pilot	Rhyme (10)	Beginning Sound (10)	Upper-Case Alphabet (26)	Print and Word Awareness (10)	Nursery Rhyme Awareness (12)	Name Writing (7)
4	7.94 (2.6)	8.58 (3.0)	17.45 (9.1)	8.50 (1.6)	8.12 (2.7)*	5.48 (2.0)

*Note: These statistics were computed before the Nursery Rhyme Awareness task was reduced to a 10-item task.

instrument. Over the course of two months, 138 children from four different preschools were assessed on each PALS-PreK task. Of the 138 children, 53% attended Head Start and 47% attended another publicly funded preschool. Additionally, 49% of the preschoolers were female and 51% were male. The pilot sample was also diverse in ethnicity; 78% of participants were Caucasian, 17% African American, 3% Hispanic, and 3% another ethnicity. Results from this pilot, including estimates of reliability and validity, are described in the following section on Technical Adequacy.

Reliability refers to the consistency with which a test (or subtest) measures a given construct. Two forms of reliability have been examined with respect to PALS-PreK: internal consistency and inter-rater reliability.

Technical Adequacy and Reliability

Internal Consistency

Reliability for PALS-PreK tasks was assessed by examining the internal consistency of the scale using Guttman split-half reliability and Cronbach's alpha level. Guttman split-half explores the degree of internal consistency by randomly separating the task items in half and testing the similarity or relation between the two halves. Ideally, perfect reliability of task items using Guttman split-half is 1.00. Internal consistency was also assessed using Cronbach's alpha, which is an index of internal consistency based on the average correlation of tasks within a screening instrument (Mehrens & Lehmann, 1987). A Cronbach's alpha level of 1.00 is an indication of perfect internal consistency. In the 2003–2004 pilot, Cronbach's alpha levels, Guttman split-half, and inter-rater reliability statistics were explored for each PALS-PreK task. Internal consistency estimates for PALS-PreK tasks are presented in Table 5.4. As can be seen in the table, the internal consistency estimates for all PALS-PreK tasks were in an acceptable range.

Inter-rater reliability

Inter-rater reliability was assessed to determine the extent to which two different individuals would score PALS-PreK tasks the same. This was accomplished by having two separate and independent raters score tasks as they were administered. Inter-rater reliability estimates, expressed as Pearson correlation coefficients, are also presented in Table 5.4.

Table 5.4 Internal Consistency and Inter-Rater Reliability Estimates for PALS-PreK Tasks

Task	2003–2004 Pilot Sample	Cronbach's alpha	Guttman split-half	Inter-rater Reliability
Name Writing	$n = 99$	n/a	—	.99
Alphabet Knowledge	$n = 138$	n/a	—	Upper-Case .99 Lower-Case .99
Beginning Sound	$n = 126$	.93	.94	.99
Rhyme	$n = 126$	.84	.87	.99
Print and Word Awareness	$n = 125$	.75	.71	—
Nursery Rhyme Awareness	$n = 99$	.77	.75	.99

Reliabilities for PALS-PreK tasks were also determined for grade, gender, SES, and ethnicity using data generated from the 2003–2004 pilot study. Task reliabilities were determined once again using Cronbach's alpha, an index of internal consistency based on the average correlation of tasks within a screening instrument (Badian, 2000; Mehrens et al., 1987). Alpha coefficients within demographic groups were consistent with alphas obtained for the entire sample, suggesting that PALS-PreK tasks are stable across a broad representation of children.

Internet Data Entry Reliability

In the Commonwealth of Virginia, preschool teachers or preschool directors enter PALS-PreK scores via the Internet into a password-protected, securely encrypted, relational database. The reliability of data entry into the Internet database was checked against the original hand-scored Class Summary Sheets for a randomly-selected ten percent sample of the entire database. The total number of child records sampled in 2003 was 1189. There were 11 possible data fields for each of the 1189 child records resulting in a potential to err in 13,079 fields. The reliability check indicated that in 2003 there were 100 errors in the 13,079-field sample. The resulting error rate for 2003 was .76%. Thus, the accuracy rate for PALS-PreK data entry for 2003 was 99.24 %.

Validity

In general terms, validity refers to the extent to which one can trust that a test measures what it is intended to measure. But a test is not said to be valid or not valid in isolation. Instead, a test must be assessed for evidence of validity in relation to the specific purpose for which it is used with a given population. Thus, for PALS-PreK three types of validity have been evaluated through our pilots and our examination of statewide data. In the following sections, we describe evidence of (a) content validity, (b) construct validity, and (c) criterion-related validity, both concurrent and predictive, for PALS-PreK.

Content Validity

Content validity is the degree to which the sample of items and tasks provides a relevant and representative sample of the content addressed (Gronlund, 1985). To maximize content validity for tasks in PALS-PreK, special care was taken during item selection to include items that represent the subject matter being assessed. The research literature identifies two levels of phonological awareness: rhyme awareness and phonemic awareness (Swank, 1991; Yopp, 1988). Both of these levels are represented in the Rhyme and Beginning Sound Awareness tasks of PALS-PreK. The same effort was applied to the literacy screening tasks. To assess alphabet recognition, for example, all 26 letters of the alphabet were included. In the Print and Word Awareness task, children are asked to point to certain aspects of print in a simple rhyming book, and their pointing responses are scored according to item-specific guidelines. To ensure the Nursery Rhyme Awareness task contains a representative sample of nursery rhymes with which most four year olds would be at least familiar, a corpus of 30 nursery rhymes was piloted. The ten selected for PALS-PreK were those that yielded the best alpha coefficients, indicating an absence of floor effects. The content validity of PALS-PreK is also supported by the review of PALS-PreK items by an advisory panel composed of experts in early literacy development.

Construct Validity

Construct validity refers to the degree to which the underlying traits of an assessment can be identified and the extent to which these traits reflect the theoretical model on which the assessment was based. Factor analysis for the entire sample of the spring pilot yielded one factor with an eigenvalue of 2.9. The single factor solution suggests that PALS-PreK measures a unitary trait: emergent literacy. These results are in keeping with PALS-K and Perney, Morris, and Carter's (1997) research that also yielded a single factor. The PALS-PreK factor accounts for 34% to 76% of the total variance in the children's scores across all tasks in both the phonological awareness and literacy screening components of PALS-PreK.

Criterion-Related Validity

Criterion-related validity refers to the relationship between the scores on an instrument and an external measure. It is important to check the performance of any assessment against a criterion or standard. There are two types of criterion-related validity (a) concurrent, and (b) predictive validity.

Concurrent Validity

Concurrent validity refers to how well an assessment relates to an existing criterion measure or standard (Sattler, 1988). Sawyer's *Test of Awareness of Language Segments* (TALS) (1987), Part A; and High/Scope's *Child Observation Record* (COR) (1992) and the *Test of Early Reading Ability* (TERA-3) (2001) were the three independent measures against which PALS-PreK was compared.

TALS *The Test of Awareness of Language Segments* (TALS) (Sawyer, 1987) measures a young child's ability to segment spoken language into words, syllables, and phonemes. Decades of research have shown that children who are able to segment speech perform better on other measures of reading achievement. This assessment is designed to aid teachers in identifying the type of reading instruction a child between the ages of four years, six months and seven years might be ready to experience. In 2000–2001 (Pilot 2), the correlation between the PALS-PreK tasks and the TALS Part A was medium-low but significant ($r = .41, p < .01; n = 87$).

COR *The Child Observation Record* (COR) (1992) is the anecdotal evaluation of the High/Scope preschool curriculum. This evaluation is given to children ages two years, seven months and six years and is based upon teacher observations of an individual child's developmental progress during preschool. The COR assesses many facets of early childhood development ranging from social to academic. The language and literacy component of the COR was used for this validation study. This component included the teachers' evaluations of the following preschool skills (a) knowledge about books, (b) beginning reading (i.e., recognizes some letters), and (c) beginning writing. In 2000–2001 (Pilot 2), the correlation between the PALS-PreK Summed Score and the COR was medium-high and significant ($r = .71, p < .01; n = 70$).

TERA-3 *The Test of Early Reading Ability* (TERA-3) (2001) is a direct measure of the reading ability of children between the ages of three and six years. The TERA-3 does not assess the child's readiness to read; rather it assesses their mastery of early developing reading skills. The examiner tests the child on three subtests: Alphabet, Conventions, and Meaning. Alphabet simply measures the child's knowledge of the

Factor analysis for the entire sample of the spring pilot yielded one factor with an eigenvalue of 2.9.

The single factor solution suggests that PALS-PreK measures a unitary trait: emergent literacy.

alphabet and its uses. Conventions measures knowledge of the conventions of print, and Meaning assesses the child's construction of meaning from print. In 2003–2004 (Pilot 4), the correlation between the revised version of PALS-PreK and the TERA-3 was medium-high and significant ($r = .67, p < .01; n = 73$).

Predictive Validity

Predictive validity refers to the relationship between scores on an assessment and the performance on a relevant measure where there is a time interval between the assessment administration and the standard measure given (Sattler, 1988). Forty-one participants from the first pilot of PALS-PreK (Spring 2000) were reassessed in the fall of their kindergarten year with PALS-K (Invernizzi, et al., 2003). The correlation between the spring PALS-PreK Summed Scores and subsequent fall PALS-K Summed Scores was high and significant ($r = .91, p < .01$). Multiple regression analyses indicated that the core tasks on PALS-PreK significantly predicted a large portion of the variance in fall performance on PALS-K ($R^2 = .84$).

In 2003–2004, a longitudinal data analysis was conducted on 3,106 children who were assessed with PALS-PreK in Spring 2002 and then a year later assessed with PALS-K in Spring 2003. The correlation between spring PALS-PreK Summed Scores and subsequent spring PALS-K Summed Scores was moderately high and significant ($r = .53, p < .01$). Multiple regression analyses indicated that overall PALS-PreK significantly predicted variance in spring performance on PALS-K ($R^2 = .305$).

In 2003–2004, a second longitudinal data analysis was conducted on 2,574 children who were assessed with PALS-PreK in Spring 2002 and then a year and a half later reassessed with PALS 1–3 in the fall of their first grade year. The correlation between spring PALS-PreK Summed Scores and subsequent fall PALS 1–3 first-grade Summed Scores was moderately high and significant ($r = .56, p < .01$). Multiple regression analyses indicated that overall PALS-PreK significantly predicted variance in fall first-grade performance PALS 1–3 ($R^2 = .342$).

Relationship Among PALS-PreK, PALS-K, and PALS 1–3 Scores

We have examined the relationship between children's PALS-PreK scores and their performance on subsequent assessments using PALS-K in kindergarten and PALS 1–3 in first grade in several ways. It is important to note two cautions about these analyses. First, PALS-PreK was designed as a diagnostic tool to help guide teachers' literacy instruction. This stands in contrast to PALS-K and PALS 1–3, which were designed to serve a screening function in identifying children who probably need additional instruction beyond that typically provided in classroom literacy instruction. Thus, we would not expect PALS-PreK scores to align perfectly with PALS-K and PALS 1–3 Identified or Not-identified designations. Second, caution is in order in interpreting these relationships due to the particularly uneven nature of children's development at earlier ages (Bowman et al., 2001; Campbell, 1998). For example, some children who achieve relatively low scores on PALS-PreK tasks will improve relatively quickly in response to normal instruction as they progress through preschool and kindergarten. Despite these caveats, some degree of consistency is evident across time. For example, as can be seen in Table 5.5, the correlations between Summed Scores on PALS-PreK, PALS-K, and PALS 1–3 are moderate to high across time.

Table 5.5 Correlations Between PALS-PreK, PALS-K, and PALS 1–3 Summed Score

	PreK Spring	K Fall	K Spring	First Grade Fall
PreK Fall	.62	.57	.39	.49
PreK Spring	—	.74	.53	.56
K Fall		—	.59	.66
K Spring			—	.77

* $p < .001$ in all cases

Predicting Future PALS Identification

We further examined the predictive power of PALS-PreK scores in relation to children's identification for additional instruction at later screenings using PALS-K and PALS 1–3. Again, we urge extreme caution in over-interpreting these analyses, as the functions for which the instruments were designed are different. Specifically, two separate discriminant function analyses were conducted to evaluate the extent to which Fall 2001 PALS-PreK task scores would predict children's status (Identified or Not-identified) in Fall 2002 (PALS-K) and Fall 2003 (PALS 1–3). The results of these discriminant analyses, shown in Tables 5.6 and 5.7, show that PALS-PreK task scores resulted in a discriminant function that accurately classified 86.5% of children as Identified or Not-identified on PALS-K the following fall, and accurately classified 75.3% of children as Identified or Not-identified on PALS 1–3 two years later in Fall 2003. In both discriminant analyses, the Upper-Case Alphabet Recognition task contributed the most to the discriminant function, followed by the Name Writing task.

Note that in both cases, the vast majority of the prediction accuracy was associated with the group whose higher PALS-PreK scores suggested a positive outcome. Children with higher PALS-PreK scores were more likely to achieve PALS benchmarks in kindergarten and first grade.

Finally, we attempted to capture a range of performance on PALS-PreK tasks that would offer some predictive power with regard to later PALS performance. With the caveat that the course of literacy development is quite uneven and sporadic at this early age, we determined that there were certain ranges of performance on PALS-PreK tasks that seemed clearly associated with children's need for additional instruction one and two years later. Table 5.8 provides the mean scores on the original, unrevised PALS-PreK tasks for groups of children who were or were not identified as needing additional instruction in kindergarten and first grade.

In this table it is apparent that children who met PALS benchmarks in kindergarten or first grade had obtained a mean summed score of about 56 on PALS-PreK 2001. In contrast, children identified as needing additional instruction on PALS-K had obtained a mean score of about 38 on PALS-PreK the previous year. Children identified as needing additional instruction in first grade had obtained a mean score of about 42 on PALS-PreK. Note that all of these data precede the pilot studies reported above which led to the revision of PALS-PreK and the current revised edition. Therefore, the Summed Scores reported in Table 5.8 no longer apply.

Children with higher PALS-PreK scores were more likely to achieve PALS benchmarks in kindergarten and first grade.

Table 5.6 Discriminant Analysis for Fall 2001 PALS-PreK Tasks Scores Predicting Fall 2002 PALS-K Identification Status

Fall 2002 Identification Status	Predicted Group Membership	
	Not-identified	Identified
Not-identified	1,285 (73.1%)	41 (2.3%)
Identified	393 (22.3%)	39 (2.2%)

NOTE: 75.3% of cases correctly classified

Table 5.7 Discriminant Analysis for Fall 2001 PALS-PreK Task Scores Predicting Fall 2003 PALS 1–3 Identification Status

Fall 2003 Identification Status	Predicted Group Membership	
	Not-identified	Identified
Not-identified	1,838 (85.5%)	27 (1.3%)
Identified	263 (12.2%)	21 (1.0%)

NOTE: 86.5% of cases correctly classified

Particularly noteworthy are the tasks with the highest discrepancies between children later identified as needing additional instruction and those not so identified. For example, the discrepancy between later Identified and Not-identified children on the PALS-PreK Alphabet Knowledge task was substantial: 8.27 versus 1.81 for kindergarten children not identified and identified, respectively, and 8.24 versus 3.14 for first-grade children not identified and identified. Name Writing was the second most discrepant task, with means of 4.11 versus 2.49 for kindergarten Not-identified and Identified children, and 4.10 versus 2.85 for first-grade children. Note that these discrepant task scores are consistent with the discriminant function analyses, which suggested that the Alphabet Recognition and Name Writing tasks contributed most to the discrimination between groups.

Establishing Spring Developmental Ranges

PALS-PreK provides spring developmental ranges of expectations for four-year-old programs only. These developmental ranges were established to provide educators with a general sense of where four-year-old children might be if they are on the typical path of literacy development associated with successful later reading. It may not be appropriate to use these ranges to “identify” students; they are intended to help teachers target and plan future literacy instruction.

Developmental ranges are based on analysis of several data sources, including data from the earlier version of PALS-PreK from 1999 through 2003, data from the last 4 pilots, and longitudinal analyses of data from students with PALS-PreK data who have subsequently been screened with PALS-K or PALS 1–3 in later years. We have further taken into account the benchmarks for PALS-K in establishing the PALS-PreK developmental ranges. Moreover, spring PALS-PreK scores and subsequent fall PALS-K scores have been shown to be moderately to highly correlated ($r = .91$, $n = 41$ in a 2000 pilot; $r = .74$, $n = 3,104$ in 2002 statewide data).

One method for verifying developmental ranges has been to examine the PALS-PreK scores of children who were later found to be reading successfully in

Table 5.8 Mean (sd) PALS-PreK Scores for Children Later Identified and Not-identified in Kindergarten and First Grade

Fall 2001 PALS-PreK Tasks (maximum)	Fall 2002 PALS-K Identification (Kindergarten)		Fall 2003 PALS 1–3 Identification (First Grade)	
	Not-identified (<i>n</i> = 1,886)	Identified (<i>n</i> = 285)	Not-identified (<i>n</i> = 1,336)	Identified (<i>n</i> = 438)
Rhyme (10)	5.02 (2.66)	3.64 (2.01)	5.04 (2.64)	3.86 (2.15)
Upper-Case Alphabet (26)	8.27 (8.35)	1.81 (3.32)	8.24 (8.48)	3.14 (4.45)
Lower-Case Alphabet (26)	4.05 (7.32)	0.42 (2.36)	4.12 (7.47)	0.61 (2.67)
Beginning Sound (10)	5.98 (2.33)	4.96 (2.30)	5.99 (2.38)	5.22 (2.14)
Verbal Memory* (18)	14.90 (3.57)	12.53 (4.53)	14.94 (3.54)	13.32 (4.16)
Print Knowledge* (10)	6.33 (2.25)	4.75 (2.08)	6.35 (2.27)	5.27 (2.16)
Concept of Word* (24)	11.17 (7.18)	7.56 (6.38)	11.25 (7.24)	8.24 (6.42)
Name Writing (7)	4.11 (2.11)	2.49 (1.79)	4.10 (2.12)	2.85 (1.89)
Summed Score (105)	55.77 (18.91)	37.76 (13.38)	55.87 (19.36)	41.99 (13.77)

* Verbal Memory, Print Knowledge and Concept of Word tasks were replaced by a single task, Print and Word Awareness, in the revised PALS-PreK.

first grade. In a preliminary examination, for example, we looked at the PALS-PreK scores of students who were successful readers in fall of first grade, defined by their scores on the PALS 1–3 preprimer word list, their overall Entry Level Summed Score, and their oral reading accuracy. We then examined the pattern of scores these students had achieved on PALS-PreK tasks a year and a half earlier, and further divided these scores into percentiles to capture as fully as possible the range of PALS-PreK scores achieved by students who would later become successful readers. In this analysis, we found that PALS-PreK scores within the spring developmental ranges appearing in Table 5.9 were typical of students in the bottom quartile of those who were later defined as successful readers in first grade. That is, preschool children scoring within these developmental ranges tended to be those who just met the definition of successful reader in the fall of first grade. We caution that this is a preliminary analysis based on approximately 350 children, but suggest that it offers some evidence that these developmental ranges tend to be associated with successful reading achievement in subsequent years.

This analysis raises two additional cautions. First, we reiterate that students scoring below the developmental range on one or more PALS-PreK tasks should not necessarily be assumed to be “at risk” or otherwise in danger of failing to learn to read. Again, the purpose of PALS-PreK is to provide information to educators to help guide their curriculum planning. Second, many students will meet or exceed these developmental ranges, but this does not imply that these children do not need additional literacy instruction. There are many skills and building blocks toward successful literacy development that must accumulate throughout children’s early schooling, and the domains assessed on PALS-PreK are merely representative of the beginning steps.

One method for verifying developmental ranges has been to examine the PALS-PreK scores of children who were later found to be reading successfully in first grade.

Table 5.9 Spring Developmental Ranges

PALS-PreK Tasks	Spring Developmental Range	Maximum Score
Name Writing	5–7	7
Upper-Case Alphabet	12–21	26
Lower-Case Alphabet	9–17	26
Letter Sounds	4–8	26
Beginning Sound	5–8	10
Print and Word Awareness	7–9	10
Rhyme Awareness	5–7	10
Nursery Rhyme Awareness	6–10	10

Summary

PALS-PreK has been designed to provide educators with information that will help guide the planning and delivery of early literacy instruction. Pilot data and data from regular screenings in Virginia's preschools provide evidence of the reliability (including internal consistency and inter-rater reliability) and validity (including content, construct, and criterion-related validity) of PALS-PreK for the purposes for which it was intended. Spring developmental ranges suggesting a range of performance that may be associated with later reading achievement provide a general guide for educators as they use PALS-PreK to guide the planning and implementation of early literacy instruction.

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